The House of Sufficiency

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Principia Libertatis

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1. Two Processes

I have always wanted to be a good person and live a good life. I have not always succeeded at this, and what seems right to me has changed over the years, but I have never given up the effort. I am quite sure I am not merely being led by a desire to be accepted by others. In fact, I have rarely agreed with my neighbors about what is good. As it happens, I have received many helpful suggestions about what is good. However, acting along the lines of these suggestions has usually turned out to be good for them, and somewhat less good for me.

Nor do I think I am being selfish. I have been accused of being selfish. I do feel I have to look after myself. Doing the right thing requires mental and physical effort. It takes time and energy for me to evaluate my choices. And I have to evaluate my choices before I can freely choose my actions. I need my own space. I need to control the basic circumstances of my life. Maybe that sounds selfish.

In truth, I think self-sufficiency is a way out of selfishness. How can I explain this? Each person has a special familiarity with the things around them. This special knowledge lets people make good decisions about their own circumstances. My circumstances are the things I know about. When I start making decisions about things I know nothing about, the decisions are not so good. That is why I would rather not mess with anyone else's circumstances, and why I would prefer if they didn't mess with mine. When I'm in control of my own circumstances, I can act according to my conscience. When other people interfere with me and my surroundings, then I am no longer free to follow my conscience. How can I make good decisions then? How can I possibly lead a good life? This leads me to conclude that control of my own life helps me to maintain good relations with my neighbors.

Many people feel that the decent way to behave towards other people is to treat them the way you would like to be treated yourself. This idea of decency has broad circulation and is sometimes called the golden rule. I agree. Certainly, I don't think I can boss other people around and keep my own freedom. What goes around comes around. My neighbors and I are doing wrong unless all of us get to make our own choices.

And I think we are doing wrong. We do not allow each other enough free will. We do not even allow ourselves enough free will. We treat each other badly. Our habits and institutions seem designed to break the golden rule even while we praise it. It has been painful for me to see how rarely I am

able to live up to my own expectations. And the more important the occasion, the worse I behave. I behave competitively.

Competition is one of our institutions that violates every rule of decency. And I don't mean competition for fun and games. I mean a serious competition where two people are striving to control each other, or to control a prize they each desire. It is impossible for these two people to treat each other decently. The outcome of the competition is unequal. That is the purpose of the competition.

Our economy is based on competition. So are our jobs, our courts, our schools, and our dating life. Something is wrong here. Why would we run our daily affairs on principles we think are wrong?

Some people have tried to answer this question by claiming that competition is good for us. Their analogy is to natural selection in plants and animals. Look, they say, competition weeds out weak individuals for the good of the species. Similarly, economic competition weeds out inefficient businesses and makes the economy stronger.

But I disagree. This isn't just about the economy, this is about people's lives. Competition may be fine for plants and animals, but it's not fine for people. There is something additional going on with people. We have genes, like plants and animals, but we also have minds. Our minds have their own set of rules. This is a different game, and a different set of motivations. It has to do with what is going on in people's heads.

Then people tell me that competition is just part of human nature. That's the way people are made. It can't be changed. We should just get used to it.

I continue to disagree. Calling it "human nature" doesn't give us enough credit as humans. We have free will. We can change things. We can change ourselves. These people don't see that the world is changing, whether we like it or not. We may have no choice but to change ourselves. In any case, I feel there is a problem with deliberate competition that weeds out human beings. The analogy to plants and animals is too close for comfort. Our economy churns ahead and leaves poor, sick, and starving people in its wake. Incidentally, it has been destroying the natural environment of our planet. I believe that our habits and institutions are in fact set up to kill weak people, and I don't like it.

So what can be done? If we want to get along without competition, we will have to invent a very different way of life. I don't know exactly how that will look. There are problems to be overcome. For example, if I want good things, why do some of the things I want conflict with each other? And why do some of the things I want conflict with things that other people want? I hope to dig more deeply into these questions over the course of this discussion.

If I have to pick a starting point, it is free will. Free will allows me, out of my own individual conscience, to make responsible choices. These choices lead to responsible action, if I have control of my own circumstances. But in order to renounce competition, to renounce the attempt to control my neighbor, I will have to exercise free will. This is how I can come to act decently towards my neighbor.

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What are the alternatives to competition and natural selection? There are many possible approaches to this problem. As it happens, I am a scientist, and so I am most interested in a path based on observation. Other people can believe in intuition or prophesy if they like. But I believe in a single consistent universe with laws we can observe and understand. I believe that repeatable observation tells the truth. I also believe that there are no hidden truths accessible through methods other than observation.

My trust in observation is a choice of faith. I see no point in arguing with people who say they have spoken with God. I can't disprove them. Maybe we will all speak with God hereafter. Meanwhile, I affirm that the visible world is true and trustworthy. It does not deceive us. We can base our most important moral decisions on it. In fact, we must do so, if we hold that repeatable observation is the foundation of truth.

Observation tells us that our universe is made up of a few types of elementary particles known as quarks and electrons. They move around under the influence of mutual forces. The particles and forces are quite simple and well understood for conditions like the ones we live under. They are not mysterious. One electron is like every other electron.

The world as a whole is complex and unpredictable. That is not because it is made up of complex particles, but because it is made up of a vast number of simple particles. Even a few are enough to be unpredictable. It is impossible to mathematically predict the motion of three particles moving under the influence of the simple forces they exert on each other. Any larger number of particles behaves with more and more complexity.

