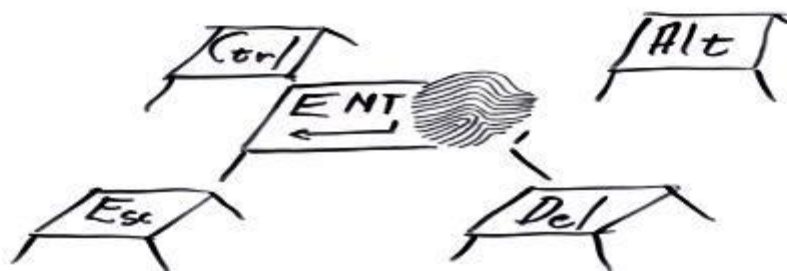


## PROPAGANDA

Will Information Out-Evolve Us?

Our ridiculous expectations of genetics, IT and conservation



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# PROPAGANDA: Will Information Out-Evolve Us?

## CONTENTS

0	Short
1	Why Wake?
2	For Your Information
3	Crystal Gazing: a Vital Side Issue
4	Energy and Info Get Together
5	Information Leaks Out
6	Energy Takes Off
7	IT's Pathetic Beginnings
8	Designer Stupid
9	Better Babies – a Flash in the Pan
10	The Game They Play in Heaven
11	Happy Families – a Laugh a Minute
12	A Special Talent
13	Liberation – Coming Ready or Not
14	Propaganda
15	Cute is Fit – For Information Too
16	What the Bearded One Thinks
17	Bit Part: What to Do?
18	The Greater Tit – a Better Life?
19	Mouse-Hugging: Luxury in the Wilderness
20	Be Reasonable
21	New New Underwater Glue
22	Wash Your Mouth Out
23	Instructions and Instructors
24	Thingocracy
25	Art with a Capital A
26	Tell That to the Judge
27	So Special
28	Fact or Fiction?
29	Prehistory
	Books
	Book Club Questions
	Author
	Back Cover
	Website and Acknowledgements

**Short**  
**(the non-compulsory intro)**

*Tell 'em what you're going to tell 'em*

*Then tell 'em.*

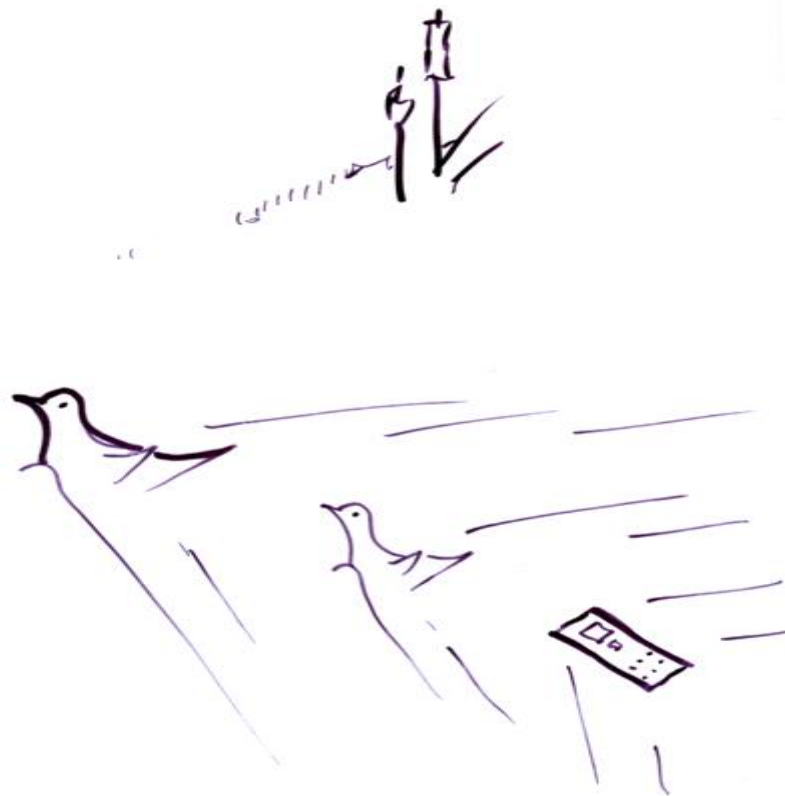
*Then tell 'em what you told 'em.*

*Mark Twain*

No, not for books – you can read back and forwards yourself. I won't repeat.

Much.

So this book is short. This suits my short attention span, and makes it a bargain in shops that sell books by the kilogram.



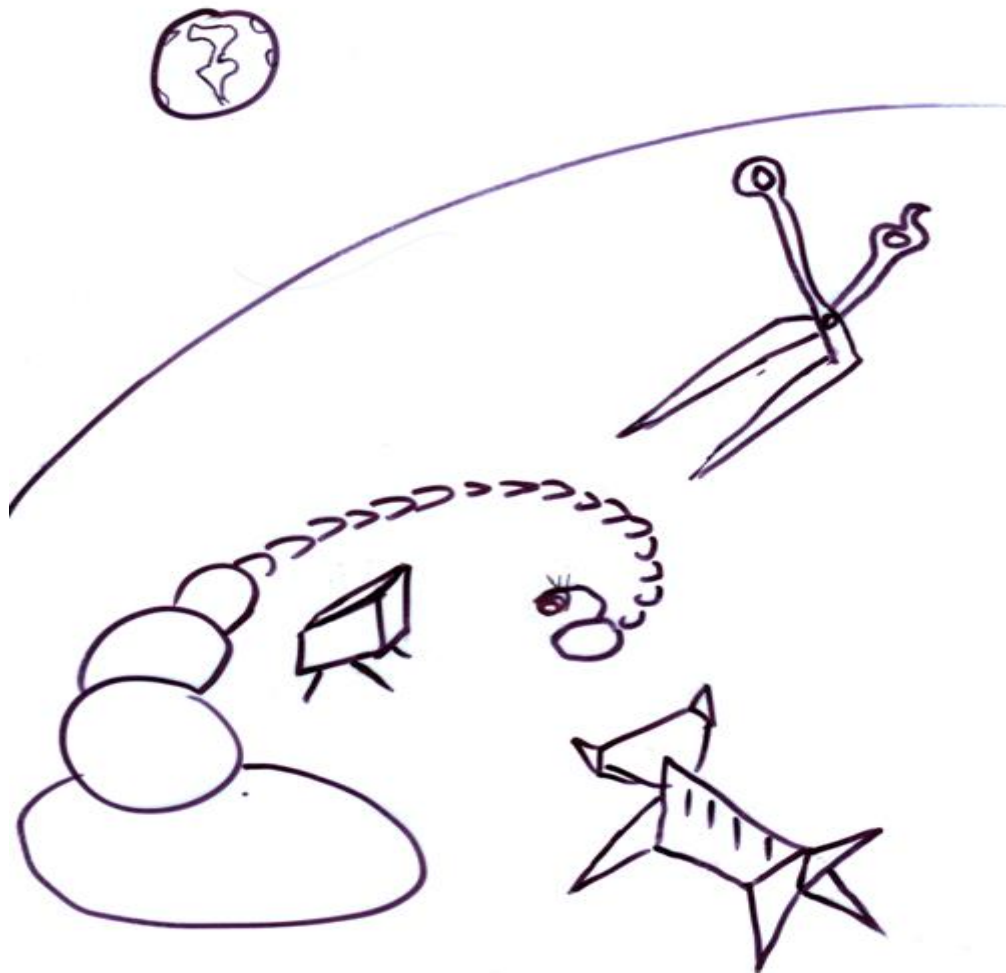
# 1 Why Wake?

## A fairytale of conservation after biology

Ideas, or information if you like, have been around for Billennia.

Information was there before life woke, and it will party on after life's funeral wake.

And meanwhile we are making a wake: radio-waves of the 1951 episodes of "I Love Lucy" are still beaming live to the waiting universe. We never heard what Alpha Centauri thought of them in 1955. Just as well, probably.



## 2 For your Information

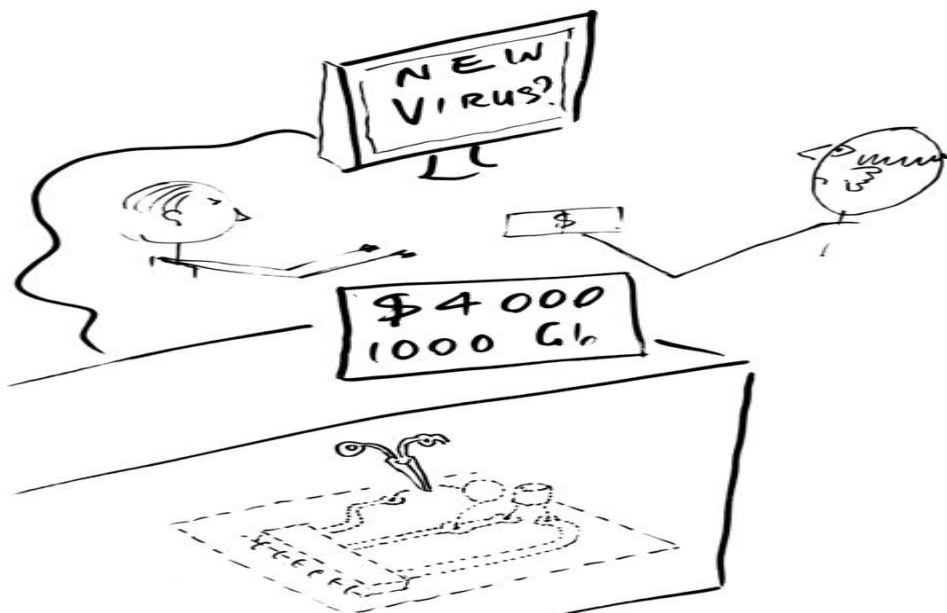
This is the kind of book that complete nut cases write. So should you pick it up from the fiction section or not?

In my opinion I am not nuts, but you can decide that.

The basic idea is that information and energy have been getting together in very interesting ways over the last three and a half billion years. Humans are one of the products and can now act, reason, have emotions, and pass all this on, possibly for all of eternity or at least for longer than a politician can imagine.

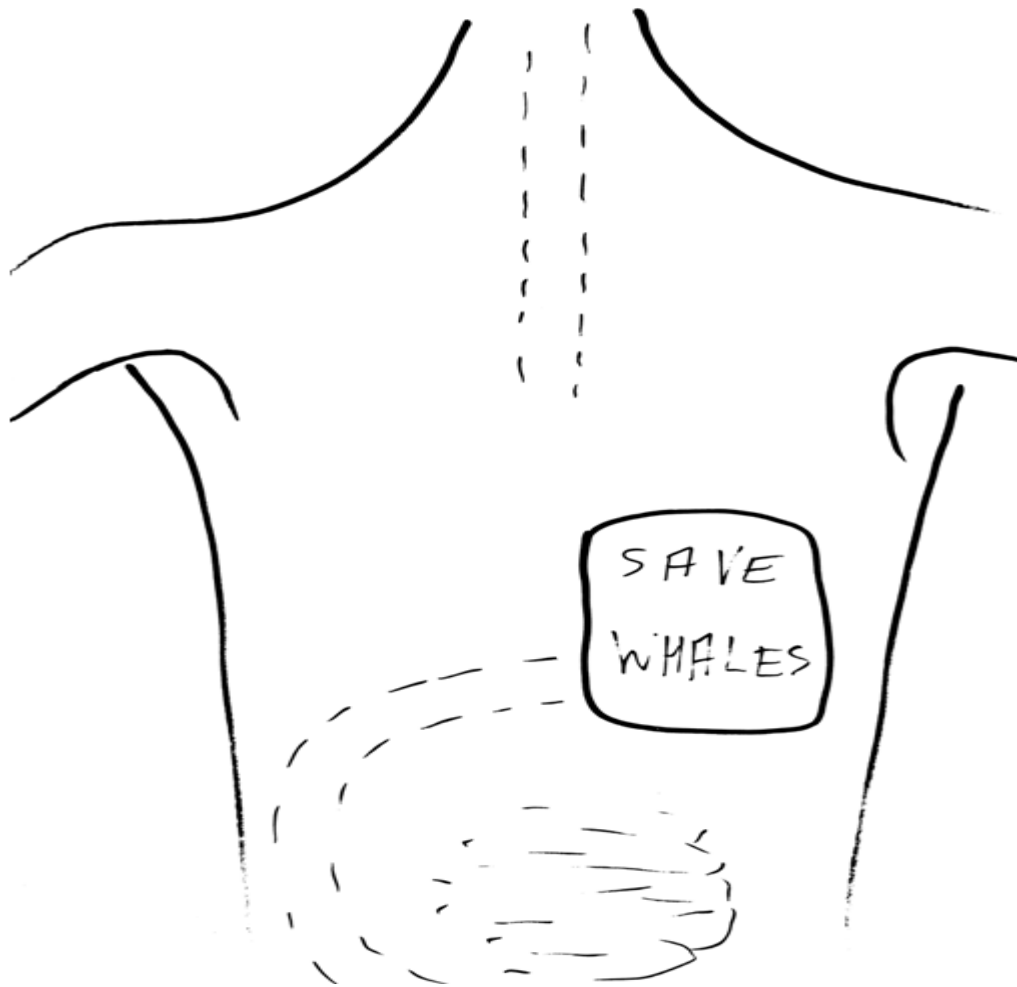
But the information and energy that created us have no special need to remain in humans, and they are progressively finding ways of doing without us. AND WE LOVE IT.

We are each individually and enthusiastically funding the departure of information and energy from humans and other life. Every time we make new machines to do something for us, we love them, and buy millions of them. Mind you these machines are still pretty pathetic - when was there ever a printer that could do the mind-bogglingly simple task of getting new paper? But they are here, and welcomed.



Right now, we are having the biotech revolution. Already people can have nasty genetic disorders fixed, or choose the sex of their kids. What other tinkering could we do? Advances are simply a matter of money and time, but will we ever reach the starry heights that we imagine? Maybe the basic plan of life is just flawed.

Much quicker and easier, is to replace parts of ourselves with machines. We do this every time that it suits us, from the bionic backside (or colostomy bag) through to the bionic ear. Whatever replacements happen, will happen because of our special talent for doing things that suit us as individuals, irrespective of whether they are good for humans in general or the planet.



Those of you who are religious might wonder whether your god(s) would intervene to stop all this. Of course, this all depends on which, if any, of your gods is the one true god – Hindu, Christian, Moslem, etc etc etc etc etc etc etc. So, for the moment, working out how a possible god might possibly react is in the too-hard basket. In the meantime humans may wish to change the way they act. Should we simply accept that we are going to become irrelevant, and get on with enjoying our obsolescence? Or should we cherish whatever is special in life, and start to look after it as we have never ever done before?

*What did he just say?*



*Chip: About information. It started life up, and humans will help it escape. I wouldn't mind escaping this smelly backpack.*

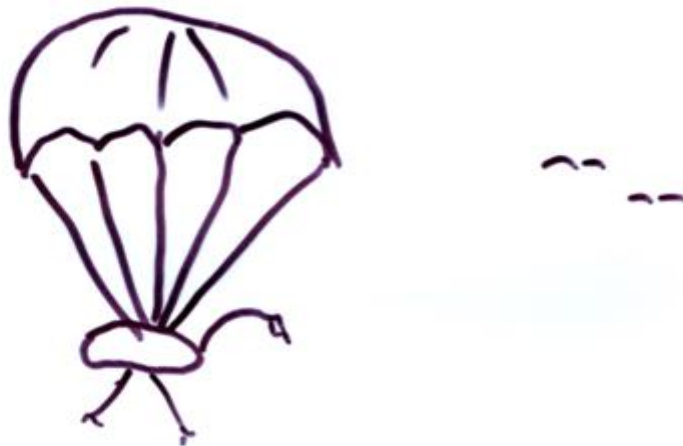


### 3 Crystal Gazing – a Vital Side Issue

*“Heavier than air flying machines are not possible”*

*Lord Kelvin, 1895*

But can we really predict the future? In 1895 it was said that “Heavier than air flying machines are not possible”. This pronouncement came from Lord Kelvin himself - the famous physicist and inventor of the fridge. Sure, old Kelvin’s fridges don’t often fly, but he had obviously never seen a bird, or had one of his students throw a paper dart at him. About 20 years later, the first planes were fighting in World War I.



We are lousy at forecasting the really big changes that we cause ourselves. A computing pioneer, von Neumann, said that predictions about computers sound silly five years later when the technology has exceeded all expectations. Since 1949, computers have done this again and again. But like the birds and the paper darts, the signs of the future are usually staring us in the face if we want to stare back at them.



Complete ignorance has never stopped humans doing anything, and soothsaying the future is no exception to this wild over-enthusiasm.

Every good fun-fair has to have a fortune teller, so there must be lots of seers and clairvoyants. What does that tell you? That it must be easy to do. Yes, easy. Note that I didn't say "easy to tell fortunes" but "easy to be a fortune teller".

First step, get a velvet tent, crystal ball, spooky new-age dress and headscarf, and a good name. Try "Crystal Balls". This works especially well if your headscarf reveals a male beard and gravel voice.

Next set yourself up with the light behind you and the crystal ball between you and the sucker-seat where your client will sit. As the client enters, groan, eye-roll, wriggle and mutter “Flying Nag for a place in the Melbourne Cup”. The snap out of your coma and say “Not for you dear, that’s next century”.

Get sucker into sucker-seat, and make some incredible prediction or insight. You watch like a hawk, so if they drag one foot a little, you try “I feel an imbalance in your lower limbs”. When all else fails, take a tip from the politician who can’t remember names, so always starts with “How’s your back!”. Due to our basic design flaws, everyone has a bad back, and they are always delighted to see that the polliie remembered. Of course, as a seer, you would say “I feel a tension, seated in your spine... blah blah”.

OK, so now you have established that your powers are absolutely uncanny, which they wanted to believe anyway, having forked out \$10 to get into the tent. Now you can get to work. “Look into the crystal ball” you say “and tell me what you can see”. Then “Gaze deeper, deeper, into your innermost soul”.

What do they see? Absolutely zip, except for your outline silhouetted by the low lamp behind you. But you, the seer, can see everything you need: their unsuspecting face, lit up by the same light, and reflected through the ball. Not realising this, the sucker lets their body-language run free over their face. Before setting up your tent, you have already done the “laying on of hands”: you have laid your hands on (and read) every book there is about body language and “cold reading”, so you are ready to begin.

“I see an important figure in your past, maybe recent, maybe distant?” you say. Which one draws the best facial twitch? Distant? “Ah” you say “I feel that this person was long long ago”.

Now “I am getting a dim picture of this person, but the mists have not yet revealed whether they are male or female.” You watch the twitches, choose one, and continue....

Once in a while slip in a few absolutely stunning facts. “Because you are a Taurean, I think that you....” How could you possibly have known that? Surely not because of the Taurus ring/brooch/tattoo. Observe observe observe.

Once you have dug up enough of their past, make some dazzling forecasts of their future. Base these on two things:

- (1) People make the same old dumb mistakes again and again, so use the past goofs.
- (2) Be vague. Read the astrology columns to learn how to say absolutely nothing, in the most convincing fashion.

And what about directly using astrology? This will only work if you take it seriously, which most astrologers do not. There is a good chance (and even some evidence) that being born at a certain season affects your development. Think of the difference between taking your first crawl on an icy midwinter floor, or in a warm summer meadow. And having your birthday each year as a beach-party in summer, or shut indoors on a winter’s day.

So how do you learn what season the person was born in? Even if you know they are Taurus it doesn’t help, because Taurus happens to be in summer in the northern hemisphere, and winter in the south. If you happen to be soothsaying in the north, you could probably guess summer, because even if your queue contained everyone in the world, less than 10% of them would be from the south. But for the southern soothsayer, it is better to fall back on “Now I see a birthday party, I think the weather was....” Etc.

Once you know their birth season, then you will call on all the learned psychological articles about the effects of birth-season on personality. Your startling insights will be something like an astrologer’s, if your victim is from the north (where most astrology books are written).

But don’t go too far, like the astrology column that once told me “This week you will be wonderful, but your partner will be appalling”. We are both the same sign, and were both wonderful for the week. SO be vague!

Oh, so you think that the new-age seer would not use scientific publications like psychology journals? Not so. If you read major scientific journals like “Science” and “Nature”, you notice that there is about a two-year lag between a scientific announcement, about, say, which sugars are worse for you, and the time when this information appears in the natural health pamphlets as “the wisdom of the ancients”. I suppose it is good that the different streams of healthcare are merging.

There are other fortune-telling methods, all with keen observation of a victim who is distracted by something like the gases in the Delphic grotto, or the gizzards of an unfortunate goat.

Modern fortune-tellers are called consultants and their fee is more like \$10 million. Like the seers, they always tell you what you want to hear - that is, if you are the CEO paying \$10 million. There is no reason for your advice to be popular with anyone else, or even to be true for that matter. Like a Greek tragedy, it becomes true because the \$10M victim, buoyed up by the consultant’s advice, goes ahead and makes it true. But if it fails two years on, who cares? Not the consultant, who is long gone. Not the CEO, who has moved on to greater things in the competing company – for him or her, the worse things go in the old company, the better. Blame is sheeted home to the new CEO, who therefore goes out and hires another consultant. Could Crystal Balls do worse?

Why am I telling you this? Not just to give you an alternative income stream (though be my guest). No, I am trying to give you the idea that our institutionalised ways of telling the future are best avoided. But we do need to try and see the future. Maybe simply thinking is best?

*What did he just say?*



*Snip: People who we pay, tell us what we want to hear. To know what might happen, we need to think. YRRCH!*

## 4 Energy and Info get together

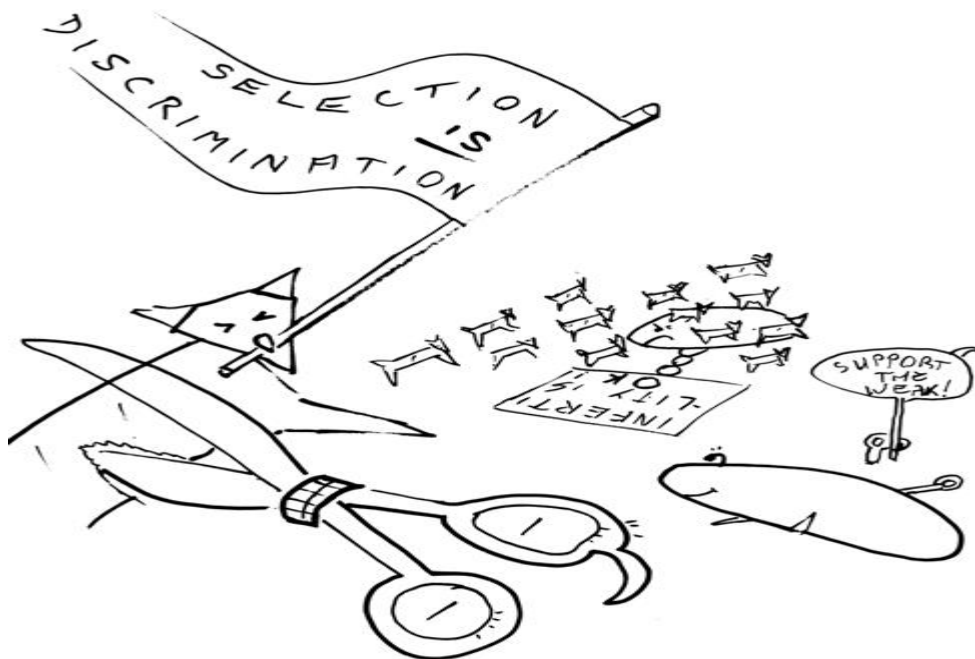
Whenever we questioned one of my history teachers about how he knew some detail, “Soapy” would simply reply “I was there”. We were ten, and he was incredibly ancient, so we accepted this meekly. One of my classmates took this to its logical conclusion, and started looking for Roman roads near the teacher’s house in Australia. One day, I must ask Soapy what really happened three-and-a-half billion years ago. He probably saw something really exciting.



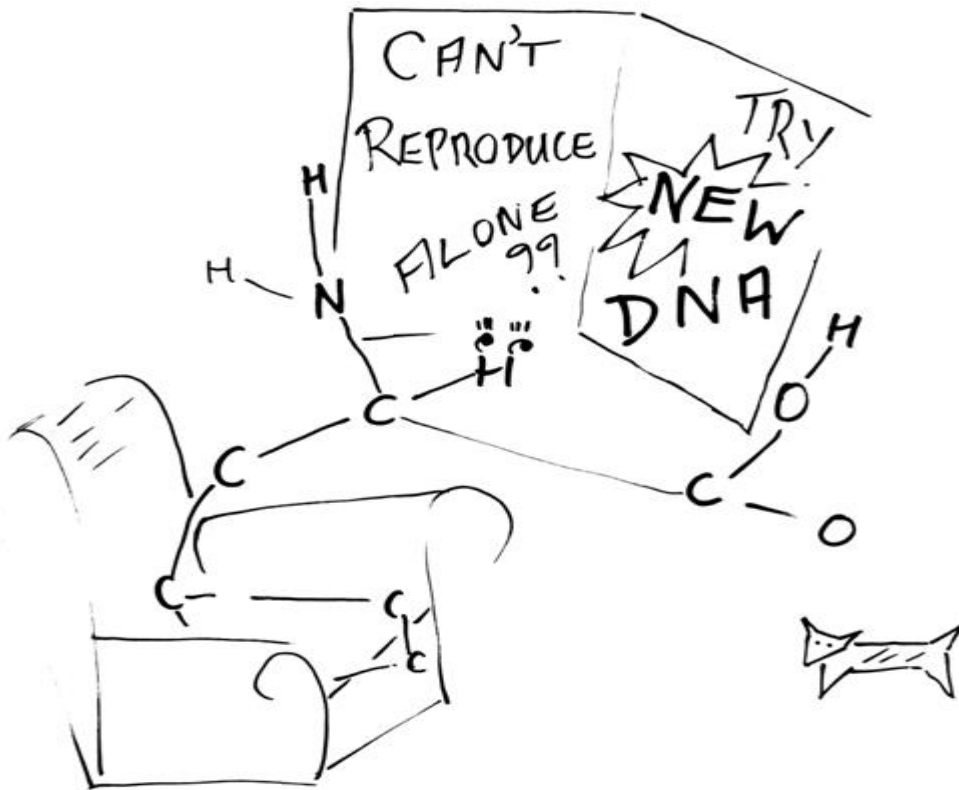
As almost everyone knows now, if we re-create the conditions of the primitive earth, then chemical reactions sometimes turn non-living chemicals into the sorts of molecules that we are made of, such as amino acids. We call such chemicals “organic”, but they are not really alive, any more than the bottle of MSG in your kitchen is alive (if you do Chinese cookery). Could they become alive? Yes they could. What would be needed is natural selection.

Now before you get all het up about natural selection being terribly complex and unlikely, let’s see how boring and obvious it is. The basic idea is that if two different things can reproduce themselves, then the one that has more babies (or less deaths) per year will become more numerous. That is all. There is no other complexity.

Natural selection is commonplace now – ask any family where some members have genes that make them more or less likely to survive or reproduce. Sometimes the differences are major and tragic, but in most cases there is only a slightly different chance. For example, the tendency to be left or right handed is partially genetic, and left handers start reproducing a little later, and die a bit younger, but I don’t think anyone is seriously concerned about this.



SO how might selection have happened 3.5 billion years ago? Just as it does nowadays, selection could have acted on variation “if two DIFFERENT things can reproduce themselves”. The lab simulations produced a huge variety of organic molecules in a short experiment. Given few hundred millennia, the primitive organic chemicals would probably have been even more varied. And we know that some of these chemicals, alone or in combination, have limited ability to reproduce. Anything that reproduced would tend to be around for longer, and things that were better at surviving and reproducing themselves would become more numerous.

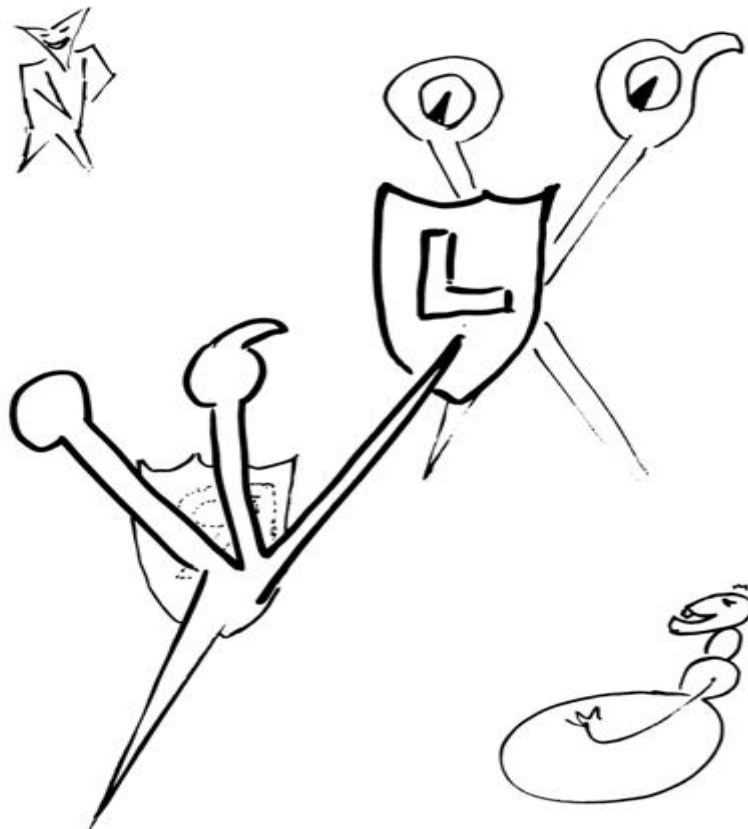


Along the way there would have been changes. These are called mutations, and would probably have been very common in the primitive organic slop. Before going any further we need to remember what a “mutation” is. The word means “change”; it



does NOT mean ERROR. Take me for instance. One tiny bit of my genetic information tells my earlobe that it should be attached to the side of my face. Your genes may say otherwise – but does that mean that one of us has wrong information? No, just different. Likewise, are the mutations that predispose a person to left-handedness “wrong”? Certainly not if you are being mugged – southpaws have the advantage in hand-to-hand combat.

In general, whether mutations are “good” “bad” or “irrelevant” depends upon whether they help their carrier to survive and reproduce in a particular environment. To understand this some more, think of a non-genetic change: you decide to change from silk stockings to woolly socks. In most parts of the world, this would be just a silly fashion statement, but in the Antarctic or the Sahara, it might make the difference between life and death. Likewise, genetic changes are usually irrelevant, but sometimes good or bad in one environment, such as being left-handed in a city where most of the muggers are right-handed.



But back to the prebiotic goo. Every time that the reproduction of some chemical(s) went OK, then there would be more of those chemicals. And every time that there were slight changes during the reproduction, then there would be some slightly different chemicals. In that environment some of these changed forms would reproduce better, others worse, and some the same.

So life as we know it could have descended from the chemicals that happened to change in ways that let them reproduce better in whatever the environment of the day was. Change has been vital all the way from the poisonous gases of 3.5 billion years to today's wealth of oxygen that has poisoned the older life forms, except where they have retreated into black slime and crevices.

Of course, the fact that we can demonstrate the individual steps nowadays does not mean that life originated in exactly this way, but it does mean that it was possible. Only Soapy might know the answer. Certainly, since that time, evolution has occurred - we see it operating everywhere today, whenever some chance genetic variant makes someone or something reproduce better or worse in a certain environment.



Now, I didn't want to teach you all about the origin of life – read some other book. But so far I have avoided the really difficult question: Exactly what do we call life? If we can't answer this, then we could not identify when it was started by evolution, god, or anything else. We could also not identify whether a machine is really living.

The important aspects of what we call “life” are:

**ENERGY** Life takes in energy – from volcanic heat billions of years ago, through sunlight falling on leaves, to a person eating bagels now.

**INFORMATION** Life uses the energy to maintain and transmit information. This information might be the form of a pre-life cluster of molecules, passed on to an approximately identical “offspring” cluster. Or it might be the sophisticated DNA details that make the person who dunked the bagel, and their offspring.

**CHANGE** No-one has ever come across a life-form that does not change. The information that it runs on is always changing. Every one of us passes a number of new mutations on to our offspring, usually without noticing.

All this results in things such as humans, which can act, reason, have emotions, and pass all this on. And this is where information and energy have spied a loophole.

What did he just say?



Dot: Any old blob like me can get ahead if it copies fast. And so can information.

WELCOME!  
DOT & DOT JR'S



## 5 Information leaks out.

Information has always been leaking out of life, but recently the exodus has become a torrent. Sometimes the adventurous info gets nowhere, like the DNA on the road from the squashed possum (unless the DNA is taken in by a friendly local bacterium, the microscopic equivalent of wildlife rescue).



Natural selection is constantly modifying the information carried in genes. Bacteria generally survive if they have genes that suit the local temperature, and die if not. What if the bacterium didn't have the right genes? The only thing it could do would be to wait for mutation to produce information that allowed it to cope with the local temperature. But DNA is quite tough, and its mutation is a one-in-a-million thing. Moreover most mutations are likely to be irrelevant, so waiting for the right mutation is not a really fast option, you might think. But you would be forgetting the hectic pace, and sheer disregard for the sacredness of life, that is the norm in the microscopic world. A million bacteria can live comfortably on the head of a pin, and they have babies every 20 minutes. If some of them happen to have a mutation that suits the next change in the environment, that is fine, and the other gazillion or so just die. In this way, bacteria have been superbly successful at coping with everything from hot springs to frozen tundra, to the new antibiotics that we try to poison them with.

So natural selection can triumph, but at what cost – millions of individuals dying because they had the wrong genes, and generations of waiting for a useful mutation to happen. Surely there must be a better way. And there is. Many organisms are able take in information from the environment, and pass it on to the right part of themselves to react correctly. If it is cold, their nervous system tells them that rather than wait a few million generations for a cold-resistant mutation to arise, it would be better to crawl under a rock, or put on some socks. Look mum, no mutations needed!

So the nervous system was the first step in the process which allowed information to bypass the ridiculously slow process of mutation and natural selection. Nervous systems range from incredibly basic ones with no such thing as a brain, to our own complex grey matter. But all of them can collect information, and make the body do something about it, without waiting for evolution.

Of course, the nervous system itself is made by genes, and so the old process of mutation and selection can improve it. Molluscs include snails shellfish and squid. Some molluscs have little pits that can do little more than detect light, while squid have eyes that are every bit as efficient and magnificent as ours, with lenses to focus and so on, but all operated in an entirely different fashion to ours. Molluscs show every possible intermediate step also. In each of these species, there have probably

been probably lots of mutations for different ways of receiving or processing light information.

We currently see many genetic variants for eye structure and function in humans, and there is no reason why molluscs should not have such a variety of genes. So why do some molluscs have only crude light sensors? Possibly the mutations in these species were not ones that made a more complex eye. Or if the mutations that produce complex eyes occurred, maybe it was simply not useful to do this in their environment: a shellfish doesn't need vision to scrape food off a rock, it only needs to know whether the moonlight is right for releasing eggs. If a mutation for a lens came along, the energy used to make the lens would take away from the energy available to make eggs. And you know what happens to things that don't reproduce well. SO the nervous system is still evolving, following the same laws that variants which help the carrier convert energy into reproduction tend to become more common (how many times have I said that? I will stop now).

*Lovely eyes dear*



*but can you  
release  
eggs*

But the presence of the nervous system was only the first step in information's escape from life. Once information could be actively collected and processed within life, it could also be transmitted and stored outside a single living organism. Bees that dance to show the way to the best flowers, are passing on information beyond their own nervous systems and genetic inheritance. Humans that draw rock-paintings, put hieroglyphs on pyramids, and write books, are passing on information not only to other unrelated individuals, but to other times. The genes are no longer the only way for information to have its effect.

Just recording and transmitting information is all well and good, but the next thing that happened to it is that machines began to relate one bit of information to another. The first abacus was invented thousands of years ago, to help with basic arithmetic. Nowadays, we have computers which can do an amazing variety of useful, interesting, or just plain pretty things with all kinds of information. Computers can put a pink hairdo on a picture of your dog, design a new car, do calculus. And the range of things is exploding at breakneck-speed.

Information is well and truly out of life, but it cannot survive there without a partner. That is where humans are still vital. At present.

*What did he just say?*



*Flap: Just having six kittens at a time is not good enough.*

*Information can outmultiply us all.*



## 6 Energy takes off

On its own, information is a rather weak little thing. In living organisms, it is wrapped in a body which gets energy to carry out the information's commands. Outside life, information is helpless. Books have no direct effect on their immediate surroundings. When did you ever see a cookbook that did the cooking for you? The partner that information needs is the same outside life as inside life – it needs energy.

Life collects energy from the environment: chemicals or light. Or lazier species like us just eat the plants that collected the energy in the first place. Life uses the energy to repair itself or reproduce. Everything else is just a step along that path – growing up is just part of getting ready to reproduce.

We like to think that human's major achievement has been to take information outside ourselves, to books and so on. But this ignores another recent achievement that is just as important. Increasingly, the energy that works for us does not need to pass through our body, or the body of a slave, a horse, or a third-world factory worker. We have figured out how to make wind or water grind wheat into flour. We can make petroleum run a car. We can make nuclear reactions warm a house. Gone are the days when we had to wait for mutation that made us cold-resistant, faster, or anything else that we wanted. We just make the right machine, and put in some kind of energy. And the range of energy sources that machines can use is astronomical. Many use electricity, but this itself can come equally well from a source that life is familiar with, such as sunlight, but also from sources that few life forms can use directly, such as coal or nuclear reactions.

But the machines we have talked about so far are mostly pretty helpless. How does the information get its energy? It gets it with the aid of humans. In the movies, the human beats the rogue computer by pulling the plug out of the socket. We could turn off every computer whenever we wanted to. And of course we do.

*What did he just say?*



*Chip: Us machines get the energy, we do what we like with the info.*

## 7 IT's pathetic beginnings

*"I think there is a world market for maybe five computers"*

*Thomas Watson, chair of IBM in 1943*

Many many books are telling us how computers will be able to do wonderful things soon, and other books say this is ridiculous. Usually it happens. I remember a learned library committee telling me that it would simply never ever be possible to have scientific journals available electronically. About one year later, the same committee was organising electronic access to scientific journals.



How often have you heard someone say that the power of computers is “awesome”? And yet the poor little things struggle terribly with tasks that seem to be dazzlingly simple. We have the information on a disc, and we want to see it as a movie. Or we see a word or picture on the screen, and we want to see that same thing on another screen, or on paper. What could be more straightforward? Anyone who has tried to

print a school assignment at the last moment knows that the simple act of moving information from one place to another is one of computing's weakest links.

Nevertheless, we are increasingly reliant on machines. At the end of 1999, everyone was panicked about Y2K – the possibility that society would crumble because of computer-reliance, and a programming glitch due to the change to “2000”.

Technicians tried to keep serious faces as they pretended to check every one of the millions of lines of code on every one of the millions of computers in the world.

Everyone else went out and partied like the world was going to end. After the event, a docklands malfunction in West Africa was blamed on Y2K, but can we believe this? But the level of concern gives us an idea of how reliant we were on computers, even at that rudimentary stage in their development.

As yet, no-one would seriously imagine computers taking on a broader role. We know that computers can only survive with us to nurture them. We make them, repair them, and generally tidy up for them, and in return they do all sorts of wonderful things for us. It is a symbiotic relationship at present.

When might computers stop being symbiotic and strike out on their own? Some say that a system is fully independent when it begins doing things that could not occur if the system was broken apart – these are called “emergent properties”. In the case of the internet, computer viruses might be emergent properties. Hey, who said that emergent properties had to be good? Of course, the virus needs a geek to program it, but some viruses are now capturing bits of text or code as they go along, so they may well be the basis of the first true emergent property.

*What did he just say?*



*Chip: OK, OK, so machines are not there yet, but just you wait.*

## 8 Designer Stupid

But at the same time as the computers are improving, aren't we improving too? We are getting better at redesigning ourselves now that new genetic engineering methods are here. But there is a long way to go with human design....

Some people see the flawless perfection of humans as evidence of an intelligent designer. But think about it. As a child you almost certainly went to a birthday party where everyone guzzled pink lemonade. And when everyone laughed, almost certainly one of the kids nearly choked on the lemonade. As a callous little sweetheart, you probably laughed at them, but it was serious – they could have died, and many people do die when the liquids going from mouth to stomach get tangled up with the air going from nose to lungs. How could anyone devise such a stupid crossover between two pathways that obviously need to be kept separate? Pointless and dangerous. Proponents of “intelligent design” are simply showing that they don't know much about intelligence or design.

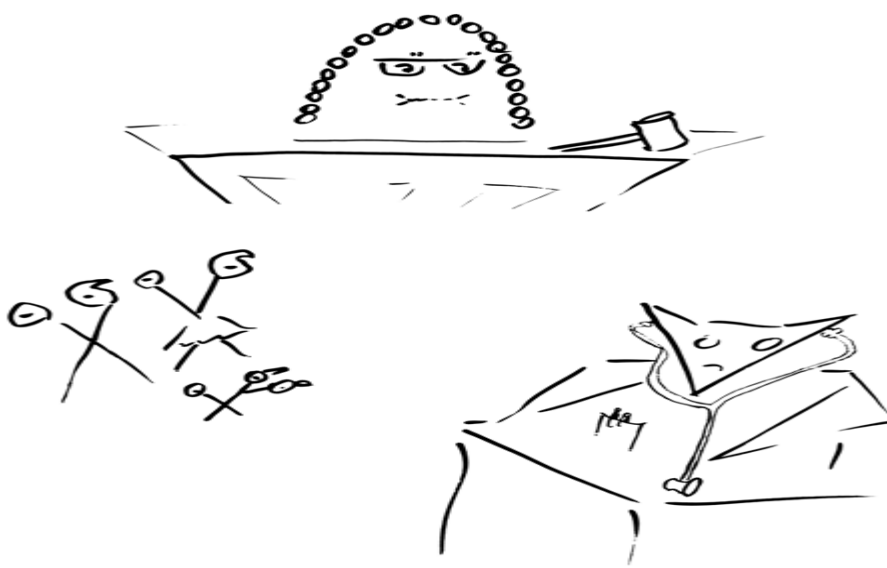
But but but, you might say, how could evolution have made such an awful mess? Easy, I say: evolution makes messes all the time, but as long as the messes reproduce faster than the little baby messes choke on lemonade or die some other way, then the glorious lineage of messes will continue. Where did this particular crazy lineage come from? Poking back into human origins, we find fishy things with gills (and we still see the gills briefly in human embryos). Fish, needless to say, both drink and breathe water, so keeping the two pathways separate was not an issue. Now that we totter about on land gasping for air, it would be good to separate the pathways. Indeed they are more separate than they were in the fish, but it seems that the necessary mutations have not yet happened to finish the job – keep hoping!



Even more ghastly than the pink lemonade, is human childbirth. We are the only species in which the child's head frequently jams in the too-small birth canal, with real risk of death or injury to child or mother. As Ben Elton said, if this process was designed, then the designer was clearly neither intelligent nor female. Looking at it from the evolutionary point of view, it appears that the loss of a few mums and kids in childbirth has been less of a loss than the increased survival and reproduction due to our huge brains. This leaves us waiting for the random mutations which one day might create a wider birth canal to accommodate the big headed babies.