So far as we can tell we're made up of the same particles as the rest of the world. If you could count the number of particles in the human body, you would come up with a number with thirty digits. That is a vast number. It is so big that it is hard to distinguish from infinity.

From another point of view, a number like that may not be big enough. How is it possible that I could be made up of a pile of simple particles? Isn't my experience truly infinite? This can be a wrenching thought at first. After all, I am not aware of any limit to my thoughts and dreams. Even if I am unable to tell the difference between "a very large number" and "infinity", isn't there still a difference?

These are valid questions. However, they are a distraction from the path we are on. For the sake of argument it is necessary to suspend disbelief for a while and to move forward with a statement that seems both obvious and impossible: humans are made of the same stuff as the rest of the universe.

This is only one piece of a larger puzzle. There are several other ideas that will have to be patiently worked out and joined together. The outline of the puzzle should become clearer as more pieces are added.

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Free will depends on what we think will happen in the future. We make choices about what we do because we think different actions are likely to have different results. But how can we have any idea about what is going to happen? We know that the movements of any three particles are unpredictable. How can we make any predictions in that kind of environment?

We can't predict the detailed activity of a group of particles. But it turns out there are a few things we can say about their overall behavior. No matter how particles are in the group, they always obey statistical principles. One of these principles is the rule of increasing disorder, which is also known as the second law of thermodynamics. The law states that entropy (a measure of disorder) always increases in a closed system.

How does a principle like that help us make any predictions? In fact, it's quite helpful. If we start with a well-ordered state of affairs, it gives us a fairly good idea of what is going to happen next. Increasing disorder is so familiar that we don't usually think twice about it. Clean clothes get dirty. Cars break down. Houses fall apart. Pollution spreads from landfills into the water table. It isn't surprising to find that these things are simply obeying a law of nature.

But we are also used to seeing another kind of process. We see plants grow and reproduce. We are used to seeing injuries heal. We can clean up our own surroundings, if we put some effort into it. Does this contradict the law of increasing disorder? No. The Earth is not a closed system.

The Earth receives a limited amount of light from the Sun. That gives us a precisely defined loophole that can be used to preserve a certain amount of order in our local area. Thermodynamics describes this situation as a heat differential. It says that a heat engine running in the Sun's heat differential can generate useful energy. Useful energy can be used to clean things up on Earth. This is very much a temporary and local effect. Disorder is still winning in the long term, and in the universe as a whole. Any attempt to preserve local order necessarily increases the overall amount of disorder in the universe.

With or without useful energy, this is a disturbing thought. It does not seem to bode well. It says that everything we value is going to get lost eventually. That is perfectly true. But we have to face this idea squarely, unless we want to give up our faith in observation. Because thermodynamics is real. I just shrug and say to myself, "what, you thought you were going to live forever?"

Relentlessly increasing disorder is a threatening idea, but it is also a creative idea. It sharpens appreciation for what is most essential to our survival. There is only so much useful energy to go around, and it is precious. Plants and their photosynthesis are the little heat engines that make our lives possible, and they couldn't do it without the Sun's heat differential. It is not an accident that our lives are taking place in a warm niche between the hot Sun and cold space.

The Sun has a few billion years left to burn. And when we look out into the night sky, we can see other stars. So it is up to us, either to be daunted by the truth of increasing disorder, or else to take this up as an opportunity and do with it what we can.

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Let us cast our thoughts back to an early Earth. There is no life yet. There is rock and heat, and an atmosphere of nitrogen and other gasses. The planet is in a convenient orbit around its star. There are oceans of liquid water, steaming in the sunlight. The moisture recondenses in the cool atmosphere, forming clouds.

Imagine an ongoing cycle of evaporation and rainfall. The cycle is distilling salt water into fresh water. It is being driven by sunlight. Water is continually evaporating off the heated surface of the ocean, and recondensing in the cooler atmosphere. We can almost feel the alternation of hot and cold. It isn't the heat alone that is doing it. Heat by itself is not useful energy. In a world of constant steam, there would be no recondensation. Only a heat differential between hot and cold makes this possible.

This distillation of salt water into fresh water is an example of how a cycling process can increase local order. A mixed state is a disordered state. Salt water is disordered. By comparison, the fresh water in our lakes is in a more ordered state. It has a lower entropy than salt water. Any sorting process of this kind reduces entropy.

We can look under the surface, where geothermal processes of heat and water are sorting specific minerals out of the rock and laying down veins of ore and native metal. Again, local order is rising instead of dwindling. Here the energy source is different. This process is not being driven by the heat differential between the Sun and space, but by the heat differential between the Earth's hot interior and cold space. The principle is the same.

Heat flows from hot to cold, and the overall disorder increases, always. At the same time, there are pockets and backwaters that feed off the main stream. Here things briefly flow in the opposite direction. In these special places, order gets built up rather than torn down. Of course, it is all paid for out of the overall stream. How does this happen?

Evaporation and rainfall move around in a loop. A cause leads to an effect, and this effect acts as the cause for another effect, and so on around until it catches its own tail. It closes the loop and starts over again. That is how a local ordering process gets started, and how it keeps moving. Energy has to feed into the loop, or it will die away and disappear. Any use of energy always increases overall disorder. However, it can produce highly ordered local results. A lake full of distilled fresh water is a remarkable thing. Local order has been increased at the expense of general order.