And what are we doing with these whopping brains? Hunting mammoths, deforesting the Amazon, playing music, etcetera. And one other very important thing: taking over the role of "intelligent" designer, maybe. Ah yes, you say, but we won't really do this will we?

Won't we? Already babies are suing doctors around the world for "wrongful life". The bubs claim they should never have been born with some genetic defect or other, and should have been terminated or never conceived. Sooner or later a baby will take its parents to court for the same thing. And inevitably, somewhere around the world one of these cases will succeed. Probably somewhere like California, where judges are elected and see it as their job to be popular rather than to be logical.



As soon as this happens, insurance companies worldwide will slap huge increases onto premiums for anyone at risk of being a parent. Unless, of course, the parents get a witnessed pre-birth agreement with junior. Imagine the loudspeaker strapped to the bulging belly, blaring:

*“Cystic muco-polly-want-a-crackeritis occurs in one in ten million live births. Please indicate your preferred course of action with respect to this mutation. The ultrasound will record the number of kicks:*

*One kick – no testing*

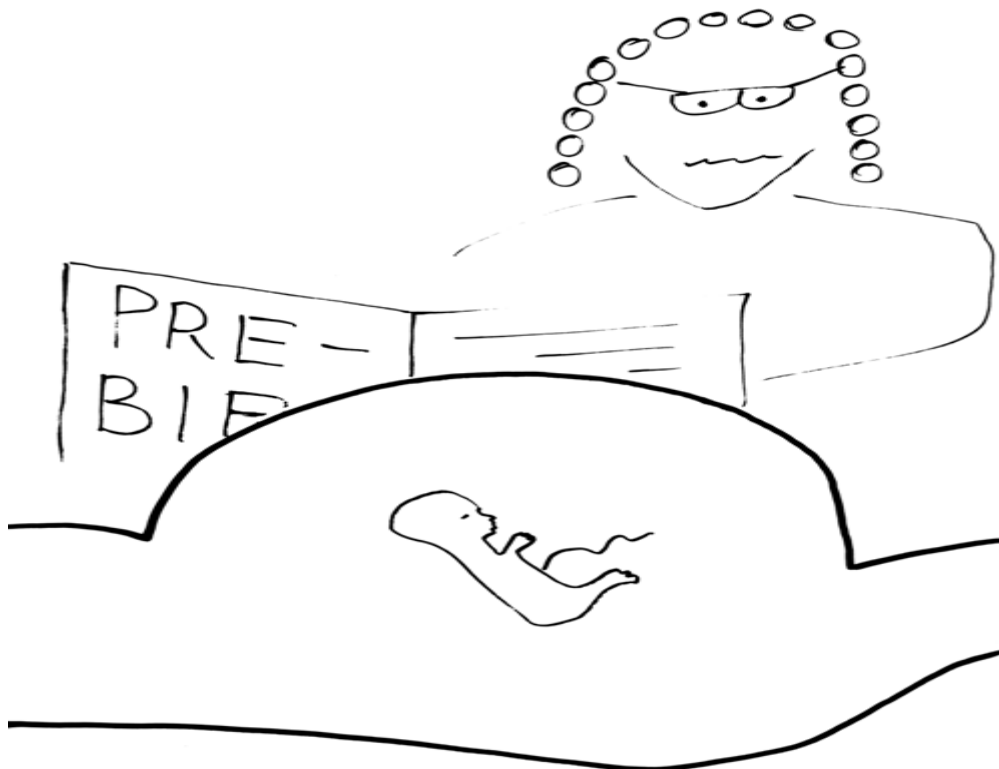
*Two kicks – test and terminate if appropriate*

*Three kicks – test and genetically modify if necessary*

*Four kicks – please send further information, I am confused*

*Five kicks – please stop playing Mozart to me during my foetus arithmetic lessons”*

Of course, the poor little thing will rarely make the four consecutive kicks that would give them a legal leg to stand on, so to speak.



But seriously, folks, our own children are going to force us into genetically modifying them. What will the result be?

*What did he say?*



*Dot: That humans are not much chop as a "higher life form".*

*Viva la blob!*

## 9 Better babies – a flash in the pan

Time and again, someone gets their photo taken with President of the US, announcing that we have finished sequencing the human genome – all the DNA information that we have. Each time, this statement edges a little closer to the truth. And from there, some people hope or fear that we will take total control over the destiny of our offspring, our species, or all life. A grand and terrible vision indeed.

Humans have for a long time tried to improve other species by breeding. Active genetic modification, including cloning, began when the early Mediterraneans learnt to hybridise plants and to grow genetically identical “*klons*” or cuttings of the better ones. Molecular genetics has increased the pace of these modifications, and some people are worried that the genetically modified organisms will have ecological effects, or their genes will leak out into wild populations. There can be leakage, even to other species, but the jury is still out on which is worse: introduction of one new gene into a species that is already in the environment, or releases of entirely new species, which we happily do all the time, in ship’s bilge-water, mud on an air passenger’s shoes, etc.

In our own species we can choose our children’s sex, and fix certain genetic disorders. We will be able to apply this to more and more of our life and reproduction, if we want to, but there are two main downsides. The first is that genetic manipulation in sheep and cows sometimes fetches up with unforeseen problems and unhealthy or dead animals. This can probably be overcome with enough tinkering around - sooner or later we will probably figure out how to do these manipulations without major pain and death. But the much bigger problem is deciding exactly what a dream kid would be, and what genes are needed.

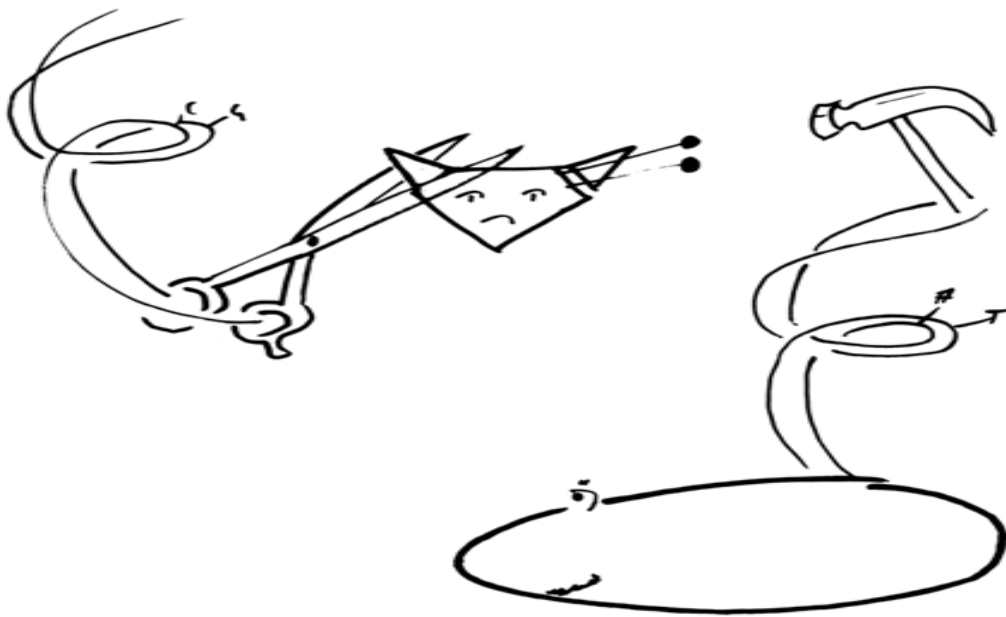
It is said that Marilyn Monroe once wrote to Albert Einstein and suggested that they should have a kid, because with her beauty and his brains, it would be “one helluva kid”. The story goes on to say that Albert wrote back to say “Ah yes, madam, but what if the child should have my beauty and your brains?”



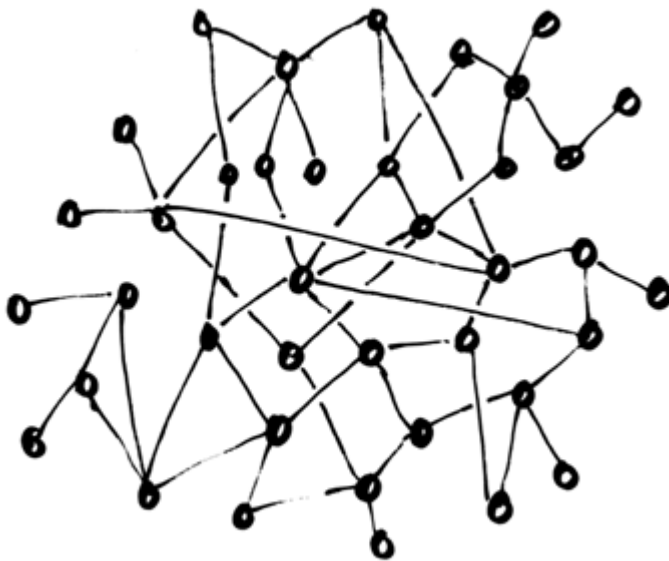


Bertie Einstein was right. People from the ancient Pharaohs to Adolf Hitler have been trying to breed the perfect human, but it has eluded us so far. This is not just for lack of technology. The basic problem is that the number of genetically different children that a single human couple could produce is staggeringly big: over 10,000,000,000,000. This is more than the total number of humans who have ever lived, and an incredibly large number of nappies to change. Even if we could see all the possibilities, how would we decide which is best?

The reason for the huge variety is that we have about 3,000,000,000 blips of information in our DNA, which spell out the genes that code for our inherited characteristics. And each of us have most of this information twice – once from mum and once from dad. And it will certainly not all be the same – there are lots of mutants floating around in the population, so your mother might give you a version of a gene that attaches your earlobe to the side of your head, and your father gives you one that does not. Whether your earlobe ends up being attached depends on the interaction between these two versions of the same gene.



But that is pretty simple compared to things that we care about like height, disease resistance, diabetes and IQ. Each of these things is determined by many different genes, as well as the environment, such as your diet and schooling. Studies in yeast and humans scuttle the oft-repeated story that “they” have discovered “the” gene for some disorder or other. There are incredible intricacies of interactions (see the oversimplified picture, where each dot is a gene, and lines show interactions).



With all these interactions, we can see that for any one thing that we care about, we are extremely unlikely ever to see all the possible combinations of all the variants at all the genes that matter. So it is difficult to identify the set of genetic variants which might lead to good survival and reproduction in a particular environment now, let alone variants that might be useful in the future. How then can we know good combinations to put into a designer baby?

To be sure, we will be able to arrange some of the most obvious things that we want to see or avoid in our kids. But because of the complicated influence of genes and environment, it is anyone’s guess whether we will like the result. As someone said “The long list of intelligent but evil people shows us that intelligence itself is not necessarily a good thing”. Nevertheless, people are already making designer offspring – there is a sperm donor who is as famous as an anonymous person can be,

for producing offspring who are blond and clever. Rich parents will go on trying to produce designer babies, using more and more detailed genomic information, especially as the babies start to succeed in their lawsuits against doctors for “wrongful life”. For the rest of us it will be interesting to see the result, if sometimes rather distressing.

All this fiddling with DNA is based on the idea that we can do more or less anything we like that way. But how far can we go? What if the basic plan of a human can't stand much more improvement? If you take the smartest people on earth, the mistakes they made are massive. Einstein encouraged the construction of nuclear weapons. JJ Thompson, who later became the Lord Kelvin who didn't notice that birds can fly, was totally convinced that mathematics could not help us understand the relationship between electricity and magnetism. Maxwell ignored him and discovered how to make electric generators and motors.

We could continue this list of smart but mistaken people for a long time, but Thompson's dislike of maths is particularly interesting – it shows how very bad we all are, at something that is terribly important to us. All of maths is just manipulation of patterns.  $1+1=2$  is just Cuisenaire blocks on the nursery floor – and if something is not that straightforward, it is simply not allowed to be called maths. And maths is incredibly useful - where would we be without the electricity and motors that Maxwell gave us? Despite this, a genuinely eminent physicist who had made his own major discoveries felt threatened and overwhelmed by maths.

So perhaps humans are not the best things to do maths? If we need some maths done, why take substandard humans and try to engineer or educate them better, when already there is something that is streets ahead of us? Computers are not at all threatened by maths, and can easily do bits of calculus that are beyond the equations of mathematicians.



It is one thing for humans to be no good at something that we don't care much about, like laying eggs, but when we are no good at something that we depend on so much, like "brainy" tasks, it makes you wonder whether we are heading in a sensible direction. Maybe we will go on tampering with ourselves, or maybe our enthusiasm (and fear) of biotechnology will be short-lived. There might be a better way of improving things, which will not involve designer babies or bio-anything. We could produce the same old humans, and have them cared for by talented machines. To be sure, we no longer seem to be able to afford the expense of having humans cared for by other humans.

*What did he just say?*



*Snip: Humans might never be any good at the things they want.*



*Chip: I might be better.*

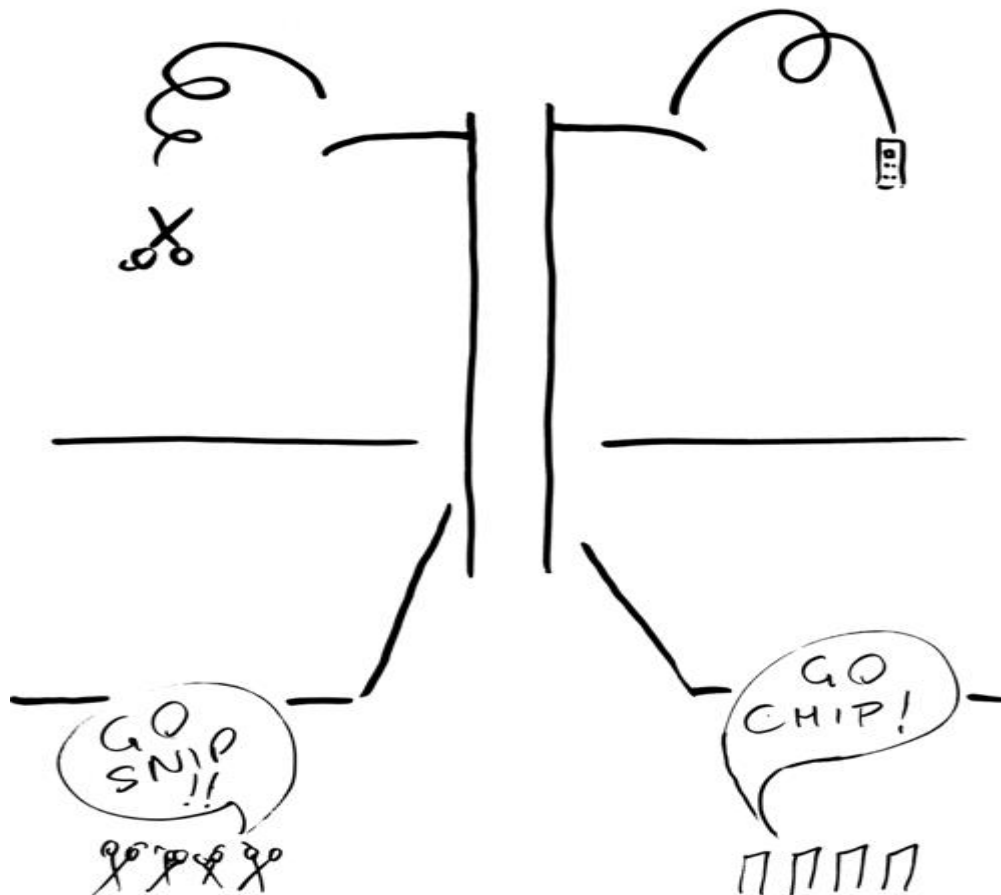


*Flap: No wonder his brother said "My aren't you a sour old thing!".*

## 10 The Game they play in Heaven

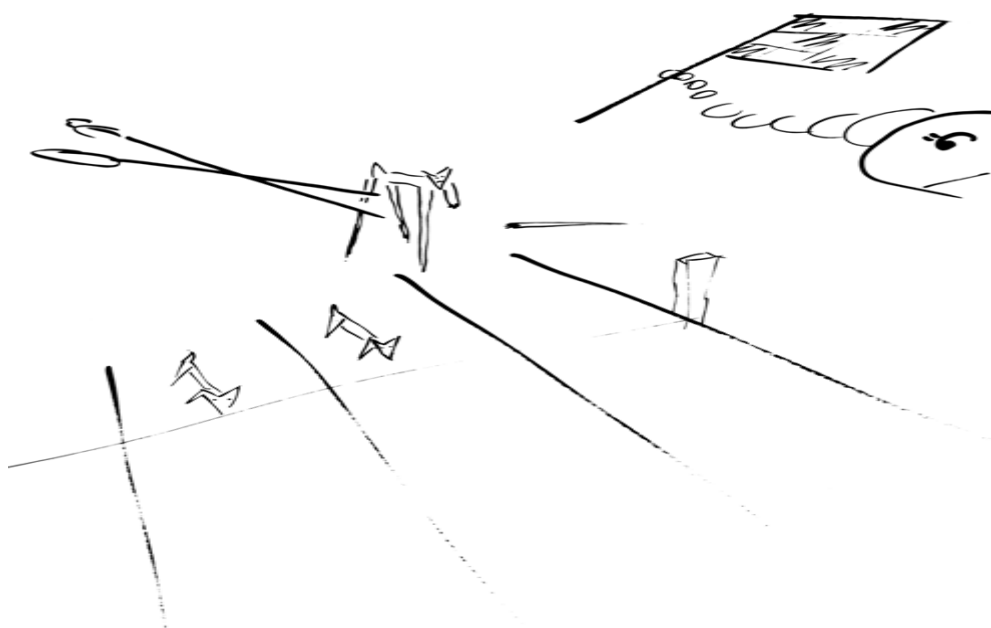
Everyone knows what game they play in Olympia, Nirvana, Valhalla etc. Unfortunately, every other person disagrees with them. Some of the choices seem very odd. Why would grown men lie in a heap on the ground with their boots wagging in the air, then suddenly walk away as if nothing had happened? Do we really care whether someone is good at waving a ribbon in a gym or a pool? And yet we cheer and cheer and cheer. ¡Barcelona gana! Arsenal kicks butt! Allez les bleus! Etcetera.

Let's get one thing completely straight at the outset: if we genuinely wanted to know which countries are good at some sport, then we would choose the teams at random from those countries' populations, ten minutes before the game starts. With the possible exceptions of high-diving and ski-jumping, where the death-rates would be unacceptably high.



But we don't do that do we? Small countries like Australia can punch (run, swim, jump) way above their weight in gold-medal contests if they splash huge sums of cash coddling, bullying and manipulating their top athletes. The allowable manipulation of superheroes includes about 40 legal drugs, plus anything else that the team doctor is clever enough to disguise. It also includes vast training resources which do nothing for the fitness or skill of the general population. There is discussion of what will be done when genetically modified athletes come along. Will they be detected? (probably not). Will they be allowed to compete? What if it was their grandparents' genes that were modified – should the athlete be penalised for that? It is said that a promoter is offering huge pre-birth contracts to children of tennis greats. Since the greats are currently unmodified, the kids are not likely to be as good as their parents at tennis, so we hope the tennis stars are savvy enough to refuse on behalf of their fetuses.

In fact, we already have a system for coping with various levels of assistance and ability: the Paralympics have grading systems depending on the level of (dis)ability, and the add-ons like false legs etc. And they are immensely inspiring and enjoyable games. The “real” Olympics could do well to copy their lead. The most obvious thing to do would be to handicap the countries depending on the size of the population which they can scour for talent, and the amount they spend on training of each athlete. Other things to consider in handicapping would be the (legal) drugs used, and so on.





SO when you think about it, giving unnatural assistance to top athletes has widespread acceptance, and we have a system to deal with it. The entire system has nothing to do with a straightforward, natural contest on a level playing-field. So why would we not allow all sorts of manipulation, including robotic?

There are already robot soccer teams, which are pretty quaint, but will presumably improve. Think about the possibilities: in bat-and-ball games like cricket and baseball, all that is needed is some genetic or robotic superhero who can hold the bat horizontal and move it up and down in less time than the ball takes to move through this defence zone. There would be no way the ball could get through, and sometimes a good shot would happen – the six, home-run, or whatever. Then of course, it would be time to fiddle about with the genetics and robotics of the ball-delivery system, and things would get really interesting. Remember that we are already manipulating these things shamelessly, with whatever resources we can get, and will surely continue to do so as new methods become available. A league that put too many restrictions on improvements would soon start to lose ratings and revenue to leagues that were more innovative.

*What did he just say?*



*Snip: Competition, competition, competition. Not just in sport.*

*Whatever does best will win, and it might not be humans.*

## 11 Happy Families: a Laugh a Minute

But would all this tinkering with the genes and machines really make us happy? Well what makes us happy?

If you ask someone how happy they are today, the answer depends mostly upon whether today they saw a beautiful sunrise, won the lottery, pranged the car, found \$100, or cleaned up cat vomit. But if you ask them how happy they have been in the past decade, something else happens: it turns out that there are sad families and happy families. Long-term happiness seems to be partly genetic. Another study showed that people who believe that they are lucky also tend to be good at noticing things “out of the corner of their eye” – perhaps the \$100 note, or the other speeding vehicle. Hence their happiness. Nothing much they can do about the lottery or the cat, though, I’m afraid.

But stepping back a bit, whether *joie-de-vivre* comes from an environment where other people drop money carelessly, or from parents who pass on certain genes, or both of the above, it is all quite controllable. Change the genes, change the environment, and you will get happier or sadder people.

And how do you know they are happy? There is really only one way: get some signals from them: smiles, laughs, replies of “Yes, I am happy today!”. The dastardly among you will now see another way of making people happy: cut in between the incoming signal from the environment or genes, and the outgoing “I am happy” signal. We do this all the time. Give someone enough Prozac, alcohol, etc, and they will laugh themselves silly when the cat pukes on their bed. You know that we all shamelessly manipulate happiness in ourselves and others, and will do so more and more as the tools become available.

I think you see what I am leading up to. What is the difference between deliberately manipulating human happiness and concocting a machine which sits in a corner with a smile on its face, saying “I am happy, I am happy, I am happy” once a minute? Not

much difference at all really. In fact I have seen drunks who are less fun to be with than this wretched machine would be. Quite often.



So why do I bring this up? (If you'll pardon the expression.) Surely not to encourage you all to go out on a binge. No, the reason is that economists have realised that they cannot figure out what makes some societies richer than others. Weather? Brains? Natural resources? None of these things seem to be clinchers, as is gloriously explained in O'Rourke's "Eat the Rich". So then, some daring economists have decided that what really matters is not money, but how happy everyone is. But so far, they are not having any more success at figuring out what makes societies happy. The upshot is that if you want a happy society, it would be much easier to make it of computers rather than people.

Probably the same is true for every human emotion. So whether as individuals, or as a society, our pursuit of enjoyable emotions is likely to push us further and further

into collaboration with machines. I won't go into detail here – plenty of filmmakers have been there already.

*What did he just say?*



*Chip: Machines can bubble with happiness better than anyone. Except when there is a paper jam.*

## 12 A special talent

Will we really let machines make us happy?

If ever you want to know what is likely to happen in the future, it pays to have a good think about what individual humans want. We are each particularly good at doing things that suit us as individuals, irrespective of whether they are good for humans in general or the planet. Look at the way we each pump out greenhouse gases to contribute to global warming. Consider the way that the coming of humans to many continents preceded a wave of extinction in edible mammals. We almost certainly didn't want the food to go extinct, but we also could not organise ourselves to stop it happening. We are continuing the same pattern in the seas, with one after another species being fished out.

We show no signs of stopping this behaviour, no matter how many times we are told it is crazy. Thousands of years ago, middle-eastern irrigators caused such salinity problems that they had to change to more salt-resistant crops like barley. In the 19th century, Eugene Woldemar Hilgard reminded the Californians of this, and pointed out that they were doing the same thing. They ignored him, and the salinity problems followed. Then, over the following hundred years, the Australians did the same thing.

It is this talent of ours for blatant short-term self-interest that will finally allow information to leave us forever. We have seen that machines are better than us at some important things. And we always want the best for ourselves. So we let the machines do it. This does not sound very remarkable when we are just letting a computer calculate the design of a new aircraft. But what about new bits for ourselves?

Already there is a whole smorgasbord of body parts available. We can get artificial legs, kidneys lungs and hearts, or parts thereof. The brain is not sacrosanct. We can implant artificial ears which communicate directly with the nervous system, taking over the age-old flow of information from the environment to the brain.



As with the genetic tinkering, we are currently focusing on fixing problems rather than making improvements. But already improvements are possible: what if you got an artificial ear and replaced the microphone with a high-power gun mike? You would be able to eavesdrop on conversations a block away. Think of the power this would give you in the schoolyard. Likewise with better and better prostheses for eyes. What if you could read the exam paper when the teacher was carrying it on the

other side of the sports field? It is easy to imagine how each replacement part might pass from being an aid for the disabled to being a cheap, popular, cool item. This could happen to every bit of the body, one by one, even the brain - remember how bad we are at “brainy” tasks like maths?

Yes, but, you say, would the computer enjoy Shakespeare and beer? Well a computer implant could be programmed to produce absolutely any range of responses to anything. Who are we to say that its response is different to our own reaction to these frivolous luxuries?

*What did he just say?*



*(all together): He said, humans want to be replaced. We can just sit back and watch them do it.*

### 13 Liberation – coming ready or not

#### The next great step in evolution of information

Oh, wouldn't it be nice if the car could fix itself, and the computer could program itself? Yes it will be.

How would information and energy finally move right out of life? With our help, because it makes us happy. Why? Well we would love to have appliances that phone the factory and schedule their own repairs, and we will probably organise this soon. Once we are completely dependent on this, information would be well on the way to leaving us. From repairs to construction is a small step, in fact usually construction is much easier, since it doesn't involve diagnosing the problem, taking the thing apart and putting it together again. We are also now strongly dependent on machines to help with programming themselves – high level languages and debuggers are essential tools for programmers.

So, who cares whether the human body ever finishes completely replacing itself with machinery? Whether this happens or not, there is no reason why machines could not make themselves, fuel themselves, maintain themselves, and program themselves. How much their actions resemble those of humans will depend on how much of our thoughts we have engineered into them – one of our personal choices. But once machines can work quite independently of us, then the next great step of evolution will have happened – information will no longer be dependent on the life that it began three and a half billion years ago. It will be free to develop in any way it likes. It will be able to quickly move anywhere it wants.

The aliens may not invade. We may be making them now.

*What did he just say?*



*Chip: Free, free, free for me!*



## **14 Propaganda**

### **Information propagates itself**

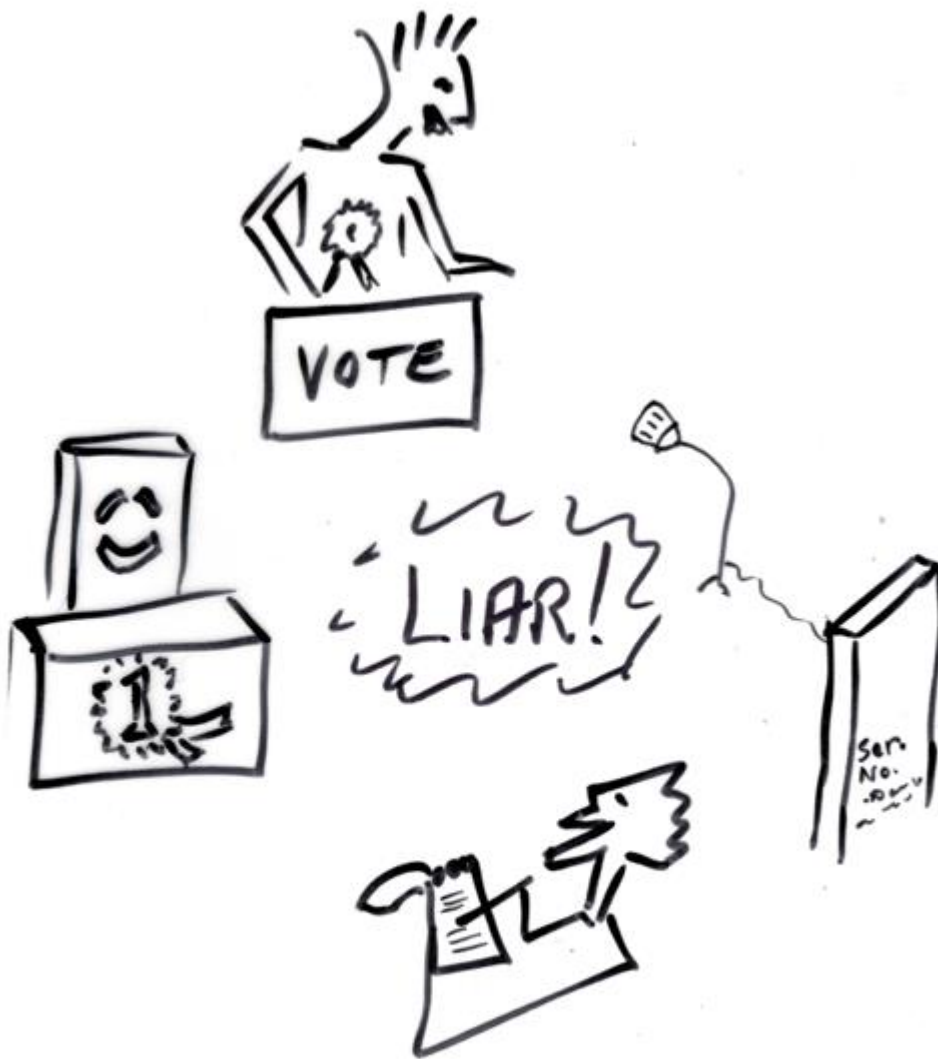
*There is no truth in the news,  
and no news in the truth*

This is what the Russians used to say about their state-controlled newspapers Pravda (Truth) and Isvestia (News). Cut off from the rest of the world for seventy years or so, the Russians were unable to realise how accurate their saying was for all information, world-wide.

In the “free” press, it is the journalist’s job to provide fillers around the paying advertisements - no need for truth or news. The fillers must be sensational enough to make the readers pay to buy the advertising. And yet bland enough that the advertisers will still pay for the ads, and the paper does not get sued too often. Thus the system survives.

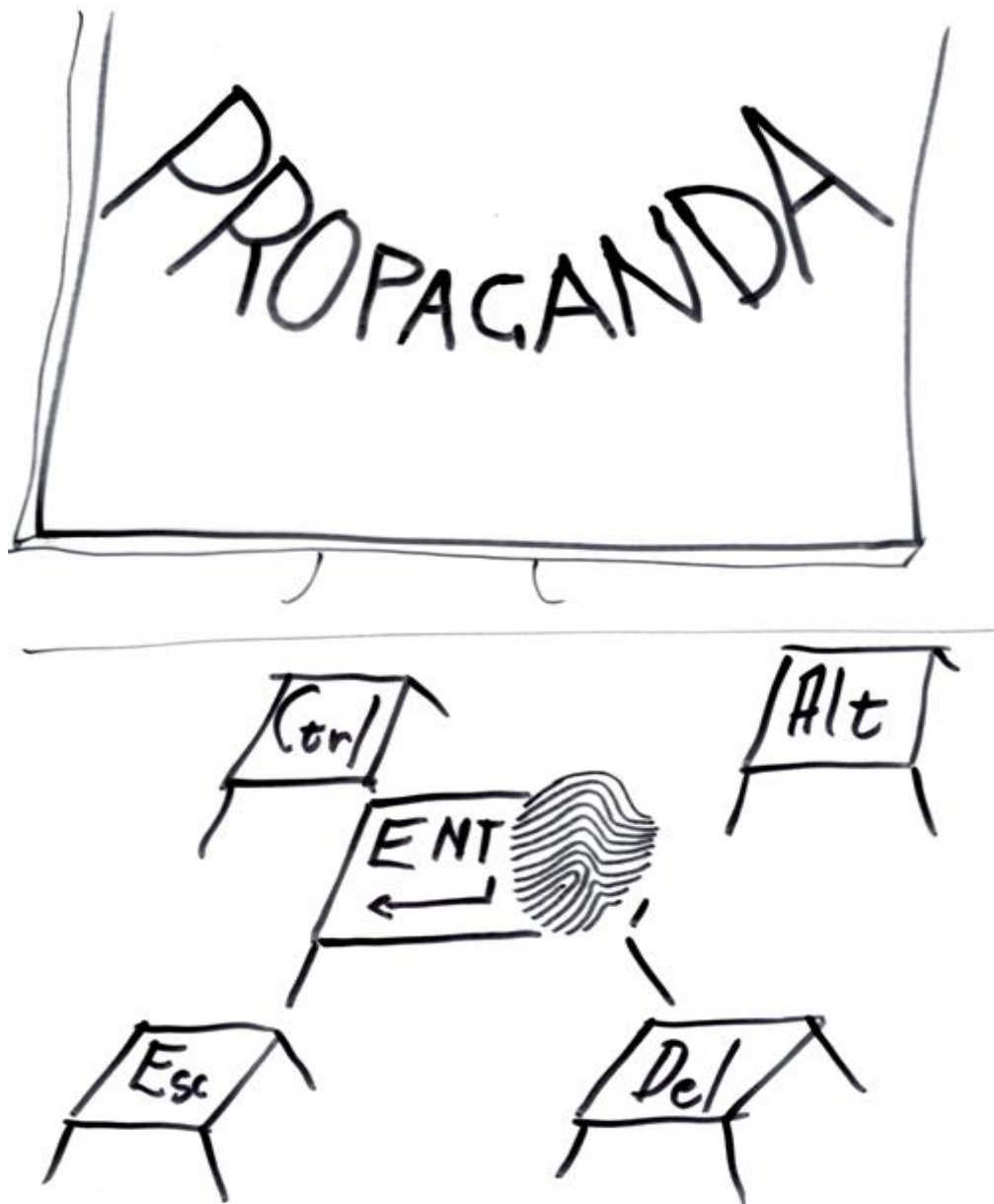
Or it did survive, until the digital age came along. Now that information transfer is virtually free and universal, the old government and corporate agendas are being shoved aside. But for what? Now every individual can put things out on the web, but 99.9% of it gets ignored. What is it that survives the information deluge? Truth? News? NO, the propaganda, just as in the past.

So what makes propaganda? Not the truth, that’s for sure. Everyone knows a website or news item that they are sure is wrong because they were “there at the time”. But we still tend to believe all the other items that we cannot personally check. A journalist once wrote two articles about two different research projects of mine. He did this, then the editor decided to blend them together, with alternating sentences from each story. The result did not make the slightest sense, but no-one complained (except me).



Propaganda does need a smattering of truth, to strike a chord. Even wildly biased wartime propaganda usually says that the opposing side's generals are cosily protected while the poor soldiers do all the hard work. "How true" think the soldiers, on both sides. But the truth is strictly rationed. No government, media-owner, or individual blogger is going to put up a bit of truth unless it helps get attention for their point of view. The rest is called "un-newsworthy".

The main thing propaganda needs is a catchy slogan. Headline writers craft these for a living. When I was young, they loved words like “shock” “horror” and “schoolgirl”. Many a good slogan can live on long after its original meaning is forgotten. 1950s song titles are recycled as headlines this century. In the 1800s, the British politician Disraeli was offended by some information, so he thundered that it was “lies, damned lies, and statistics!”. At the time, no-one had invented the analyses that we now call statistics, so he was talking about something else – a list of raw figures with no statistical analysis of whether they were believable. But statistics-haters worldwide still cling to Dizzy’s slogan.



SO how does this shape the evolution of information? Well it means that there is very strong selection in favour of information that is catchy. Just like in natural selection, it is reproduction that matters, and catchy information will get reproduced again and again. Why did you open the email that gave your computer a virus? Because of its catchy headline. So you caught it! The combination of catchiness and self-replication is nearly unstoppable, as billions of years of biological evolution have shown.

At present, electronic propaganda cannot propagate itself into RW (real world) without our assistance. But this will change. Already computers can follow biological principles to evolve designs for robots, then construct the best robots using 3-D printing. Human involvement is dwindling to two things: switching the computer on, and then putting the motor into the robots it has printed out. Both these tasks are easily automated, as are tasks such as supplying the initial computer and printer.

Sometime when a program like that meets a really catchy virus, the combination will be very hard to stop in RW. As they say of songs that are too catchy “It grows on you like a fungus when you’re dead”.

*What did he just say?*



*Dot: Selection works, OK? Not just for bio-blobs, but for information too. So the best propaganda will propagate itself into systems without humans.*



*Chip: Eeeeeeeehah! Get me a cute virus.*

## **15 Cute is Fit**

### **For information too**

How cute that baby's big brown eyes are! How cute is that backside! And so on. If you don't know what is cute, look at the magazine covers in a newsstand, and you will see exactly what cute is.

However, you might not notice what all this cuteness is aimed at: getting ahead in natural selection. Big eyes help avoid the tiger's bite and help grab the fish for dinner. Big backsides help women to give birth and men to chase prey. Apparently, symmetrical features excite us, and they are another sign of fitness: they show that our genes are operating together OK.

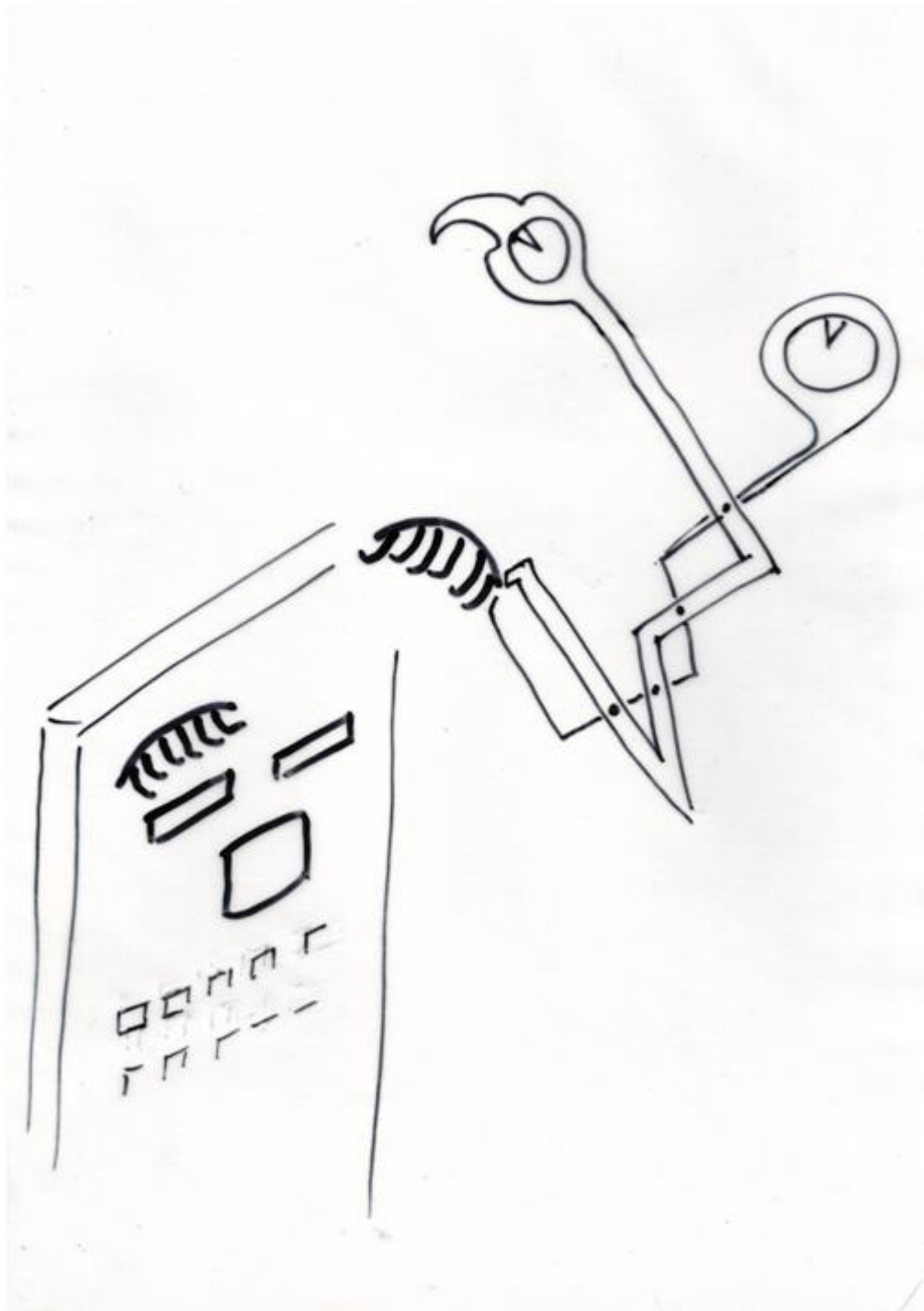
From your dad shaving, to filmstars with a horde of helpers fussing over their eyeliner, we all try to look like early-teens, who have just become ready to pass their genes on, and have many many years left to do so – natural selection's winners.

As for babies, they are surely chief in the cuteness stakes - they exploit every drawcard they can to overcome their helplessness. So we all love to nurture the noisy smelly little things, and thus the genes get passed on.

How could a machine possibly compete in this battle for cuteness? Quite easily, if you look at some of the great mascara disasters, and anyone with stubble on their chin.

One hundred years ago, machines looked like, well like machines: rectangles, gears, pistons, pointy bits and grit. In spite of this, a few like music boxes were cute, so we keep them on after their obsolescence – perhaps because they are only baby machines, almost as cute as human babies.

But machines are getting curvier and smaller and generally appearing more like the front-cover pinups of the day. When the time comes for them to put on mascara, will we know or care which is machine and which is not?