This is an attempt to paint a picture of the thermodynamic direction of the universe. Processes are chains of cause and effect that lead always on to increasing disorder, like streams flowing downhill. As we look closer, we can see little pools and eddies where cause and effect are chasing each other around in a circle. These processes catch our attention. We wonder how long they can last. The flow of the stream swirls into a loop, and it goes around and around and even backwards, always still on its way out to sea.

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Then we watch as life steps into the scene. Like the other processes we have seen, life is a process which uses the available energy to increase local order. It is bound by the same thermodynamic laws. It is a looped chain of cause and effect.

But life seems more determined than the geological and meteorological processes that we have been watching so far. It propagates itself. One individual gives rise to the next. Life adapts itself to the changing environment. Going beyond adaptation, it actively changes the environment for its own benefit. It changes the atmosphere, the oceans, and the shape of the land. It appears determined to survive. It acts as if it can remember what worked in the past. And it can, because it carries a form of memory with it, in its genetic code.

A living process like this certainly seems more capable of survival than non-living processes which depend blindly on suitable circumstances for their existence. Life's origin lies in the simple fact that some early organism survived and propagated itself. Some of the descendants didn't make it. Some did. The ones that survived eventually went on to change their own circumstances to improve their chances of survival. That didn't require any intelligence. Mere trial and error was enough. Earth may be a pleasant niche in a hostile universe, but there is only so much room on the planet. Natural selection kills some organisms and allows others to survive. The genetic

code of the survivors is a tiny reservoir of information that describes what worked in the past. That which survives, survives.

Any local ordering process is worth studying. A self-perpetuating one is rare and precious. Try to imagine a process that adapts itself to the business of creating its own niche. This is a swirl in the stream that molds itself to carve out a convenient pool. It is an eddy that shapes both itself and its surroundings. There are no guarantees. The great river of thermodynamics carves its own course. There are floods and droughts and ice ages. Maybe this analogy should not be carried too far. But a useful image remains: it is possible for local pools of self-reinforcing order to persist in the world's great flow of order-becoming-disorder.

We know a fair number of facts about how life works. Biological organisms pass along their adaptations using genetic information. Each cell contains a DNA writeup of its structure. The nucleic acid sequence describes the proteins that give the cell its form and carry out its operations. The cell's operations include the construction of proteins, and the replication of the DNA sequence whenever the cell divides.

But the full outline of what happens with genetic information looms larger than just the cell that contains it. Many individual organisms consist of large numbers of differentiated cells working together. These cells share the same DNA. The DNA varies only slightly between individuals of the same species. Evolution operates on these slight variations to adapt the species as a whole to its environment. An unsuccessful species will become extinct. A successful species will continue to exist, and perhaps radiates into several distinct species filling diverse ecological niches. Finally, the survival of each species depends on many other species which form its environment. The environment as a whole is affected by outside events. Geological changes, asteroid impacts, and changes in solar output all play a part in life processes on Earth.

Out of this complex ecology, we select the single process which has had the greatest effect on the genetic information of the species. We do not find this in the operation of the cell, nor in the operation of the individual organism, but in the evolution of the species as a whole. It is natural selection that shapes genetic information.

Information is the key difference between the living and non-living processes that use energy to increase local order. The fact that living processes use genetic information is what allows their successful adaptations to be passed along to future generations. This is how a determination to survive can be selected for and strengthened. It is how a capacity to survive adverse circumstances can evolve, and how species can gain some degree of control over their circumstances. Nevertheless, the iron rule of

thermodynamics insists that no local ordering process can run without useful energy. Life as we know it cannot exist without a heat differential.

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Information is an essential piece of this puzzle. But what exactly is information? This question takes us into a discussion of computation. Computation is a process that reads and writes information. In fact, as far as I can tell, information is defined by the fact that it is read and written by a computational process.

The word "information" has sometimes been used in a more abstract sense. But we will restrict it to a very specific sense. For our purposes, information will always refer to a material thing, a thing that is made out of particles like anything else. Information may consist of some electrons in a transistor, a few atoms in a DNA chain, or a letter printed in ink on a page. In any case, it is an unambiguously real object. There are no ghosts in the universe. We will use the word information in the sense of "materially represented information that can be read and written by a computer."

People have already discovered many useful facts about how computation works. Again, we observe a chain of cause and effect chasing each other around in a circle, with energy feeding into the loop. We have seen several of these processes already. Like those processes, computation is capable of sorting and ordering things. It is capable of reducing local entropy. So computation is another kind of local ordering process.

Computers read and write bits of information according to certain rules. For example, a computer might read two bits, say a one and a zero, compare them with each other using a rule called "AND", write out the zero bit that results from this comparison, and then go on and read the next two bits.

In fact, computers effectively read the rules from the information they are working with. All that a computer really does is compare bits of information with each other, and then read and write other bits accordingly. These comparisons are known as boolean logic operations. The sequence of operations a computer carries out is known as an algorithm. The algorithm itself is just another sequence of bits. It turns out that all algorithms can be broken down into elementary steps that can be carried out by any minimal computer stepping back and forth along a string of bits and using a couple of simple boolean logic operations.

In a sense, that means that all computers are the same. A minimal computer does everything a fancy computer does, only more slowly. The only reason to build a fancy computer is to run through a particular algorithm more quickly. People have built fast digital computers as elaborations of the minimal computer. The same is true for neural networks. These are structures which have been modelled algorithmically. Small neural networks

have been implemented on digital computers. These neural networks, too, are elaborations of the minimal computer.