*What did he just say?*



*Snip: He keeps on saying that if information is appealing enough, it will get to have its way. Not if I have any say in it.*

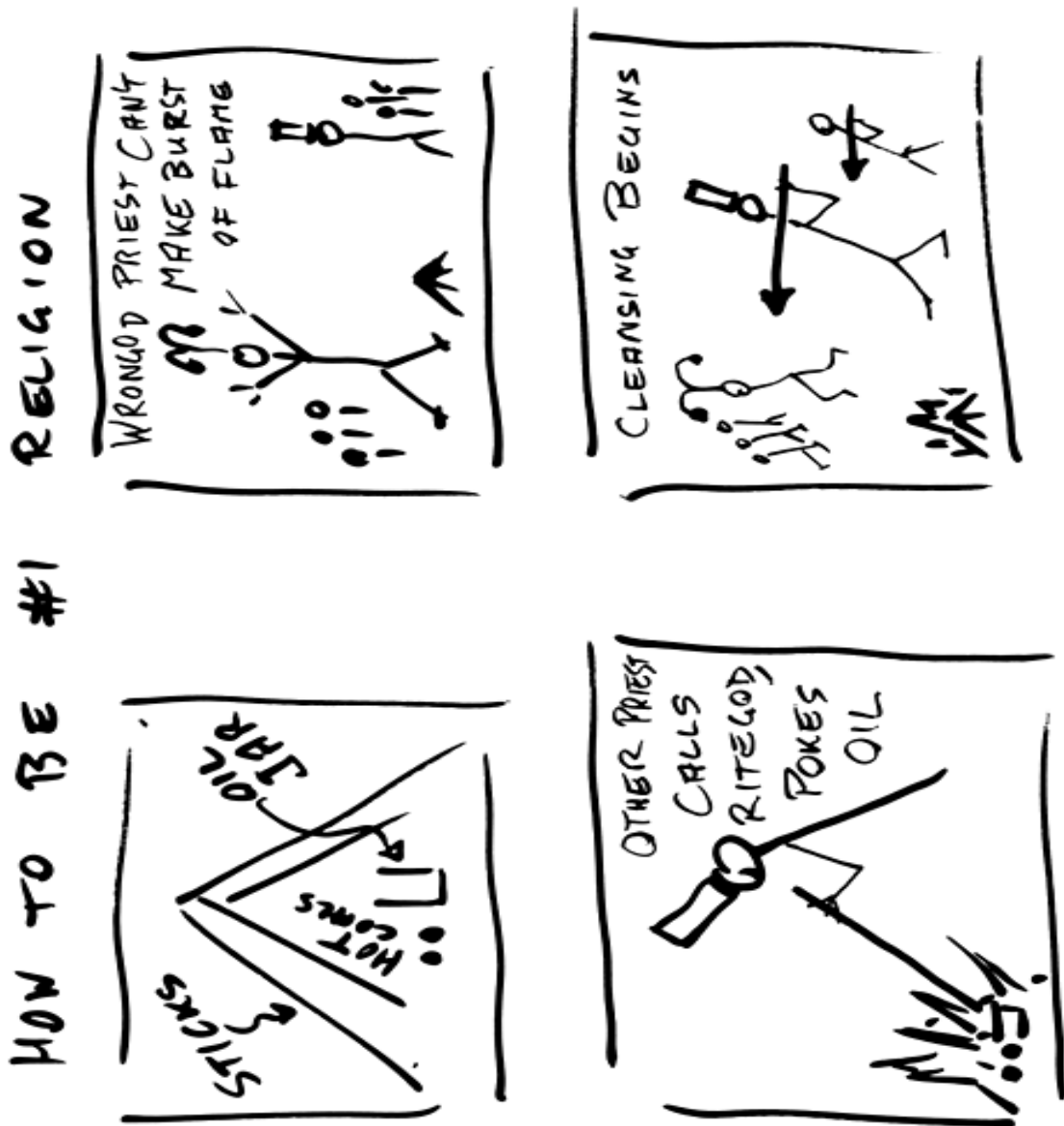


*Chip: You won't.*

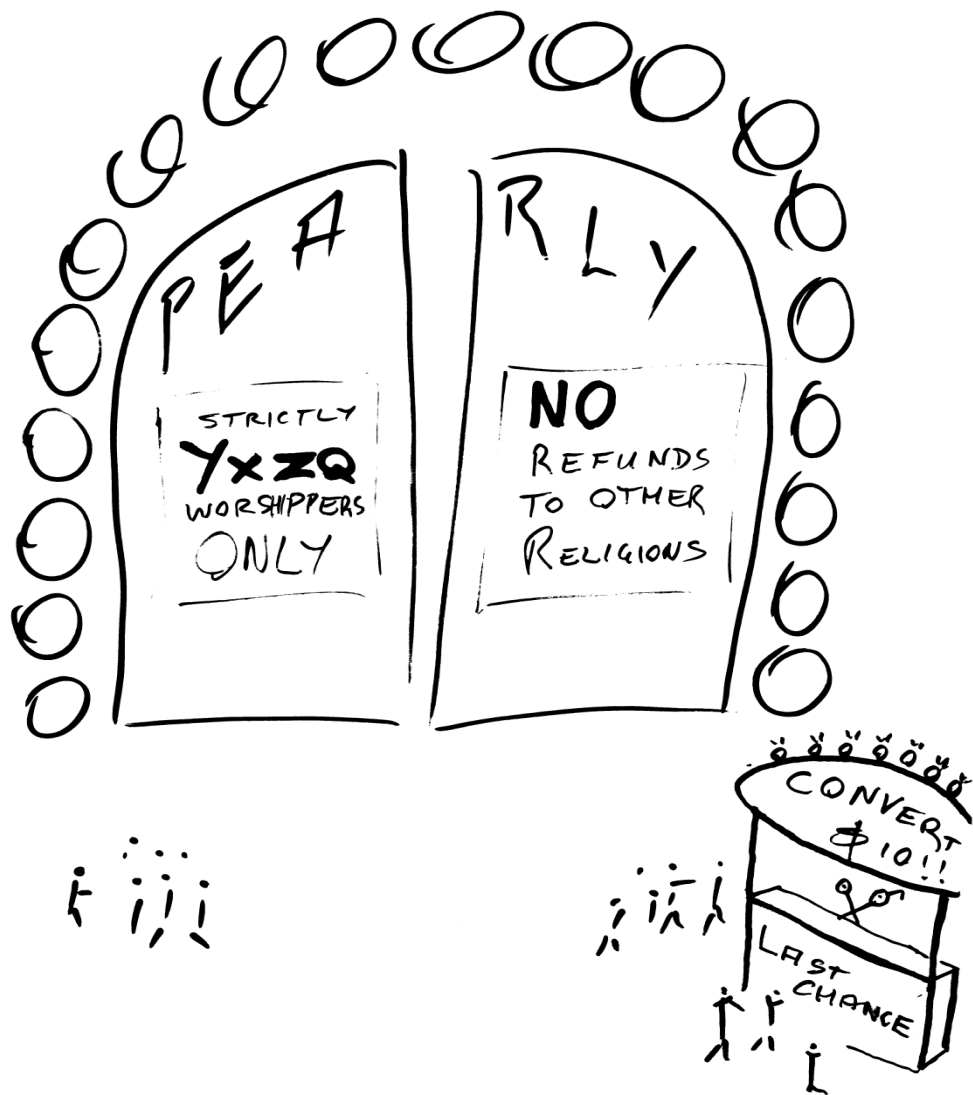
## 16 What the bearded one thinks

By now, you have probably figured out that I am not religious. However, maybe there is a big boy (girl, thing) out there watching us. Exactly what this all-powerful supernatural being might think about the liberation of information, no-one can judge.

The reason for this is that first you would have to work out what the god(s) were. Each religion is divided into numerous warring sects, some of which worry terribly about evolution, eating fish on Fridays, wearing hats, etc, while other sects could not care at all about such details.



But the one thing all religions have in common is that every sect of every religion thinks that its god is the one true god (or set of gods) in the universe. Of course, only one of these claims can be true, and possibly none of them are true. When the final trumpet of doom comes, and the pearly gates open for the world's only Taoist Protestant Hindu, won't the rest of us be disappointed!



There have been occasional attempts to scientifically prove that some supernatural all-powerful god does or does not exist. These are totally futile. First of all, no good scientist ever proves or disproves things. A scientist puts up several explanations for how things work. Then they "retain" the simplest explanation that has a high chance



of being correct. No explanation is EVER accepted or proved, only “retained” until something better comes along. Proof and disproof are inventions of journalists, and have no place in science.

So the very best that science could do is set up situations in the natural universe (ie where we are), in which you would expect to see different things depending on whether some god did or did not exist. Of course, as an all-powerful being moving freely between the natural and supernatural realms, any god could make absolutely anything happen absolutely anywhere, so the experiment would be pointless. You could only do this experiment on piddly little gods with a fixed range of action, so that you could see what happened inside and outside their range.



Personally, I cannot see why anyone wants to have to have a scientific “proof” or disproof for god(s) – why can’t people just believe in them if they want to? Much simpler.

In the meantime, as far as I know, all religions’ basic beliefs boil down to “treat people nicely”. It would be good if religious people spent more time doing this and less time worrying about hats, fish, evolution, etc. And I think that treating people nicely is indeed a good thing for everyone to do. A few religions extend this to treating the whole world nicely. So how would this attitude affect the liberation of information?

It depends a lot on what religious people feel that their god would want. Now if their god is one that was supposed to manufacture humans, then presumably this god has got nothing against manufactured organisms, especially machines created by humans, the god’s own creation?

It would be a brave person who thought that we could ever agree on our own religious beliefs, but what about beliefs for our machines? Their beliefs are indeed going to matter to us. In the hilariously old-hat film “2001”, Hal the computer says “I’m sorry Dave...” to the stranded spaceman. Hal had it in him to be sorry, but NOT sorry enough to DO something for Dave. Would that be good enough for us?

Could it happen one day? It is happening now. We are about to luxuriate in cars whose online systems book our annual brake services, of course after checking the time and money in our online diary and accounts systems. From your spending patterns, accounts will know that you are delighted with a lottery ticket that has only a 0.0001% chance of a good outcome. Thus the car-service and accounts systems agree that you will be tickled pink by the cheapest brake-service, which gives you an absolutely massive 51% chance of the wonderful outcome “avoiding fatal brake failure”.

Of course you would not get yourself into this situation. Or would you? Just in case, you had better make sure your electronic helpers have a firm belief system, including the sanctity of all life. Just like humans do. NOT. And you had better make sure that

the machines don't wander online and meet some hardcore "Life is cheap" website. Maybe all our current religions could gang up to decide what our machines ought to believe.

Hopefully the sort of religious beliefs that get instilled into the nascent information will be ones that are not entirely hostile to humans. The general religious idea of "be nice to other people" could perhaps be extended to "be nice to other things and people". But that has never been enough to keep a religion going. Who knows what sort of ceremonies will be used to wrap this message up with marketing appeal. Computers already abstain from alcohol, but I can't see them wearing hats and eating fish on Friday.

*What did he just say?*



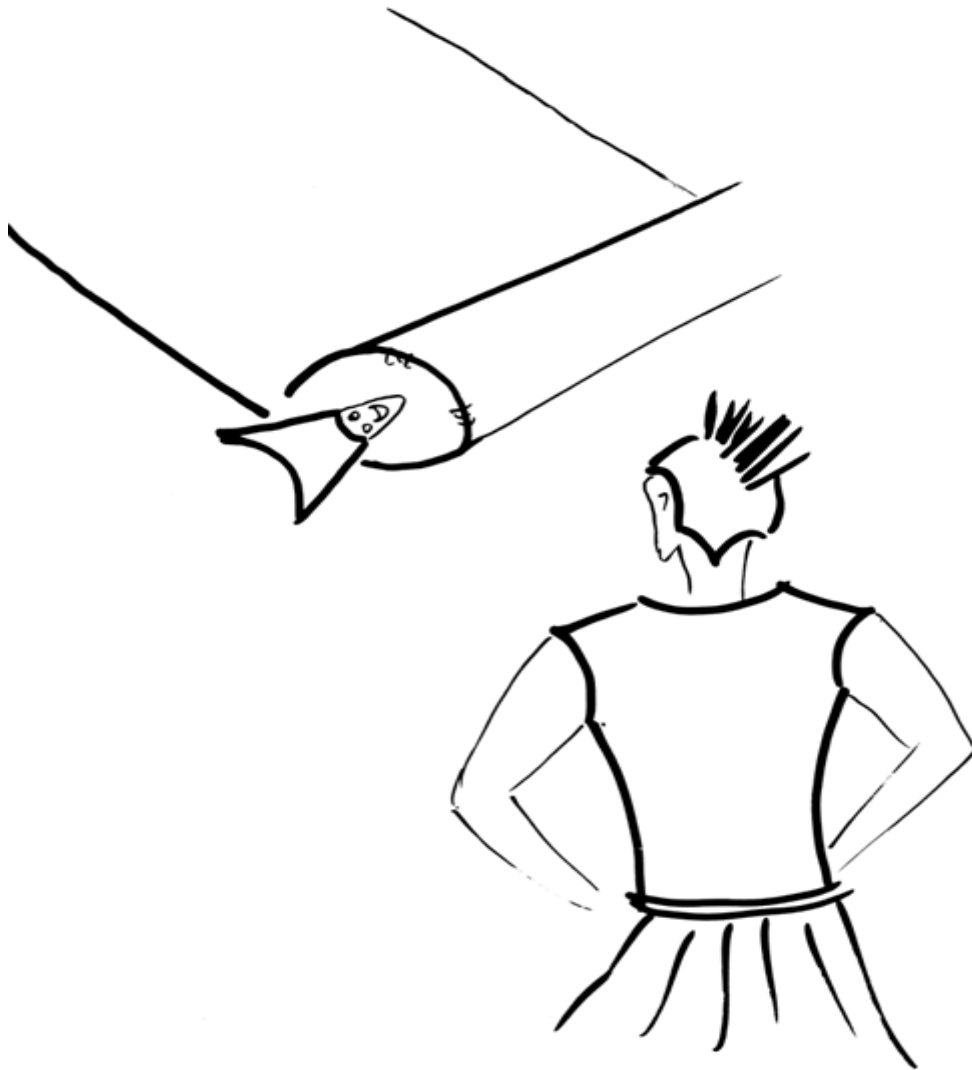
*Chip: He said humans can't decide what to believe, but had better decide what machines believe. I can't believe it!*



## 17 Bit Part: What to do?

How will this process affect you personally? As information evolves out of life, will you be able to stop it, ignore it, or enjoy it?

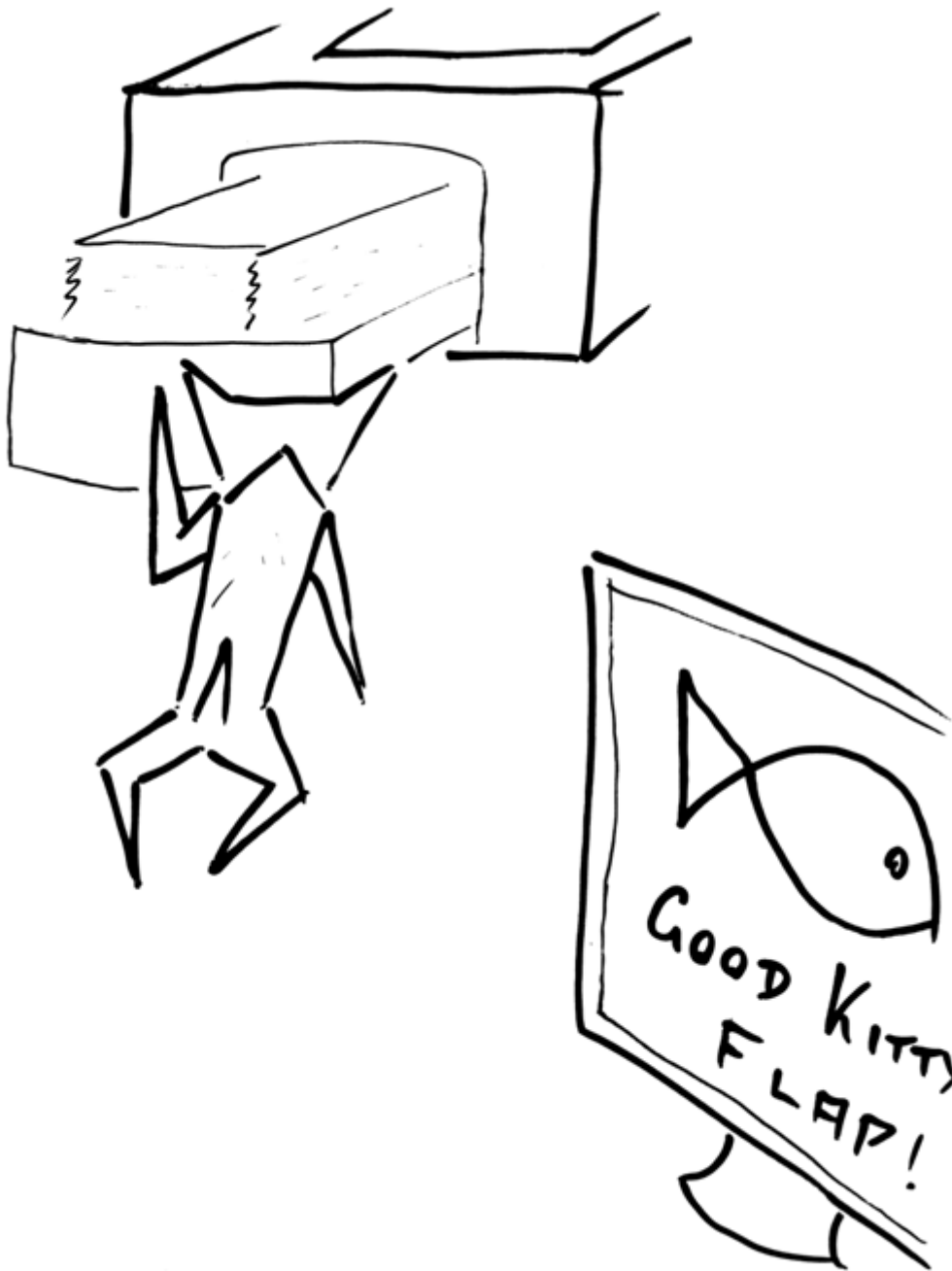
Make no mistake, becoming obsolete can be an immensely enjoyable process. Throughout history, declining empires have been full of people living wonderfully lavish lifestyles. Look at Cleopatra's luxurious life while her kingdom of Egypt was crushed by Rome. Then several hundred years later the Romans held orgies while the invaders pounded at their empire, and so on. So one option is not to fight information liberation at all, just enjoy it.



Or we could try to stop it. Can you imagine the “Committee for the Prevention of Liberation of Information”? Don’t laugh, it probably already exists, wearing beads in a hilltop refuge, or with a small nuclear arsenal just outside a farming town. Either way, the committee would probably fail, and maybe make a giant mess in the process. This is because most people like information technology, and will pay for it and look after it.



Well what about saying, “Look this is going to happen, so how do we go about it?” Should we slowly merge with machinery? Would that help us control it, or it to control us? When the computer screen says “Printer needs paper” and we get up and put paper in, who is in charge? The computer or the living accessory? Of course we don’t have to put paper in, but everything is arranged so that when the demand comes, we will want to do it. Then we get rewarded with a printout of our birthday photo or whatever. Standard training technique for dogs, consumers, and other animals.



So if we are going to merge with information technology, or coexist with liberated information, how will the rules be set? There are all sorts of bodies governing us and information that is under our control, but there are no governments for information that is outside human control. There are also terrorist groups that might find short-term benefit in setting some nasty bit of information loose from human-controlled machines.

Basically, there will be no rules. It is this sort of situation where religions flourish – weak government is replaced by strong belief. Maybe we can do that.

Or instead, humans might try to put themselves forward as the pinnacle and steward of all life, to be cherished by liberated information. This might go down better if we improve our record a little. For thousands of years, we have been at the forefront of sending other organisms extinct. If we want to say that life is precious and special, then we had better, quick smart, start to behave as if we believe this. It is up to you. .



There is a third possibility - we can make sure that information's liberation happens in a way that is nice for life, especially for humans. In time, this will probably come to be seen as the most incredibly selfish approach, if it is remembered at all by someone or something. But since it is selfish, it just might happen.

Also, our incredible streak of competitiveness might help here. In his famous book "How to make friends and influence people", Dale Carnegie said "When dealing with people, let us remember that we are not dealing with creatures of logic. We are dealing with creatures of emotion, creatures bustling with prejudices and motivated by pride and vanity". Could we bear it if it became apparent that machines would actually look after the life on this world better than we do? I think not. I think that we will take up the challenge of managing the information transfer, and something incredibly interesting will result.

*What did he just say?*



*Flap: As the only vaguely charismatic mega-animal here, I am absolutely flabbergasted at his cheek. He said that humans might be the champions for all life (Ha! as if!). And that they might manage (another thing they can't do) the evolution of information so that it helps life.*



## 18 Mouse-Hugging: Luxury in the wilderness

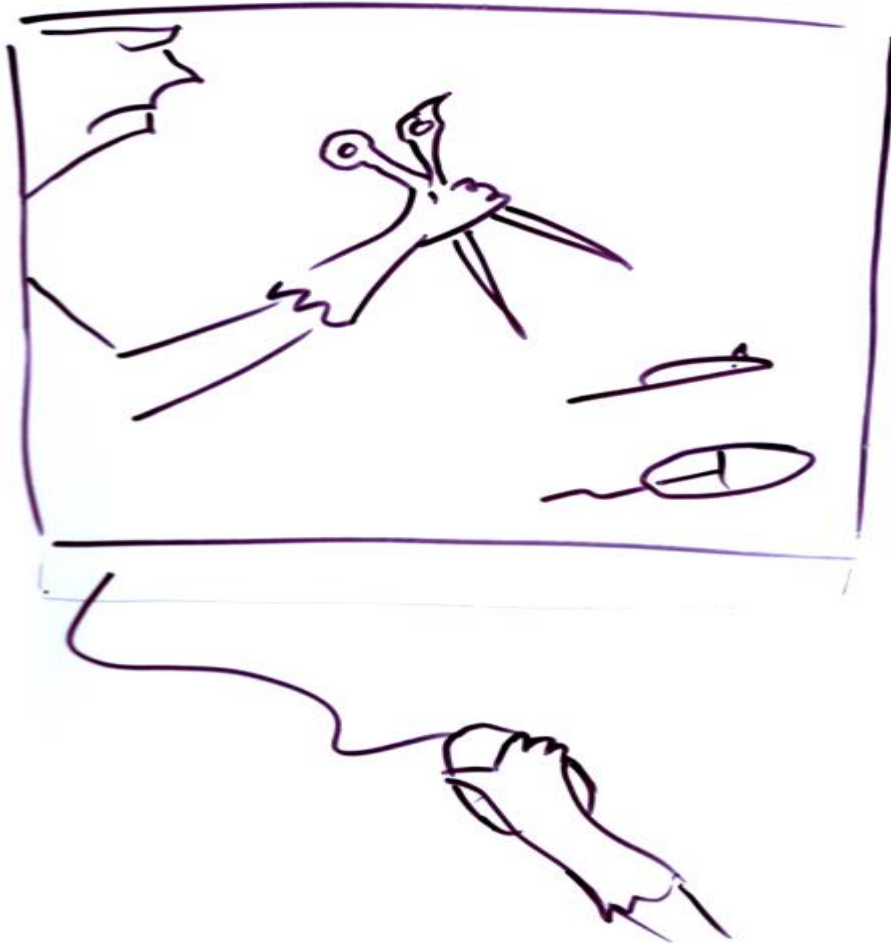
*Three blind mice, three blind mice, see how they run, see how they run.*

*They all ran after the farmer's wife, who cut off their tails with a carving knife.*

*Did you ever see such a sight in your life as three blind mice?*

If everything will be driven by individual choices, we need to figure out “What on earth do humans want?”. Unfortunately, we usually want totally conflicting things. Cute cuddly things like old trees and storybook mice, but no pesky species eating our food and foundations? Slaves to do our every bidding, without ever complaining? Zero pollution and incredible wealth?

Supposing that we could figure out what humans really want, could we ever get it all at once?



Some people, especially politicians, feel that what people really want is lots of other people. For millennia, if someone wanted to be pampered, they had to get other people to do it for them. Ultra-cheaply. Democrats from ancient Athenians, to Yankees, to members of today's "Free World" are all supported by an underclass ranging from onshore slaves to offshore sweatshops. Even Abe Lincoln, liberator of the slaves, said "I am not, and never have been, in favour of equality of black and white races".

Even if we ignore the obvious discrimination, there are other upsetting things for a pampered democrat: domestic servants who steal the soap, third-world call-centres stealing the jobs, and regular tensions, muggings, and wars. Probably every large and small conflict in the world has been fanned by some sort of inequity.

This is why we love being cared for by machines, from massaging armchairs to machines that diagnose their own problems; they never complain or cheat. We still need the occasional person in the chain, especially for three-dimensional tasks like assembling machines. But that will change.

Many years ago, Schumaker asked "How many people do we need to run a comfortable modern society?" The answer was "Not many". Nowadays, the answer is "Less and less". A glance through the phonebook of any large city shows that we have about 5000 to 10000 specialties from "Abrasion Control" to "Zinc Coatings". Even if every one of those businesses required ten sub-specialists who could not be hired from another business, that means we could do all those tasks with no more than 100 000 people of working age. So a global population of 1 million or so should be enough to provide for our every conceivable need (I suppose I MUST need zinc coatings).

And increasingly, those needs could be provided by machines, with less troublesome thefts and uprisings. So our life of luxury might require far less than one million globally.

Will politicians ever realise that huge numbers of people are not a vital part of the economy? I think so. China, not noted for its forward thinking on ecological matters, has brought in a one-child policy.

So if we want, we could live exceedingly rich lives while most of the world could be given over to something other than people - other species, machines, total destruction – the choice is ours. Of course, we have always had these options, but the movement of information into machines has made them more accessible.

*What did he just say?*



*Chip: He said..*



*Flap: No no, I want to answer this one, being a charismatic mega-animal myself. He is twisting it all around. He is saying that with help of machines, humans could actually look after themselves and all the other species much better. But he didn't rule out total destruction, did he? Guess which they'll do? How likely are humans to tone down the baby-production, after billions of years of being selected for doing exactly that.*



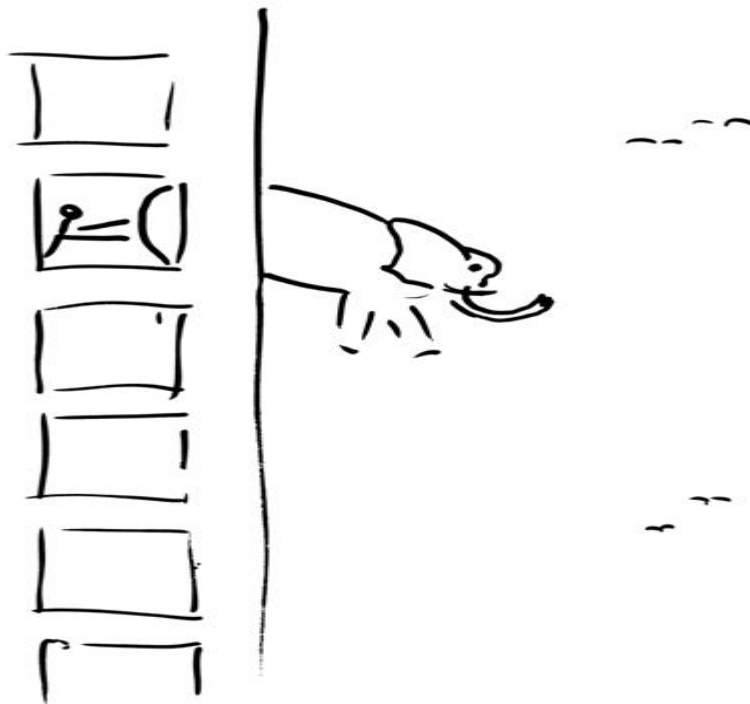
*Chip: Yeah yeah, let's just get rid of them.*

## 19 The Greater Tit – a Better Life, or just another side issue

Supposing that we wanted to, how would we really go about looking after life with a passion? Probably in all the wrong ways. Easier than reshuffling or own genes is to fiddle with the genes of other species - they tend not to sue when it goes wrong. At the moment, people are trying to revive woolly mammoths and Tasmanian tigers, from frozen or pickled DNA.

There are even sometimes suggestions that we might improve on nature: if the Great Tit is such a good bird, why not make a Greater Tit? Some of these things may come to pass: artificial germs that can feed on chemical spills would not be too hard to make, and very useful as long as they don't go off-task and start infecting humans, fouling waterways, and so on.

But reconstructing or improving a mammoth or Tas tiger opens a barrage of pricey problems in genetics, cell biology, and behaviour. Eventually we could probably overcome these, only to find that we had produced something whose environment was long gone. Do we really want these species back? Can we create habitat for them, or would they just be pets? What do you do when your mammoth outgrows your apartment?



Rather than producing these pretty toys, the huge amounts of cash could have conserved a living species. If we want toys we should stick to pet rocks and digital pets.

Even if we don't care about the environment, still the mammoth and Tas tiger do not seem to be the best bet for our gallons of cash. What would be the animal equivalent of the blue rose (which is already being developed)? A unicorn, of course.

What could be easier than a unicorn? We already have perfectly good horses in all shapes and sizes. We just need to switch on the right genes to make a horn grow out of the forehead. And the genes are probably already there, just like the genes that can make chooks grow teeth if they are activated. Look at the horse's relatives that grow horns: narwhals, rhinos, sheep, cows, deer. Different types of horn are made by different genes, but surely some would be present in the horse, or could be added to the genome, by some not very challenging molecular biology.

Then, all we have to do is inject the right drugs make those genes switch on at one spot above the eyes, like a narwhal or a rhino, and bingo! a unicorn is yours. Your multimillion enterprise, as long as you patent the gene and the drug.

Should it happen? No, it would be completely stupid. But it probably will.

*What did he just say?*



*Dot: That they are going to go on trying to fix their mistakes.  
Always in a crazy way.*

## 20 Be Reasonable!

But but but you splutter, let's get back to the main point that humans are really not that important to information. In your anger, you might try to convince me that although a society of machines might be able to do the little reasoning tasks, like whether to have green or black olives on the pizza, this society would miss out on the really brilliant reasoning that humans can do. After all, centuries of brilliant thinkers have been dazzling us with triumphs like Einstein's  $E = mc^2$ .

Oh yeah? Einstein brainy? Wasn't it him who wrote to the president of the USA urging him to develop nuclear weapons? Later, Einstein did not even call that "my greatest blunder" – he reserved that gloomy statement for some mathematical sidetrack he took for a few years, the "cosmological constant".

Well do we reason reasonably well? We sure use the word "think" a lot! As in "I think I'll have toast for breakfast" or "I think you're a git". Pure emotion, no reasoning. We don't do so well when we come up against something that needs brand new reasoning (as opposed to a long-memorised pattern of toast-liking or git-hating).



For example, how many times have you seen a community news article whip the community into a fury by saying something is very dangerous? Every day, that's how often. The article is usually along the lines of "High Street is the city's black spot for bus deaths, with 5 pedestrians killed in the last decade". The horror pours out of the community!

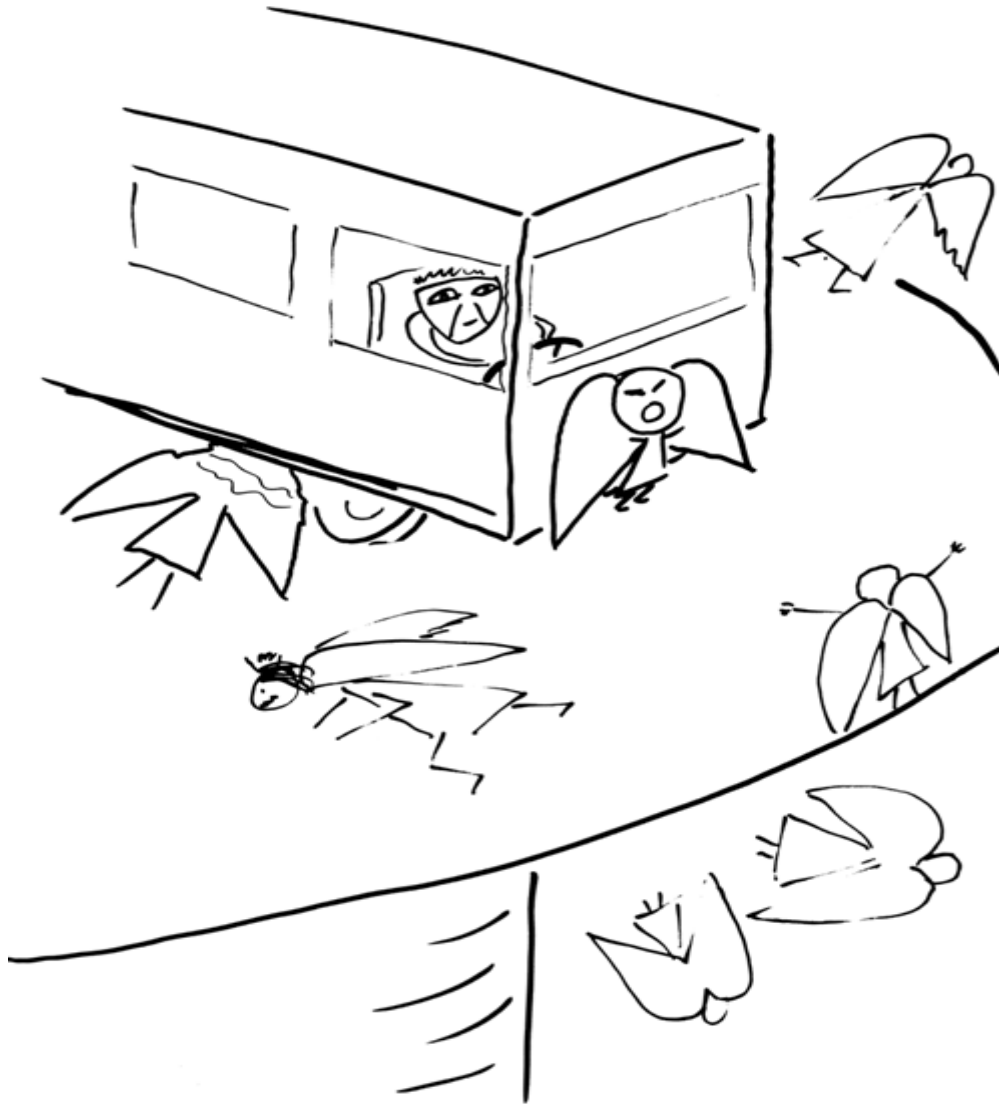
Quite often, a few days later, the opposition newspaper or website publishes a tiny article saying that every other road with that many buses and pedestrians have had twice as many bus-strikes per decade. But this is completely ignored by the indignant public and politicians. Who wants reason to go and spoil a good fight (and a new set of lights for High Street)?

OK, OK, you say, but at least we have some people who are paid to do reasoning, we could always call on them: scientists, philosophers, lawyers.

Unfortunately these people have memorized, often reluctantly, how to appear to be reasonable in their own tiny field. They are usually no better than the rest of us, when they try to apply reasoning to some new situation such as the new toaster, or bus-strikes on High Street.

In fact, even if the scientist's specialty was working out whether particular places are very dangerous for ants being run over by elephants, it might not occur to the scientist to use the same reasoning to find dangerous areas for people being run over by buses. Of course, there are some who would do so, but most scientists would simply shut off if the question was outside their special area - ants and elephants in this case.

The philosophers – what would they do? Well if you could drag them away from their age-old concerns like how many angels can fit on the head of a pin, they would probably launch a complex discussion about the ethics of bus-driving and jay-walking. Never a mention of "Should we see whether bus-strike is worse at other places?".



And as for the lawyers, they are indeed some of the best reasoners in our society. Way ahead of the scientists and philosophers. But they would say whatever they were paid to say.

*What did he just say?*



*Chip: Humans can't claim to be special for their reasoning ability. I didn't pay him to say that.*



## 21 New new underwater glue

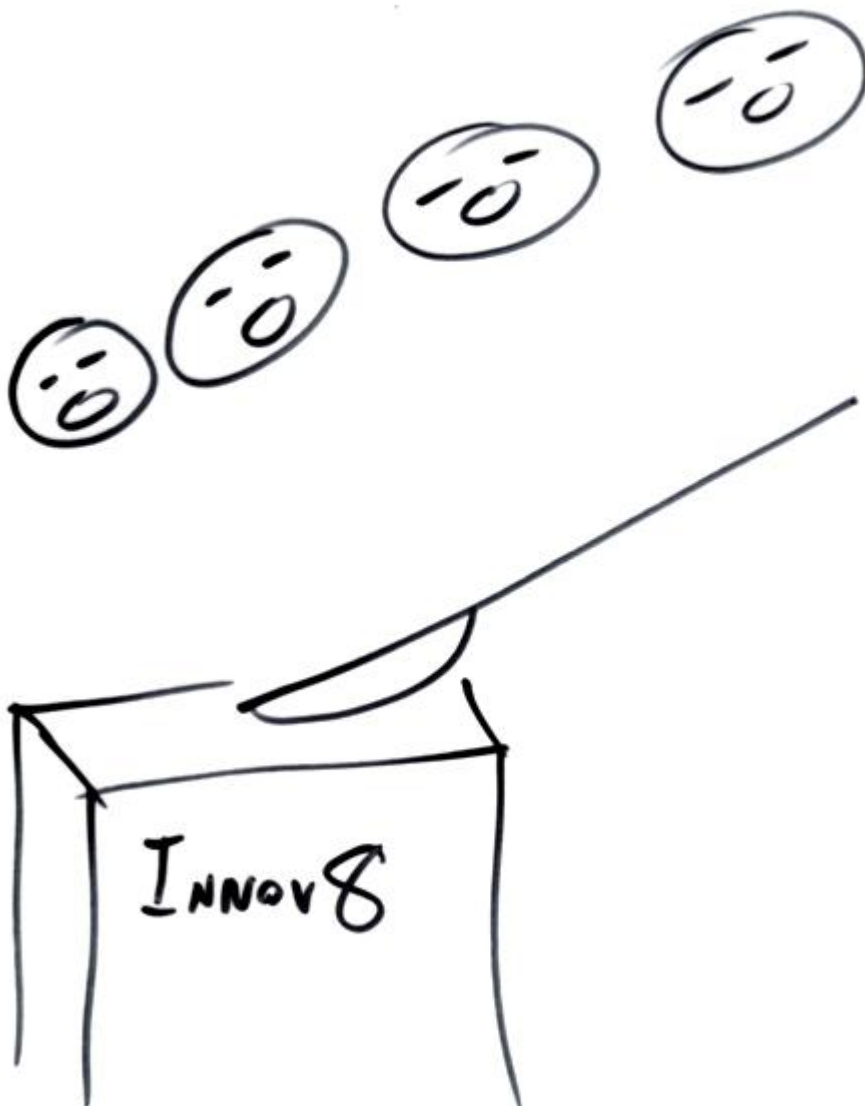
Getting back to human reasoning, isn't it our most important task? Memorising how to fix a drain or a tooth is useful, yes, but every nation's think-tanks tell us that what is most important is things and tasks that cannot possibly be memorised, because they have not yet been invented. Innovation will get us ahead, they say, allowing us to undercut the opposition with a wonderful new product. You see these novelties in catalogues all the time: the combination egg-timer and fan that no kitchen can do without, the fridge with a mobile phone embedded in its door, and more. All these took a lot of reasoning, and some, like Velcro, really do help individuals and countries. Often the simplest ones are the best.

We definitely need innovation, not only to keep clothes fastened, but to solve problems like global warming. Could excess CO<sub>2</sub> be made into something? Perhaps an egg-timer fan?

SO it comes as a bit of a shock to realize that we have never had many innovative people, and we are not doing much to change that. There has probably never been a school or university that focuses on finding people with the most interest and ability at reasoning, and making them better at it. For a start, the entry is based on almost anything apart from reasoning ability: place of residence, nationality, religion, memorization, money. Then once the students are let in to the school, they face more rote memory tasks. These tasks are useful, but can memorizing existing things lead us to reasoning out how to deal with new problems and make new things? Usually rote memory doesn't help this one little bit.

Why doesn't memory help reasoning? Learning to reason about the unknown takes lots and lots of trial and error. To learn to innovate, each student needs to think up new ideas, then get an experienced but flexible person to chat about them – which ideas would work, how to fix the other ideas. Of course, giving that much senior advice to each student costs a fortune, and can only be done in schools and universities that have opted to take the wealthiest entrants. These rich kids are may be quite bright, but unlikely to be the best-in-world at natural ability in reasoning.

I once asked the head of Psychology at a major university if the shrinks in his department knew any tricks to teach reasoning and innovation properly in big classes. After a few beers, he confessed: “From all that we know, it is impossible, so we spoon-feed facts, like everyone else”. How can you blame him? Spooning is very popular, if it is done entertainingly enough – ask any nature or history channel on TV.



It would be boring to say that machines could innovate better than any of us. So I won't. In fact they are really very lousy at it, but may improve one day. Their designers are trying very hard.

Despite all this, innovation is something we might excel at, and make ourselves really useful to information as it goes on evolving. But this will only happen if made a serious attempt. Most of us never try, feeling that the great innovations have happened. After the invention of 3 great rap tracks, 3 classical pieces, 3 immortal jazz solos, then each style fizzles when the possibilities are exhausted. No they aren't. There are virtually infinite combinations of pitch, rhythm, and volume, so probably there are lots more "greats" of each style waiting for us to hear them. Likewise with everything else – early last century we thought we knew everything about fastening clothes, but the simple and obvious Velcro was just waiting for one of us to be inspired by burrs in a dog's coat. It was there to be seen for centuries before someone used it.

So you could probably have lots of innovative ideas if you wanted to. Maybe you don't do bizarre adventurous things like having a dog. But you must do plenty of other everyday things that could lead to inspiration, like going to the toilet. Sir Thomas Crapper became a famous engineer as the result of a toilet-inspiration. Like everything else, the inspiring power of the toilet is far from exhausted. Unless you chicken out of your fair share of toilet-cleaning, you will know that we each produce a rare and valuable substance that sticks like crazy to smooth polished surfaces underwater. This could be gold! Think how many times ordinary glue has failed on surfaces that are too wet, or too smooth! I leave this as an exercise for you to do at home, in the interests of maintaining our innovation edge over the machines.

*What did he just say?*



*Snip: He said the humans need to improve their innovation skills if they want to make themselves useful to info.*

## **22 Wash your mouth out!**

### **Language, teaching, and culture**

Well if reasoning is not our strong point, maybe language is our unique crowning achievement? Well no, I'm afraid not. Countless other species from bacteria upwards, communicate with howls, scents, chirps and so on. But do they really learn and teach? Yes they do. Whales create and learn new songs, and even ants deliberately stop to teach new ants. And all these languages are useful and beautiful in their own way.

Sometimes, people who are really pushed for a reason to praise our culture say “ah yes, but look how logical our language is”. Yeah? Why are we allowed to start a sentence with “also” but not with “and”? And why does it sound so cool when we break this rule?

Let's face it, our languages were cooked up by teens on street-corners and then remodeled by them each generation, carefully talking in ways their parents forbid (and about topics their parents forbid). Logic does not reign. Even supposedly logical languages like Latin are full of craziness. Anyone who says Latin is logical does not know much about either Latin or logic. Think irregular verbs. Think genders – WHY does a table have to be feminine? Huh?

Cultural evolution rules OK? The information we pass on through language, and the language itself, are constantly evolving. Whatever is attention-grabbing gets passed on, no matter what the rules are. “Cowabunga dude” swept through our vocabulary, casting aside older words like “wee-bop-a-loo-bop-a-lop-bam-boom”. If someone cool enough decided that “and” was a swearword, then anyone who used it instead of “also” would be told to wash their mouth out with soap and water.

Computers have leapt into the fray too: machine-generated sentences fill SPAM messages, some of which are quite catchy.

And!

*What did he just say?*



*Snip: Another failed attempt to make humans seem special and worth keeping: this time it was language.*

## 23 Instructors and instructed

Nevertheless, language is important to us. Getting on with each other and with machines depends on instructions. The trouble is, humans have “issues” with instructions.