Computers can become quite complex, and so can information. A large number of bits can be used to describe a complex algorithm. But the idea of a computer itself is simple, just as the idea of a single bit of information is simple. A minimal computer remains simple even if it is running a complex algorithm.

So which is more important, the computer or the information? A computer can't do anything without information. But the information by itself is also useless. It doesn't accomplish anything. It is meaningless without a computer that reads and writes that specific information. So you can't have one without the other. Computers and information exist only in relation to each other, like a lock and key.

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This discussion is somewhat theoretical. We haven't talked about how to build a modern digital computer, and it may be hard to visualize the functions of a minimal computer that just carries out logic operations on a string of ones and zeros. But it is important to realize that such a minimal computer is possible, and that it is mathematically equal to any other computer. This is a place where we have to rely on mathematics.

In general, whenever we run into a complicated problem, we try to simplify it by finding some underlying principle that is consistent with our observations and allows us to make testable predictions. Computation is one of these underlying principles that helps us cut through the confusion.

We did the same thing when we ran into the unpredictable motion of the elementary particles. The amount of detail in their movements was overwhelming, and it seemed impossible that we would ever be able to make any useful predictions about future events. But then we found a thermodynamic principle, upheld by observation, that helped us to make sense of what was happening around us. The detailed motion of particles is still entirely unpredictable. Nevertheless, we can reasonably expect that our lakes will continue to fill with fresh rainwater, and that biological organisms will continue to pass their genetic information to their descendants.

When we make these predictions, we are suspending the disbelief that we naturally feel in the face of a mountain of incomprehensible details, and entrusting our weight to a slender bridge of observation and reason. Obviously there is the risk that we could be wrong, and there is much that we do not know. But with more knowledge we can build stronger and more secure bridges. And really we have no choice but to go on, unless we are willing to be daunted and sit down on the spot.

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The ideas discussed so far are bedrock science. Many of them are centuries old and have withstood generations of observation and testing. They do not need any further defense here, because they already have many thoughtful defenders. These ideas form a rock-steady foundation. It is on this foundation that I would like to build my own house of cards. This structure of speculative ideas of mine may well collapse, but such a collapse can do no harm to the underlying foundation of science.

Some people will disagree with the foundation. They will reject one of the ideas, perhaps evolution, or thermodynamics, and they will read on only to find fault with the other things I am going to say. They can do this if they like, but it's not going to lead to any interesting conversations. All I can do is shrug and suggest that they please themselves. May they find another path. I intend to continue along this present path of observation.

We have now accumulated many pieces of the puzzle. Let us try to put them together. Local ordering processes use heat differentials to increase the level of order in a particular area, within the rules of thermodynamics. Among these processes are computational processes. They preserve and adapt information that assists the survival of the process. All of these processes take place against a background of steadily increasing disorder in the universe as a whole. Seen from a distance, the story of computation is that of a long struggle to preserve and adapt a small amount of materially represented information against a rising tide of entropic noise.

The history of biological organisms is written in their genetic information. It may be difficult to demonstrate that natural selection is a form of computation in progress, but genetic information is unmistakably information. We can see the DNA, and where there is smoke, there is fire. Information signals the presence of a computer. Materially represented information exists because it is being read and written by a computational process.

We are now approaching the question of why people do the things they do. To me, this is the most interesting piece of the puzzle. Competition and natural selection are a part of who we are, but there is another part, and this has to do with what is going on in our heads. We have a cognitive process. Again, we see that this process involves information. It is entirely distinct from genetic information, so we will call it cognitive information. We can draw a line of reasoning that connects the neural network in our brains with the digital computers we can build today. Of course, today's digital computers are weak and poor things compared with brains.

No one has yet demonstrated that consciousness can arise from computation. Nor has anyone observed anything that shows this to be impossible. Conscious awareness seems unique and detached from the particles and forces we have studied so far. However, we have watched as

physics gave rise to the rules of chemistry, and as chemistry gave rise to the rules of biology. If we accept a belief that biology then gave rise to something that is not made of particles and forces, then we will have stepped away from our faith in observation and consistent explanation. But we cannot remain on our present path if we step away from a consistent faith in observation. The simplest alternative is that consciousness is not an infinite and otherworldly thing. Instead, consciousness consists of a very large number of moving parts, a number which we cannot easily distinguish from infinity.

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We will proceed with the following two hypotheses:

1. Evolution is a computational local ordering process that operates on genetic information.

2. Cognition is a computational local ordering process that operates on cognitive information.

Evolution and cognition are separate processes that operate on separate sets of information. Both of these processes are present in human beings. Evolution pursues the survival of the species. Cognition, however, takes place within the individual rather than within the species. And as it takes place within the individual, so it pursues the survival of that individual. The goals of the two processes are similar, but not identical.

Energy efficiency is the biggest difference between the two processes. Cognitive problem solving is vastly more efficient than evolutionary trial and error. Cognition can do more with less energy. This question of efficiency carries a lot of weight on a small planet that intercepts only a limited amount of sunlight every day.

We humans have one foot in each world. Everything we do affects the future of two very different computational processes. Two different sets of critical information demand to be looked after. Each one of our actions has two reasons.

I believe that these are the underlying reasons that explain why we do things. I have long sought an answer to the question "why?" and this is the best answer I can find. This is what it comes down to. These are our true motives, the inner meanings of our actions. These are the purposes that move us to act.