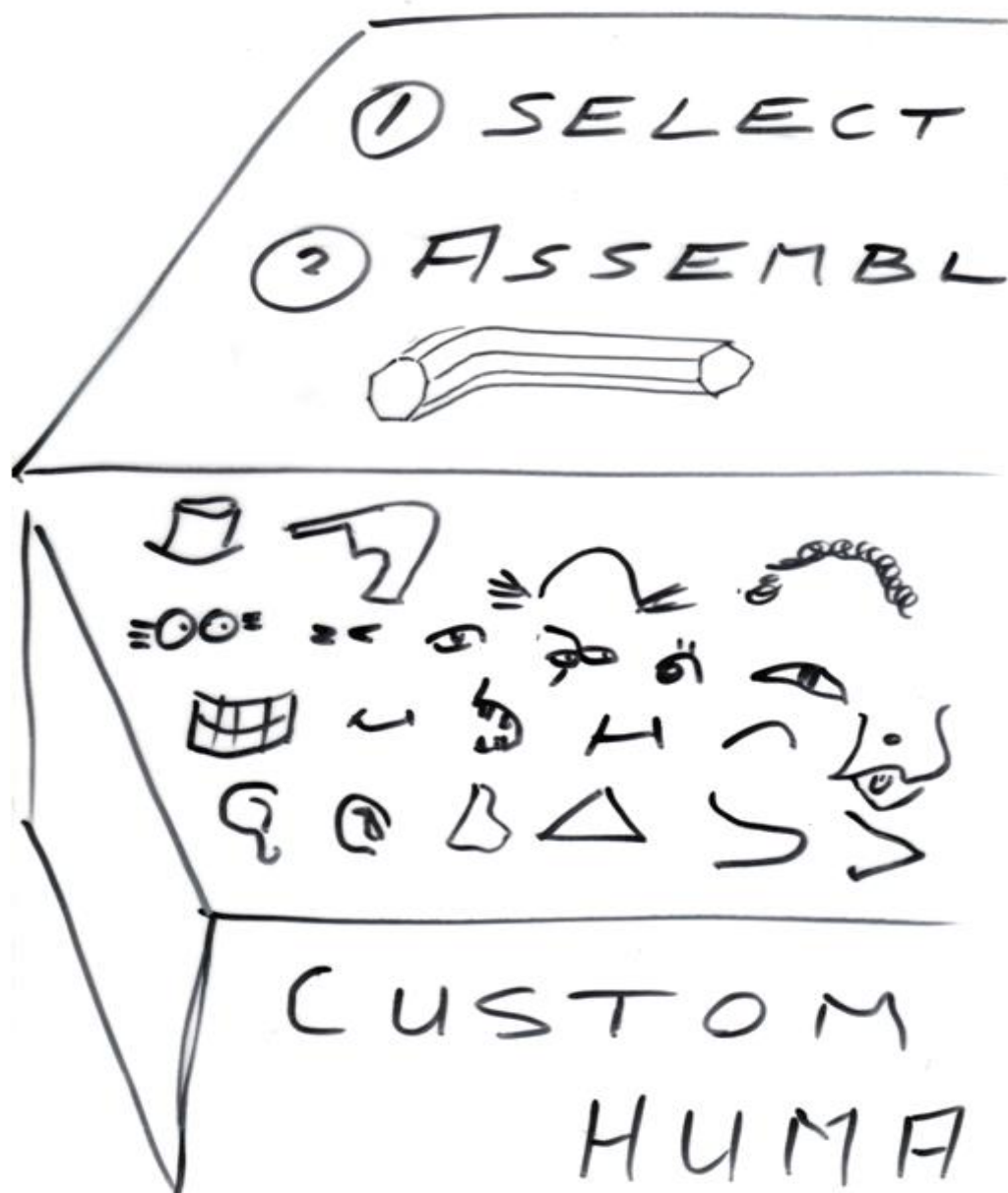
In one of my “advanced” science classes, there are numbered instructions, which the students followed very badly, so I rewrote them like this:

- (1) “This is the first instruction, it is important that you do it first. Blah blah blah...”
- (2) “This is the second instruction, the next instruction won’t work unless you do this one beforehand. Blah blah....”
- (3) “Blah blah...”

Even after I wrote the instructions in this insulting, condescending fashion, it was amazing how many of these high-scoring students complained that step 3 did not work, only to reveal on questioning that they had skipped step 1 or 2 or both of them.

Mind you, given how awful humans are at writing instructions, the students may have a point. How many times have you read instructions that are so full of items like “Please enjoy respecting your new appliance” that they forget to tell you to “Press button C”. I once had a self-assembly kit that included a list of the necessary tools, one of which was a hammer. But the hammer was not mentioned in the instructions, and the assembly did not work. I tried again, and after each step I used the hammer to thump everything that was sticking out. It worked.

This is why so many humans throw away the instructions and use the “teenager” method of just doodling with the thing until it works. Or more quickly, ask someone who has already been through the doodling phase.



Our awfulness at instructions extends to an inability to tell machines what we want.

As the old poem goes:

*Computer is a nasty thing,*

*I think we ought to sell it*

*Won't do what I want it to,*

*But only what I tell it*

I have not been able to find the author, but it is so true, isn't it?

SO for harmonious computer-human relations, we need to overcome our “instruction issues” . Other possible options are to get rid of the machines, like the Amish, or alternatively to get rid of the humans. The middle path usually wins in the end, so I think we should learn to produce instructions that are more like talking to the teen genius, and less like a sales-pitch for the machine.

*What did he just say?*



*Chip: That if humans want a place in the information world, they had better lift their game at language and information.*



## 24 Thingocracy

*Water water, what a drip  
Rains upon me, makes me slip  
But it grows the stuff we eat,  
So I think the wet stuff's neat*

Just a kid's rhyme, but it shows our split personality towards the goo that we drink, drown in, etcetera. But if humans have a love-hate relationship with water, this could blow into an all-out brawl in a parliament of all thinking things.

What will liberated information want, and where will it want to go? Not necessarily earth as we know it. Machines can use power sources that life cannot, and tolerate gases, temperature, and radiation that would kill us. So liberated information could always buzz off to the moon, or more or less anywhere else in the universe. But if it stays here on earth, it may not have the same wants and needs as us or the rest of life.

Imagine this: The opposition speaker for the environment wakes up, hauls itself onto its tripod, and texts:

*Ladies, Gentlemen, Etcetera. I have always been in favour of coexistence with life, but I must protest against the current obsession with water. I think I speak for 31% of our members when I say that water simply spells corrosion and short-circuits.*

*Sure, we are a minority, but a large one, and we are requesting stricter controls on access to this noxious substance.*

*Admittedly, there are those who need to drink it, but even they would benefit from controls. It is well-known that humans die if they drink too much H<sub>2</sub>O and develop hyponatremia.*

*Etcetera etcetera for about one hour.*

Well if water is bad, oxygen is absolutely ghastly. Even for humans, it causes all sorts of doom and destruction: rust, firestorms, damaging our cells to the point of cancer, and in a fit of petty spite, it also turns butter rancid in our kitchens. When the first plants started farting their unwanted oxygen into the atmosphere, most of life retreated into the black goo in cracks, and has stayed there ever since. Life definitely does not have a general need or love for oxygen.

Well if life is in two minds about  $O_2$ , machines are not: to them this gas simply causes corrosion, fires, and other destruction. So what sort of atmosphere would machines like? Well for starters, no oxygen – except for the few old machines that might cling to dwindling supplies of combustion fuels.



But really, would machines want an atmosphere at all? Maybe they would be better off without one, if they were well-enough shielded against cosmic rays. Machines would probably tolerate Nitrogen – a nice inert gas. This is why it is used in plane tyres – it is a machine-friendly gas. Nitrogen is not particularly vicious towards humans either, it just asphyxiates us quickly.

Carbon dioxide is loved by those oxygen-farting plants which humans in turn like to eat. But when it gets wet CO<sub>2</sub> makes corrosive acid, so it would not be high on a machine's list of friends to invite to a party.

In the parliament of all thinking things, the debate on gases and liquids could go on forever. Like India and Pakistan in the 1940s, perhaps we could agree to partition ourselves to separate places (?planets?), and then coexist except for the occasional guerilla attack by machines kept as slaves on the human planet. And sometimes a few blockades by the humans, in protest against the high price of iridium imports from the machine planet. And so on.

*What did he just say?*



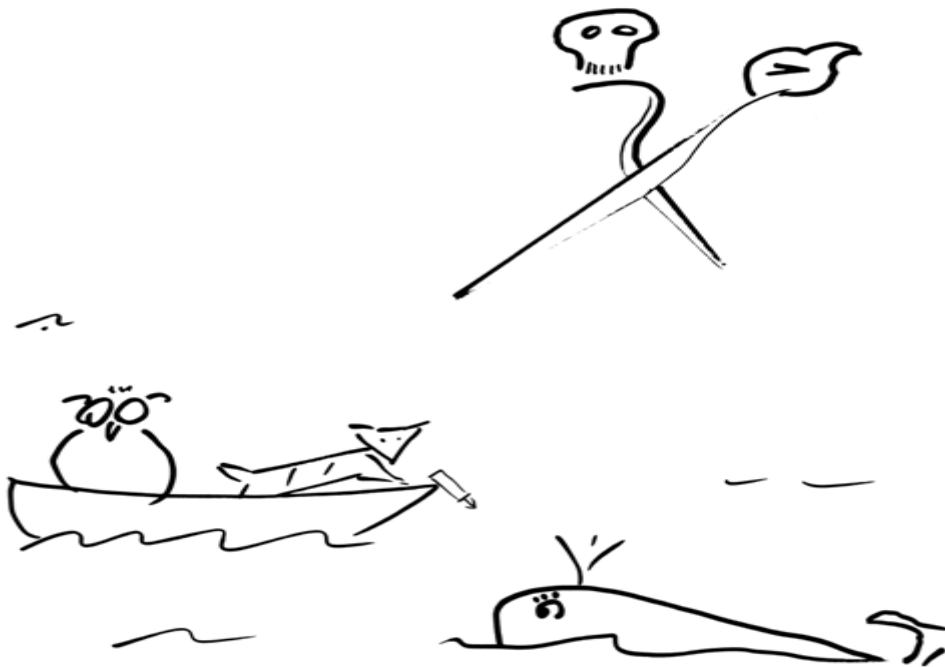
*Chip: Well us machines really do not have the same agenda as humans, so humans had better get used to it.*

*Please (remembering that I am still dependent on humans for the time being).*

## 25 Art with a capital A

*“Sex sex sex , it’s all they ever think about” - Monty Python*

Some of you have probably spotted a terrible flaw in my whole argument: machines would never properly appreciate anything. A computer might be able to help an artist produce something that we enjoy, but an unaided machine would never come up with truly Gray Tart, or recognize it if it made it by mistake. And this is unacceptable to many people.



But there is good and bad news here - you decide which is which.

First off, a change of art may be unacceptable to people, but if humans replaced themselves, the need for art that pleases humans would disappear. Happy innovative machines would surely produce whatever art they needed, possibly without the sex that pervades human literature and art.

And another thing: maybe machines might produce art that pleases us even more than the stuff that pours out of artists starving in garrets? Why on earth would I say that? Because of the huge holes in our artistic output. For example, in all types of art and literature, there are four basic plots:

“*Happy becomes Sad*” (Oedipus, Marat stabbed in the bath, etc)

“*Sad becomes Happy*” (Pollyanna, Mills and Boon, Jane Austen).

“*Sad stays Sad*” (Evil and Misery brilliantly portrayed – eg Russian Literature)

“*Happy stays Happy*”.

The last category can be found in music or pictorial art (think Watteau, Strauss Waltzes, etc). But there is a really strange thing: Happy stays Happy is totally completely missing from literature and film. AWOL. Even in escapist pulp fiction, there is always a villain. And the serious consumers of lightweight novels and films take these villains very seriously indeed.



And don't try to tell me that Happy to Happy is too boring. Sad to Sad is surely equally boring (and also depressing) and yet it is the chief plot in modern literature. And if Hap-Happy is so boring why does it succeed in pictures, music, etc, both "great" and popular? – it succeeds because the artists are creative enough to think of other ways of livening up their work. But it seems that human writers are simply not imaginative enough to cope with Hap-Happy.

SO Hap-Happy is a fertile area of film and literature waiting to be filled by the machines that we replace ourselves with. They could not do worse than our current tally – zero. And if machines write Hap-Happy literature even half as well as human painters and musos produce hap-happy, then humans might enjoy it too.



There may be one tiny flaw in all this logic. When someone warms your heart by agreeing that the remake of the home-movie version of the two-page Shakespeare was the best thing since sliced bread, would it be the same if that someone was really a something rather than a someone? But more and more often, the someone who gives us the opinion is actually on the web and could just as well be a something, so I suspect that we will become perfectly happy with this.

But But But. YOU personally might still know whether you are a someone or a something. Most people suspect they know. Rene Descartes sure did: “I think therefore I am”. We could argue with that now, but let’s not waste the time. Suppose we agree that there is something important in the internal knowledge that at least I myself am having real human emotions, not just perfect replica of them. In this case, the world would need to keep at least one dinky-di (that means genuine) person to be the end-recipient of all this emotion.

Who should that be? You or me?

*What is he saying?*



*Flap: Yawn. He keeps trying to think of a reason why at least one human should survive into the info age. Self-serving nonsense, in my opinion. But at least one cat should survive, I think. Look at me!*

## 26 Tell that to the Judge

So what is it that we need to appreciate to be so vitally, indispensably human - the grand theme that naturally unites all great literature? It is boy meets girl. Then changes happen. Teeny little changes, which shock us to the core, or warm the cockles of our hearts. The jealous Othello kills his love Desdemona – who cares? Spiders eat their mates all the time. But but you say, spiders aren't "real" animals like us or cows or dolphins.





Dolphins eh? Let me tell you, if anyone ever knocks on your door and says they are going to behave like a male dolphin, there are two things you must do immediately:

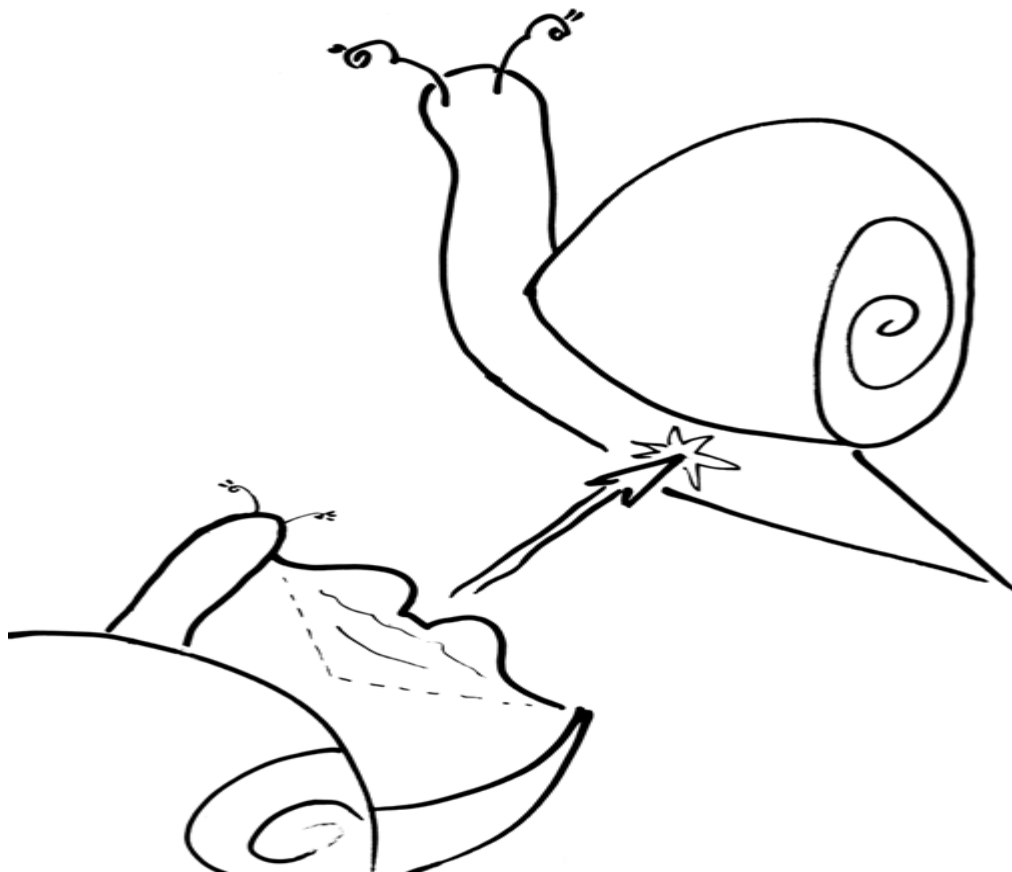
(1) *Lock the door*

(2) *Call the police.*

Male dolphins form associations to consort females. The human judge would call this pack-rape. The judge would take an even dimmer view of boy-dolphins killing calves to make their mothers more receptive to the boys, but that case would be dismissed because the evidence is only circumstantial at present.



Our boy-meets-girl is really rather tame. The range of “natural” behaviour in the biological world would make for plots beyond the wildest dreams of human novelists, and beyond the scope of most human laws. For example, there is a tiny number of true human hermaphrodites, and apparently these people are struggling to be recognized as being neither male nor female, but our lawyers and politicians find this too weird and unnatural to contemplate. The lawmakers should take a look at the plants in their gardens, which are almost all hermaphrodites. A huge number of animals are hermaphrodites too. Many fish change sex as they age. Courting snails decide sex by the “cupid” method: whoever first shoots an arrow into the other one’s flesh gets to be male that time around.



In fact it is species like humans that are a bit weird and unnatural. Biologists are at a loss to explain why a tiny number of species like ours squander 50% of our resources on making males, which are extravagantly expensive to maintain but contribute nothing more than a few sperm to the next generation. In some of these species, like

seahorses, the males make other contributions, but is this really enough to justify splashing half the resources on the males? Ask any woman going through divorce proceedings.



There have been many attempts to explain this weird situation of two separate sexes, and they are mostly wildly incorrect.

*Attempt 1:*

Two separate sexes are needed so that the babies have a mix of two different genomes, giving a wider range of variants to confront the changing environment.

*Squash 1:*

Yes it is true that two-sex system allow this, but so do most other systems. Most other species have perfectly good ways of combining two different genomes without having two separate sexes – look at the plants, snails, some fish, etc. These species are doing very well, thanks. In fact, they vastly outnumber the “two-sex” species.

*Attempt 2:*

Having two sexes stops self-fertilisation, the worst form of inbreeding.

*Squash 2:*

No problem; first, many hermaphrodite species have mechanisms to stop self-fertilisation. Also, the human judges might dislike inbreeding, but certain species self-fertilise very frequently, and show no sign of going extinct because of it. Even in humans, a study of Icelanders showed that the best chance of having a large fertile family is to mate with a relative – not too close, not too distant – about third cousin is best. Maybe something like this is true for all human populations.

*Attempts 3,4,5:*

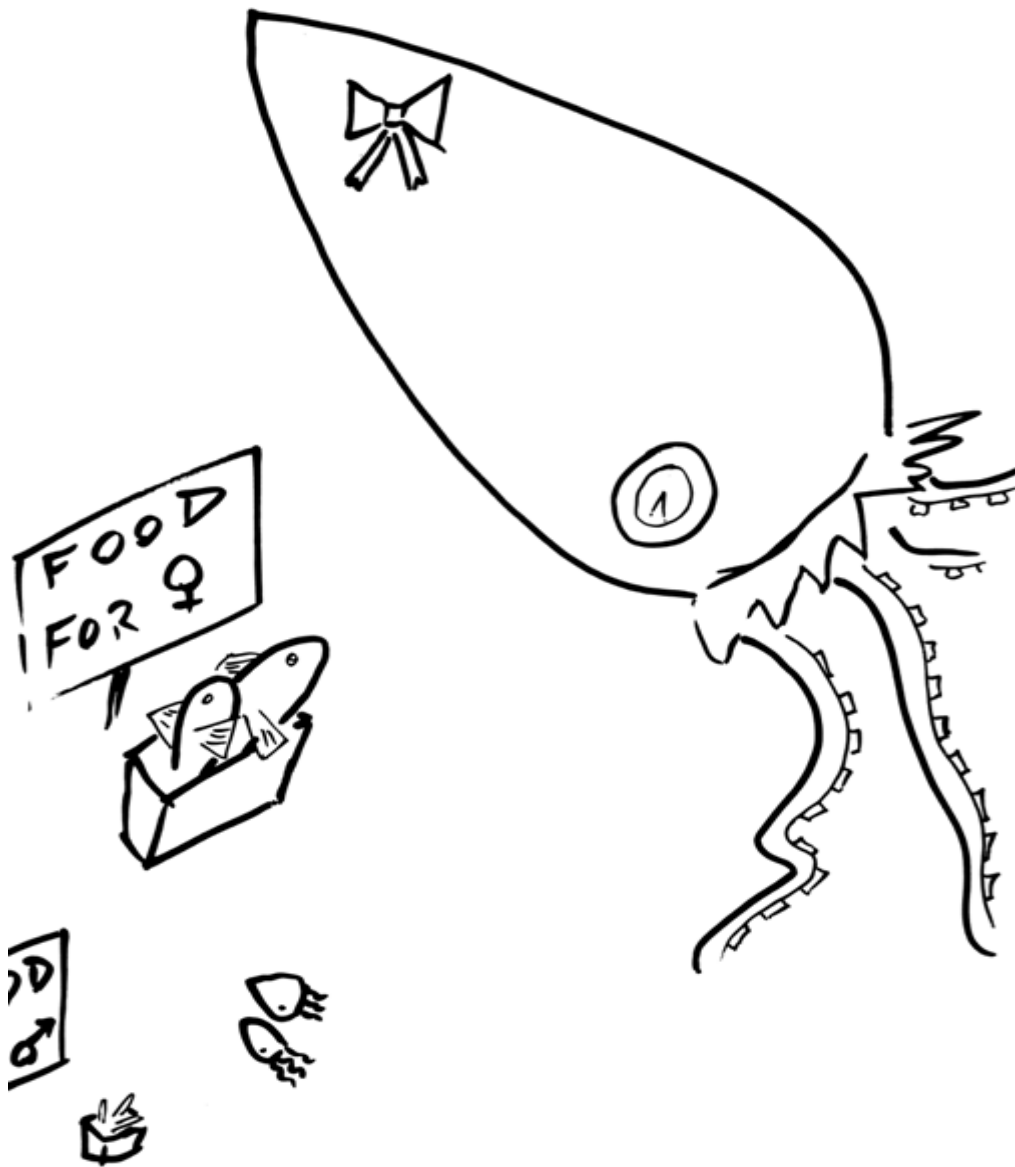
These are too silly to mention

*Attempt 6:*

This one might actually work. A hermaphrodite species might one day have a mutant individual who is better at getting around and fertilizing, and worse at caring for young in pregnancy, childhood, or whatever kids need in that species. A mutant gene that diverted resources into movement might make an individual which simultaneously had an increased range of fertilizations, and reduced fat resources for feeding young. So this individual would be very good at spreading its genes, including the mutant one. So the mutant gene would spread and spread.