There are two motives, cognitive and evolutionary. Sometimes the two motives work together and propel us in a single direction. For instance, in situations of life and death, both motives urge us to seek individual survival. Beyond that, there are times when they pull in opposite directions. For instance, there is the question: should I seek advantages over my fellow

humans, or should I insist on a strict equality that allows us to speak freely with each other? In these and other matters there is a conflict between our two innermost purposes. When our two rival motives demand inconsistent actions, we are forced to choose. We are forced to exercise free will.

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Fear of these choices and their consequences has, I believe, set us back and caused us to hesitate. This hesitation has led us into a dangerous situation. Our actions are causing a crisis in the health of our natural environment. But we have not responded to the crisis. I believe this is because we have not come to grips with the real reasons behind our actions.

So what is our basis for choosing right actions, and rejecting wrong actions? What relations should we cultivate with each other? These are just a few of the many useful questions we can ask. In the following chapters, I will try to provide some preliminary answers to these questions. I will try to explore some of the consequences that these choices bring with them.

First, I would like to survey the origins of the cognitive apparatus, how it arose from the evolutionary process, and how its purpose differs from that of the evolutionary process. Next, there follows a discussion of communication. Communication doesn't have to be perfect. It can tolerate errors. In fact, a computational process can often extract a small signal from a large amount of noise. The kind of communication we undertake among ourselves, from one person to another, can tell us a lot about the cognitive process. Depending on our intentions, the information content of our communication varies widely, as does its usefulness to the recipient.

Then I would like to discuss the nature of our free choices, and the sensory flood of information that these choices are based on. This is a philosophical issue, but it has practical consequences for the scope and application of our decisions. My conclusions assign full responsibility to the individual. I affirm that there is no judge beyond the individual conscience. The cognitive process has different implications for our behavior than does the evolutionary process. This leads to some brief speculation about a way of life that might be consistent with the cognitive process.

Finally, I would like to address the present state of affairs in human society. I think it is correct to argue that our present economy and social interactions are largely based on evolutionary motives, and that these motives are often harmful to cognitive interests. No one can be forced to change their personal motives. However, a shift towards cognitive motives will benefit all of us. Leaving evolutionary competition behind opens up a brighter future for the species of thinking ape to which we belong. I conclude with the rough draft of a political and personal agenda that may, or may not, be useful to someone who is thinking about the benefits of cognitive motivation.

I have tried to work out the logical consequences of the two hypotheses introduced above, as they appear to me. At the same time I am aware that there are other lines of argument that could have been followed, and other conclusions that could have been reached. If I am wrong, I would like nothing more than to be convinced by better arguments. Vigorous discussion is essential to the progress of ideas. Having said that, I very much hope that this discussion can take place within a framework of well established scientific facts. There is little point in arguing with people who can't acknowledge that evolution takes place in the natural world, or who deny that the second law of thermodynamics holds true on our planet, or who refuse to believe that computers are capable of doing the various things which they can plainly do.

2. Origin of the Cognitive Apparatus

Memories can be written in many ways in order to maintain a history of past events. History forms a guide to future action. The history of biological organisms is written in their genetic information. This information is constantly being read and written by individual organisms as part of the larger process of natural selection.

I have asserted that this is an algorithmic process. This assertion seems reasonable to me because I know how little is required to get an algorithm started, and how far it can go. This is a hypothesis. It can be tested by observation. It can be proven or disproven. For the present, though, I am not concerned with proof. I simply want to formulate and explain the hypothesis. Then I would like to work out the logical consequences of the assertion. By doing this, I hope to show that the consequences of the hypothesis are reasonable and acceptable.

An algorithm is represented by information, and it is executed by a computer. We can throw the outline of a computer around any area of activity that we want to discuss, provided that it meets the minimum requirements for algorithmic computation. The computer does not have to be in any way isolated from the exterior world. It can interact with other computational activity. These interactions are described as inputs and outputs of the computational process we are studying. However, it is absolutely necessary for our chosen area of activity to possess a complete computational process of its own.

Therefore we cannot discuss the evolutionary activity of one individual cell on its own, or of one individual organism on its own. These individuals do not meet the minimum requirements for algorithmic computation, at least in their treatment of genetic information. Individuals read genetic information, but they do not write it in a meaningful way. Random mutations in the genetic code only become meaningful when they are operated on by a larger process of natural selection. That kind of activity takes place within a species.

Within a species as a whole, we can discuss evolutionary activity as an algorithm. We throw the outline of a computer around one species. We do not have to include all of the other species that this one species interacts with. These interactions are the inputs and outputs of an evolutionary process which is already happening within the species. The only requirement for computation is that there is already sufficient competition among the members of the species to drive natural selection. As it happens, the most vigorous competition takes place among members of the same species, rather

than with other species. I will make use of this fact when we get to the discussion of human behavior. I believe that evolutionarily motivated human behavior is driven primarily by the competition of humans with other humans.

In the meanwhile, we come back to the point that DNA is unquestionably information. Where there is smoke, there is fire. Where there is information, there is a computer. The genetic information of each species is being read and written by an evolutionary process. I believe that this process is also a computational process.

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The human cognitive apparatus is a second type of computational process. In discussing this process, we throw the outline of a computer around each separate person. Cognition takes place within the individual human. It uses cognitive information, which is distinct from genetic information. It certainly meets the minimum requirements for algorithmic computation. I can perform boolean logic operations in my head and record the results in speech and writing.

But how did our cognitive faculties come to exist in the first place? How did evolution construct this apparatus? In order to delve into this question, we will need the largest possible picture of human evolution. Our best guide is the classical description of evolution in terms of variation and natural selection. I argue that the main driver leading to the development of the cognitive apparatus is the survival advantage conferred by foresight.

Recall that our initial view of the universe made it seem unlikely that we would ever be able to make any meaningful predictions about the future. After all, it is mathematically impossible to predict the motion of any three particles under the mutual influence of their forces. And there are vast numbers of particles in even the smallest speck of matter. Nevertheless, we discovered that the second law of thermodynamics helped to lend this universe a degree of predictability. The plain fact that everything is growing messier was found to carry great predictive power. This has been quite important to us. Any ability to anticipate the future can yield survival advantages.

Foresight has deep roots on Earth. Evolution has over the ages constructed many mechanisms that are capable of limited foresight. For example, some plants open their pores at night, and close them when the Sun comes up. They respire at night so that they won't lose too much water during the heat of the day. This is a form of foresight. It is based on the experience of millions of years during which the Sun rose every morning. There was a recurring pattern of cool nights, followed by the first rays of light, followed by increasing heat and evaporation. Plants make use of this predictable sequence of events by closing down their pores in time for the morning light.

Evolution produced this trait through random variation and natural selection. Like other traits, this trait continues to vary. Today, a variant plant that does not close its pores in the morning is likely to lose moisture and dry out. This plant will be at a disadvantage to other members of its plant species, and its genes will soon disappear from the gene pool. On the other hand, a variant plant that happens to get the timing just right may be able to do better than its rivals, and its genes will be strongly represented in the following generations.

This type of foresight is instinctive. The individuals with the most successful behavior patterns live, while others die. Their descendants possess the precise behavior patterns that enabled their ancestors to survive. A successful trait can become prevalent in the population. In this way, insects have senses that warn them of dangers in their immediate surroundings and draw them towards opportunities to obtain food or to reproduce. They react to their senses in certain definite ways. This is the result of recurring sequences of events that have been historically predictable. Fleeing away from a predator usually works better than fleeing towards a predator. That was true in the past, and it is still true.

The mechanisms of instinctive foresight are recorded in each species' genes. However, evolution did not exercise any foresight of its own when it constructed these mechanisms. Random variation produced the individuals from whom the survivors were selected. The pieces of these foresight mechanisms all came out of random variation. They were built up and reinforced by natural selection, which rewarded each lucky improvement with a place in the genome.

We should stop for a moment to give due credit to instinctive foresight. I have described these behavior patterns as mechanisms because I wanted to show how they could have had simple beginnings. But I don't mean to minimize their importance, or to imply that they stayed simple. The construction of practical instincts is a remarkable evolutionary achievement.

Early forms of self-replicating life made a living out of photosynthesis, or from geothermal heat and minerals. They recorded what had worked in the past and adapted this genetic record to changing circumstances. Then, in a slow and fumbling way, these life processes took control of their surroundings. As the ages passed, they went on to change the land and the sea and the air for the purposes of their own survival.

Now we encounter individuals armed with instinctive foresight. These individuals are constantly watching their surroundings for dangers and opportunities. They respond to these challenges with great energy and perseverance. The individuals have brief and small lives, compared with the endurance of species, because they are merely expendable variations in an

evolutionary process. Nevertheless, many individual animals, in their brief lives, have a very real control of their surroundings.

Some of these animals have information that goes beyond genetic information. Somewhere between amphibians and reptiles, the amount of information that is held in an animal's nervous system began to exceed the amount of information contained in its genes. This new kind of information is held by the individual. It lasts as long as the individual lasts. It is not part of the common inheritance of the species. This individual information, even though it is not genetic information, is essential to the animal's foresight and survival.

These animal species are a step further along in the development of foresight mechanisms. They are capable of learned responses. Think of an imaginary mouse in a cage. At one end of the cage there is a pad that delivers electric shocks. We expect that the mouse will quickly learn to avoid the electric pad. This response is different from instinctive foresight. It is different from the repetitive motion of the moth towards the porch light. It is a learned response that is not directly impressed by natural selection. The mouse does not avoid the electric pad because its relatives died when they went there. It avoids the pad because it received an electric shock when it touched it, and the memory of that fact remains somewhere in its nervous system. The mouse learns to associate the shock with the electric pad. It avoids that location because of the remembered association. This kind of learned response is an advanced achievement of the evolutionary process.

Consider what evolution has had to accomplish to make learned responses possible. The nervous system of the mouse contains a model of its surroundings, which has been built up out of its sensory impressions. This model has enormous practical value. The mouse is able to predict the results of different courses of action, based on what it has learned. From among these predictions, it is able to choose the best course for itself. This is learned foresight. It is a far more efficient method of responding to challenges than instinctive foresight, because it does not involve the destruction of generations of randomly varying individuals. In fact, learned foresight begins to make a trial-and-error method look like a waste of time.

Humans have at least one additional way of predicting the future, namely rational foresight. We are capable of extensive analytic reasoning, symbolic manipulation, and problem solving. As with learned foresight, rational foresight begins with the construction of a mental model of our surroundings. We use our senses and curiosity to gather information about the things around us. We assemble a corresponding model of the world in our minds. We use the model to solve problems, and then we apply the results to the world around us. This makes use of the remarkably flexible mental cyberspace that evolution has provided us with.