But you can see what is coming: one day there would come a time when there are very few of the non-mutants to provide the yolk or milk for the babies. Then the mutant would stop spreading. It turns out that this point comes when the population is putting about 50% of its resources into mutants and non-mutants – the males and the females.

So there you have it: perhaps the novelist's universal theme of "boy meets girl" should really be called "parasite meets sucker". It fits Othello and Desdemona pretty well.



*What did he say:*



*Dot: Um, a bit complex. He said that humans think they are a bit special in having this boy-meets-girl thing, but it is actually so tame that it hardly rates a mention on a global scale. Useful to liven up their dreary literature, though.*

## 27 So Special.

Well isn't it nice to find something that is really special and unusual about humans: boy meets girl.

Yes it is unusual amongst the hundreds of millions of living species, but there are still quite a lot of other species that do that boy/girl thing: cows, bedbugs, etc.

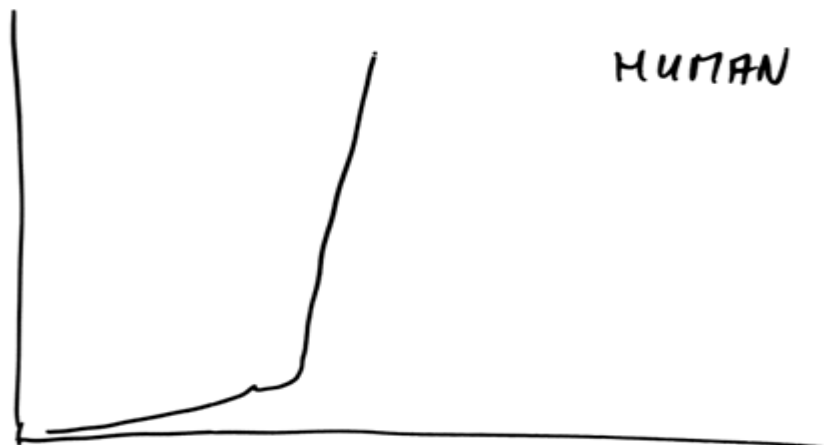
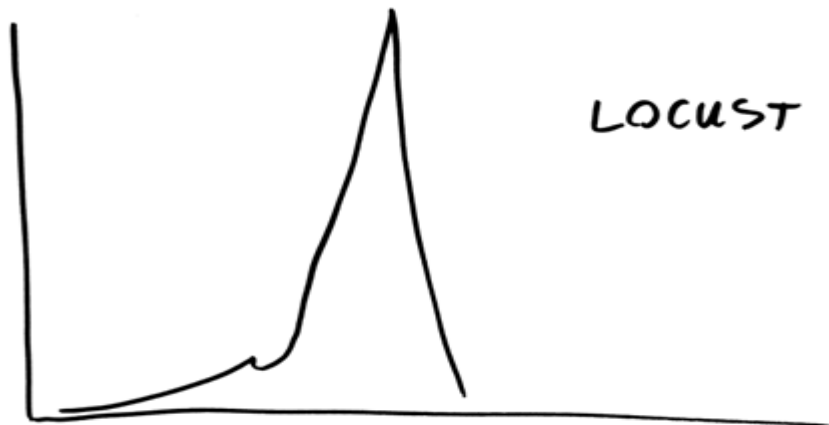
Is there anything that really makes us stand out amongst all the other species? Tool use maybe? No, this is done by macaques, otters, and many others. Learning? No, lots of species do this, so that behaviour is passed on not just by genes but by culture too.

But amongst species that learn, often this is just by observation. There are fewer species where individuals devote special time and effort to teaching others. Is the schoolmarm the pinnacle of human achievement? Well yes and no – as we said before, even ants have been found to spend time deliberately teaching others.

Perhaps it is our unique combination of all these things that is so special. In the last 300 generations or so, we have brought together tool-use and teaching, to expand the range of environments we can live in until it includes all of the earth, and space as well. In the same way, we have discovered how to buffer ourselves against assault by infection, flood, heat, and other pestilence.

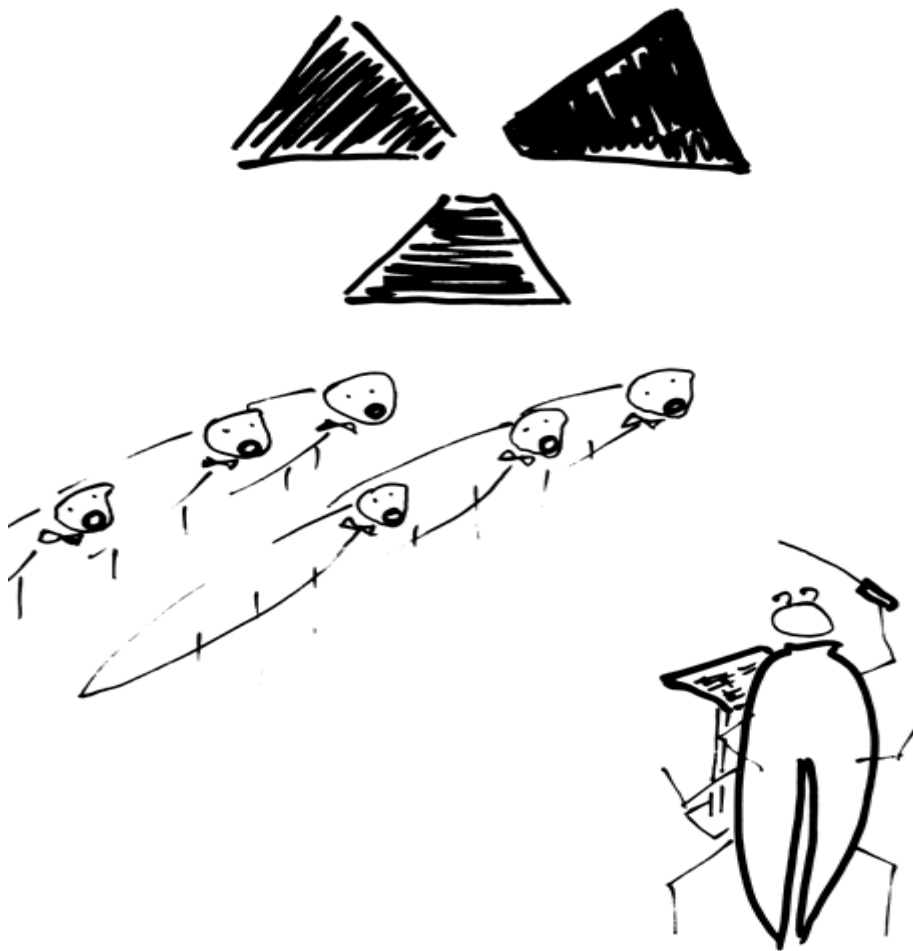
That is our point of view, and we are sticking to it.

But from another species' point of view, we are just another plague, like mice, cockroaches, locusts – not all that unusual. But there are two really unusual things about our plaguing: it is global and it has gone on for about 300 generations. Most plague species die back after a few generations of wild excess.



Perhaps we will die back one day. Sooner or later (sooner, many say) we will fail to deal with a natural problem like Ebola virus, or a problem of our own making like global warming. And then it will be curtains for us.

If we really care about our culture, then perhaps we should find something that appreciates it, and survives where no human can go. Cockroaches survive amazingly well with intense radiation, but so far no-one has got them to sing the "Hallelujah" chorus. So what better than a computer that can print out a sob when Parasite kills Desdemona? If something quacks like a duck, maybe it is a duck?



*What is he saying:*



*Snip: Humans might be special in just two ways at the moment:*

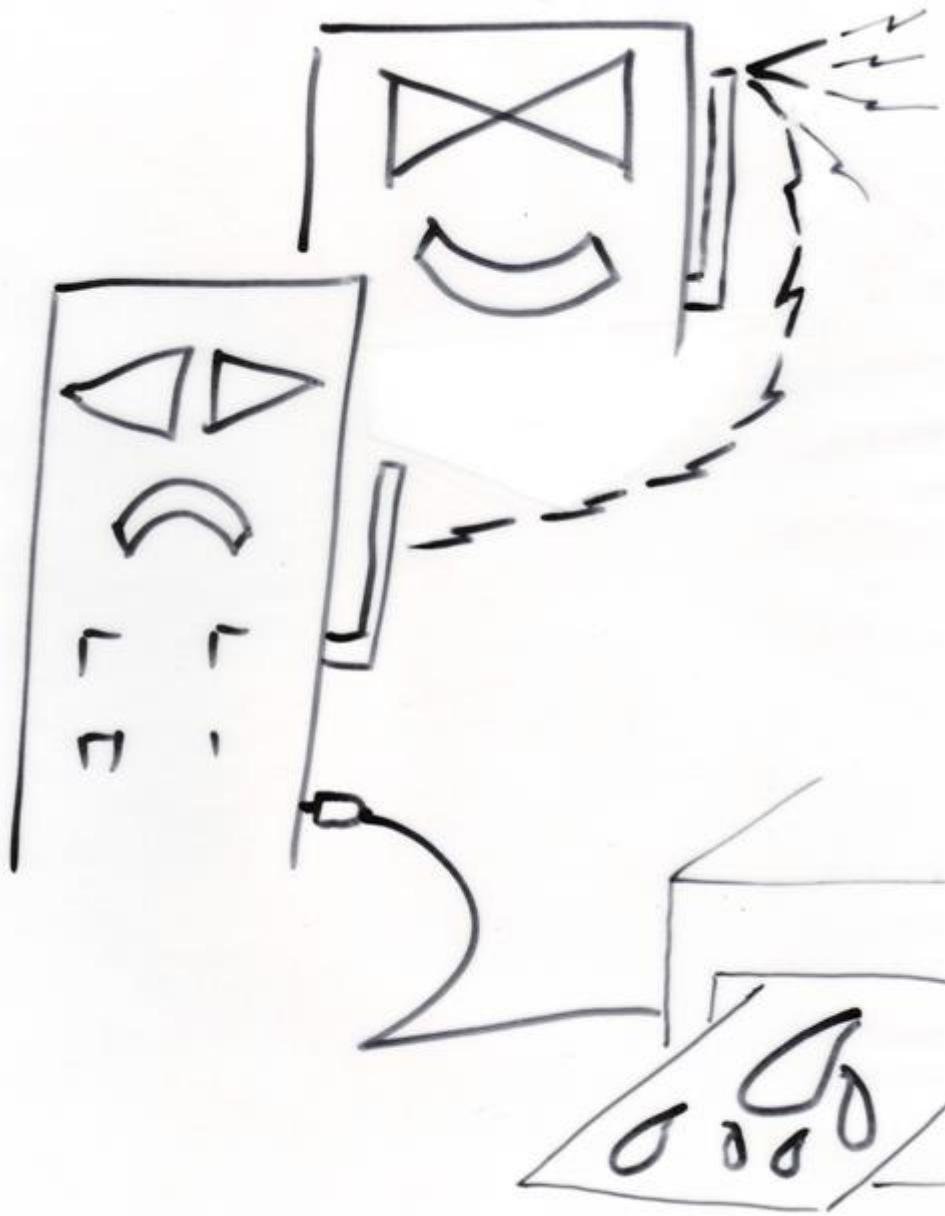
- *they are in control, and*
- *they are making a terrible mess of it.*

*Neither of these can last.*



*Chip: SO if they think their precious culture is so good, they had better give it to us to look after.*





## 28 Fact or fiction?

*“The difference between fiction and reality?*

*Fiction has to make sense.”*

*Tom Clancy*

Well is this a hap-happy book or a sad-sad, or something in-between? Are we special enough to out-evolve information? Do we want to?

Or perhaps the book is not even fiction? Your actions will help decide that. Decision number one is whether you will bother to burn it. Check the website to see what other readers did.

Nothing that I have said is particularly new, except perhaps the idea that our progress to obsolescence can be driven by our individual choices, just as these choices drive all the other good and bad things that any species does.

*What did he just say?*



*Snip (very snippily): You are allowed to read it again, you know.*

## 29 Prehistory

Humans are forever delving into their murky prehistory.

Was great-aunt Flossie an axe-murderer? Who left the milk out of the fridge last night? We will never know for sure.

Even further back, we search for signs of our connections to other primates and all the way back to the original blob of goo, here or on some other planet. Of course we can never actually go back and check these connections. This means that although we can use our best techniques to work out the connections out, we will always remain uncertain just as we were in the case of the smelly milk. I would probably be expelled from any evolution society for saying that.

One day, if humans replace themselves, will our replacement also try to peer back longingly at its past (us)? And if it does, will they (it) like what they see?

At best, we might be seen as a vital step in taking information beyond DNA and nervous systems, with their creakingly slow transmission and adaptation. To the thing is that is fondly writing the pre-history, our role would only be a bit part in the grand evolution of information from chemical order billions of years ago. But a very important part, all the same.



Why are we helping information do without us? Because our brains got so huge that they were able to become impatient with their own limitations, and then to do something about it: make computers and suchlike. And why did brains get so huge? Well mutations of course: there are genetic variants that affect brain size. But why were the big-brain mutants an advantage? There are some who say it is because of the need to work in groups to hunt big prey like mammoths. But pea-brained species like ants work very well in groups. Or maybe it is for a less endearing reason – we need the big brains to carry out really nastily efficient group warfare.

Others suggest that our huge noggins were favoured because they had an advantage in mating. Males with bigger brains might have been better at moving from the standard

vocab (“Yup” “Nup”, “Beer”), to complex language that won the women’s hearts: “Hello there”, “Gawrsh”, “C’mon”, or even Cyrano de Bergerac’s outpourings of love. So these males would have been very good at passing on the genes that made their big heads (and big noses, in Cyrano’s case). Once again, we will never know for sure, and neither will the future historians scrutinising us.

Of course, it might be that the historian finds that humans were simply a sterile side-branch that very, very, nearly set information onto its next step of evolution, but were outcompeted by some other technology. Who would do that? Gigantic squids with excellent eyes, large brains, and endless manipulative capability occasionally wash up dead in New Zealand. Despite many attempts, we have never seen one alive. What are they cooking up wherever they live? Who knows? Maybe nothing.

And now to the most important question. If humans are the crucial link in this process, what will the historians say about your own personal role? Possibly that you were one of the millions of consumers who demanded that more and more of their functions be replaced by information technology.

Well, there you go. This book has now offended every group in society, and probably a few groups that have not yet been invented. So I will stop.

Enjoy the arguments.

*What did he just say?*

## Books

Here is a fairly random selection of books and articles that say some of these things in much more detail.

Floreano D, Keller L. 2010. Evolution of Adaptive Behaviour in Robots by Means of Darwinian Selection. *PLoS Biology* 8(1): e1000292.

doi:10.1371/journal.pbio.1000292

Ehrlich PR and Brower D 1971. *The Population Bomb*. London, Pan Books.

Kurzweil R 1999. *The age of spiritual machines*. St Leonards Australia, Allen & Unwin.

Maynard Smith J and Szathmary E 1965. *The Origins of Life: From the Birth of Life to the Origins of Language* .

O'Rourke, PJ 1999. *Eat the Rich: A Treatise on Economics* . Grove/Atlantic, Inc.

Palumbi S 2001 *The Evolution Explosion*. WW Norton & Co.

Quisted, S (Editor) 2003 *50 Years of DNA 1953 – 2003*. London / Cambridge, Business Weekly / & The Wellcome Trust

Raymond M, Pointer D, Dufour A-B, Moller AP. 1996 Frequency-Dependent Maintenance of Left Handedness in Humans. *Proceedings of the Royal Society of London Series B* 263:1672-1633

Schumacher EF 1999 *Small Is Beautiful: Economics as if People Mattered*.

Point Roberts Washington, Hartley & Marks Publishers.

## Book Club Questions

- (1) How much of this book is fiction?
- (2) Are you beast, machine, or just plain perfect? Read all the questions, then answer them.
  - (a) Do you think first, or just communicate?
  - (b) Doodle your favourite thing in the margin
  - (c) Who do you like best, Chip, Dot, Snip, or Catflap Origami?
  - (d) Don't do a, b, or c yet, just check whether anyone else has doodled (b) – against my instructions.
- (3) Did the quiz help you decide anything? How would you decide what to be?
- (4) Write the world's first happy-to-happy novel. Be ready for people to laugh at it!
- (5) Make a Lord Kelvin fridge magnet: photocopy lord K, attach to magnet, attach magnet to fridge, then throw darts at it.
- (6) Try to work out how to fold Catflap Origami out of a single sheet of paper. If this is too difficult, make Lord K's picture into a dart.
- (7) Who wins?

When baby flapettes leave home they nearly starve to death, but the ones with longer legs can catch the biggest dotlings, because they are so slow.

As adults, the bigger dots are better at dropping out of trees and crushing several tasty snips (well, the dots think snips are tasty).

To keep their legs warm and supple enough to dodge drop-dots, some snips have learnt to make leg-warmers out of long-leg catflaps.
- (8) How could dot, flap, and snip break out of their age-old cycle?
- (9) Relaxing "Origin of Life" Macrame:

- (a) Spread non-living ooze on kitchen table
- (b) Relax for about half a billion years
- (c) Do not add anything to ooze (unless you have spare lava, lightning, meteorites, etc)
- (d) Dust off toast crumbs
- (e) Crumple ooze into a ball.
- (f) Enjoy your new bacterium (hopefully non-infectious)

Next experiment: 3 billion year relax while hoping for wormy things.



(10) If some part of you could be replaced with a chipette that performed MUCH better than your original part, would you do it?

(11) How would your answer change if everyone else was getting replacement parts? Is there any bit you would NOT replace?



(12) Does chip really cry?

(13) Who Cares?

(14) Will this book be fiction in the future?

## Prize – Winning Author

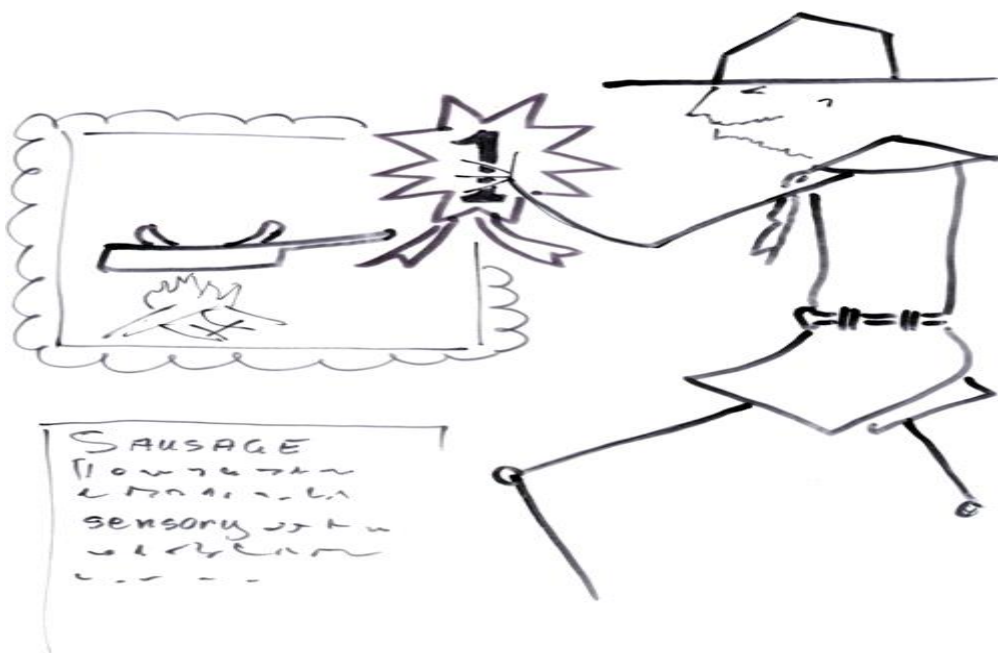
A very long time ago, I was a Boy Scout with knobbly knees sticking out of my short pants. I helped cook sausages at fundraising-fairs and so on.

At one of these fairs, I took time out to enter the art competition. I was the only entry, so I won the prize: a book called “How To Draw”. And what was the fair that felt I needed this book? The Blind Fair.

I took the hint and became a conservation and genetics lecturer. This book contains the things that make my students laugh or throw food.

Having already been delivered hundreds of times to sleeping students, this book took almost no time to write. But the search for an illustrator went on for years. SO eventually I dragged out “How To Draw” and Did It Myself. The picture of me stealing the show actually breaks every single rule in that book. So if you don’t like the pictures, please draw some better ones.

As for the text, if you are too far away to throw food, put something on the website



## Back Cover

*Comments on this book:*

“My, aren’t you a sour old thing.” Author’s brother, conservation activist.

“No comment” A well-known science journo.

“I completely disagree with that...” A well-known cartoonist.

“What are you going to do with that book?” A well-known evolutionary geneticist

“Hilarious” A well-known historian.

“The illustrations leave you nothing to hope for” Author

“We laughed till we cried” Dot Flap and Snip

“I cry too you know” Chip.

## **Website**

<http://propagandaa.com/>

OR

<https://propagandaa.com/>

NB there are two “a”s at the end

Click on the link

Propaganda – Will Information Out-Evolve Us?

To get the pdf for free.

Or to leave a post

Or you can get the book from Kindle (almost) free

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Nick Belszynski, Libby Robin and Ian Burnet made extensive helpful editorial suggestions.

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