Such a mental model is constructed of symbols that represent the important features of our surroundings. We have learned about these exterior features through our senses. These are features that we can touch with our hands and our tools. However, it costs a lot of energy to experiment directly with the exterior world. It is much cheaper to move around symbols in mental cyberspace. Therefore, we experiment with symbolic models in order to find and fix problems. This is symbolic manipulation. We use logical reasoning to analyze our problems and obtain useful solutions. Then we translate the symbols back into exterior features. That tells us what we need to do with our hands and our tools in order to control our circumstances.

We use this kind of symbolic manipulation to play through elaborate scenarios of what may happen in the future. We imagine many different possibilities, some likely, others unlikely. We try to estimate which eventualities are most likely to happen in the future. The accuracy of our prediction depends on the accuracy and timeliness of our sensory perceptions. But, most crucially, success depends on our logical abilities and manipulative skill. It is this flexible and logical treatment of alternative models that distinguishes symbolic manipulation from learned responses. Rational foresight gives us prospects that are closed to other species. One of these prospects is the possibility of human self-perpetuation separate from the evolutionary process.

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It is evident that humans have the same instinctive and learned responses that other animals have. If we follow our instincts we can expect to show the same type of behavior that animals show. This will be evolutionarily meaningful behavior. It is largely about competition with other members of our species and the propagation of our genes. That is fine for animals. Whether or not this kind of behavior is suitable for humans is a separate question. I believe we should rely on rational foresight for our most important decisions, and suppress our instinctive responses.

Individual behavior plays a role in natural selection, so it might be reasonable to argue that the activity of the nervous system is merely a subprocess of the evolutionary process. However, I feel that this would be a mistaken argument. That is the way it started, but there are now two separate and distinct areas of activity. I believe it makes more sense to try to understand them as two separate processes. They affect each other, but they are not the same thing. They use two distinct sets of information, and they have two very different material representations for the information they use.

The separation of genetic and cognitive information is an important point. There is one set of information stored in the genome, and a different set of information stored in the nervous system. Each process is concerned with the maintenance of its own information. It preserves and adapts the

information that helps it survive. The interactions between the two are less important than their separate purposes.

Do these processes depend on each other? Currently, they do. An animal's nervous system has no way to perpetuate itself, or to replace individuals who fall to mortality. It depends on the genetic process to do this. On the other hand, natural selection depends on its fortuitous construction of nervous-system-level foresight mechanisms because these offer a singularly valuable survival advantage. The two rely on each other, but they remain separate processes.

Think of two species living with each other in a symbiotic relationship. Each depends on the other. Yet they are distinct, and each pursues its own interest. It is not unthinkable that one might abandon the other if it found a better niche somewhere else, some place where it could obtain all that it formerly obtained from its symbiont, at a lower cost. Just so, it is imaginable that humans carrying their individual mental processes might abandon the evolutionary process of natural variation and selection. The prerequisite for such a jump would be that we had found a more efficient and less costly means of self-perpetuation. For example, this could happen if we obtain individual control of genetic information and the ability to correctly maintain genetic information.

* * *

Cognition and evolution are two computational life processes trying to survive in a hostile universe. Evolution operates on the genetic information of a species as a whole. In the case of humans, it has preserved perhaps 50 megabytes of useful information over millions of years.

For evolution, individuals are expendable instances of the same basic text - a sheaf of copies with small variations that might prove useful. These small variations are the maximum effect any individual is going to have on the basic genetic text of their species. The genetic text controls, to the best of its ability, all the circumstances of the species' existence.

However, individual humans also carry an individual text in their mental apparatus, and a cognitive process which operates on it. An individual's cognition has the run of perhaps ten trillion synaptic connections. This potentially represents a much greater amount of information than the genetic information that describes a species, but it endures only for the threescore and ten years of a human life span.

Until recently evolutionary interests have controlled most human behavior. Cognition has had little opportunity to advance its interests in the world at large. Recently, science and technology have discovered new cognitive tools which have begun to shift the balance of power in favor of cognition.

The evolutionary process winnows individuals to preserve and adapt the genetic information which allows species to inhabit their material circumstances successfully. In contrast, cognition preserves and adapts the cognitive information which allows individual humans to control their own circumstances successfully. This cognitive process winnows ideas, not individuals.

* * *

Cognitive computation has a greater scope than evolutionary computation because of the greater efficiency of its process. More can be done with the same energy. The crucial difference between the two processes is the nature of the workspace in which each carries out its computation.

Evolution replicates and destroys individuals who are the material representation of its genetic information. When exterior circumstances change, the species either adapts itself to the new circumstances, or it goes extinct. This adaptation of the species' genetic information occurs by a trial-and-error method which requires the replication and destruction of great numbers of individuals.

For example, the environment of squirrels has changed to include streets and cars. We can guess that evolution is currently working on an adapted squirrel that doesn't dash in front of moving vehicles. It is certainly going through a lot of squirrels. These individuals are energetically expensive. The evolutionary process requires a substantial amount of energy, which is ultimately derived from photosynthesis and from the Sun.

Cognition performs its computations in an energetically efficient workspace. It replicates and destroys ideas in mental cyberspace. These ideas are materially represented as cognitive information in the human brain. They include such things as conscious and unconscious thoughts, dreams, symbols, memories, and values.

The cognitive process uses these ideas to build a model of the exterior world in its internal mental space. When it encounters a problem in the exterior world, it uses this model to try out solutions. When the exterior world changes, the individual must adapt their mental model to reflect the changes. Not reflecting the changes can be dangerous. The solutions developed in cognitive space will no longer work in the exterior world. An outdated mental model can endanger individual survival. On the other hand, successful problem solving leads to effective control of individual circumstances.

For example, cognitive control of genetic information would enable us to fix our own broken genes and cure diseases. We could model genetic problems in our minds and find solutions to these problems. This would give us greater control of our own lives. Simply from a point of view of energy

efficiency, it would be cheaper than the evolutionary process of building generations of trial-and-error humans. We are currently developing the cognitive tools we will need to understand and repair genetic problems.

Evolutionary and cognitive processes both pursue their continued existence in a hostile and changing universe. Both processes do so by preserving and adapting the information that makes their continued existence possible. The more efficient nature of mental cyberspace gives cognition the edge over evolution.

* * *

These are the purposes that move us to act. The roots are simple, but the consequences for human behavior are complex. We can begin to explore these consequences by looking at the underlying conflict between our two basic reasons for doing the things we do.

The evolutionary and cognitive processes operate on separate sets of information, but they intersect when it comes to the motivation of human behavior. Both processes perpetuate themselves by controlling their material circumstances, and they can only do this through the individual mind and body. Both processes use the cognitive apparatus as an intermediary for their own purposes. Cognition has been just as persistent as evolution in trying to express its purpose. However, in the past it has had fewer tools with which to affect the exterior world.

In many cases, the two processes reinforce either other. Both motivate the individual to seek survival. Evolution has found its invention of the cognitive process to be a singularly effective survival tool. Cognition will continue to rely on the genetic reproduction of the species until such a time as it gains control of genetic information and artificial reproduction. In the meanwhile, both processes continue to need each other.

At the same time, the processes have divergent interests that occasionally place conflicting demands on human behavior. In this conflict, the human body can serve the ends of either process. So can the human mind.

The cognitive process encounters a number of obstacles in directing human behavior to cognitive purposes. These obstacles are presented by the fact that mind and body were created by evolutionary processes. The accommodation of some evolutionary instincts and needs is probably unavoidable. A cognitively motivated individual will have to strike a balance between cognitive needs and the present limits of the human mind and body. This balance can only be struck by the individual conscience.

* * *

Cognition, due to the efficiency of problem solving in mental cyberspace, has the potential to explore realms of possibility that are inaccessible to

evolution. It has built machines that are capable of travelling to the moon and outer planets of the solar system. It is not unthinkable that it could propagate life processes to the heat differentials around other stars.

At present, evolution holds a long lead in the design and replication of biological organisms. Advances in science and technology are shortening that lead. Cognition will eventually overtake evolution. New cognitive tools will bring the design and replication of the human individual under the cognitive control of the human individual.

It is the development of cognitive tools that will allow cognition to replace evolution as the prime motivator of human action. Where effective cognitive tools are unavailable, human motivation remains evolutionary in nature. Where cognitive tools become available to individuals, the human body and the human mind are freed from biological destiny.

* * *

Evolutionary motives are characterized as harmful where they interfere with cognitive interests. Some of the interests at risk are individuals' control of their own circumstances, free communication between individuals, and access to cognitive tools.

Evolutionary motives are characterized as positive, however, where cognitive interests are not at risk. This applies, for instance, where the choice lies between an evolutionarily based life process or no life process at all. In recent evolutionary history this has been the situation of humans without access to cognitive tools. It remains the situation of all non-human species on Earth. These species have no prospect of cognitive control over their own circumstances.

We may feel more sympathy for a tool-using chimpanzee than for an instinct-driven insect. That is because we can see the beginning of problem solving ability in the chimpanzee. But we should remember that chimpanzees have no prospect of independence from the evolutionary process. For all our sympathy, we must make a clean break between what they are doing, and what we are doing. Our own journey is perilous enough.

Plant and animal species do not pose a threat to human cognitive interests. The interests of these species are limited to the preservation of their wilderness arena of evolutionary competition. This arena provides humans with food and oxygen. The wilderness is also a museum of human origins and a school of the arts and achievements of evolution. Despite their importance to humans, plant and animal species are vulnerable bystanders in the evolutionary competition between human and human. The survival of these species will depend on habitat protection by cognitively motivated humans.

Non-human species do not have cognitive interests. Therefore, habitat protection takes place within a framework of evolutionary interests. The non-cognitive individual does not matter. It is the species and their environments that are important and merit protection.

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Plants, animals, and humans all have a common need for food, shelter, and, given mortality, some means of reproduction. Survival motivates their behavior. Their need for food derives from the fact that all life processes, whether cognitive or evolutionary, run on energy, and require energy to survive. All life processes are driven to seek stored energy or the means of generating energy. A sufficient supply of energy is a prerequisite for the pursuit of other survival needs.

Most of the energy used by life processes on this planet derives from solar radiation, that is, from the heat differential in which the earth resides. Sun-driven energy sources include photosynthesis, wind and water power, and fossil fuels. Other energy sources include the radioisotopes that drive geothermal and nuclear power. Useful energy is the most basic form of wealth. All computational life processes rely on this wealth.

3. Communication

Individuals control their surroundings by reacting swiftly to their senses. Sensory input is extensive, but only a few fragments of this sensory information are transferred to memory. The rest is lost. We remember some things, but we can't remember everything we see. A few memories are later transferred to other people through speech. We tell others about some things, but we can't convey everything we remember.

That is the way things are. There is just too much information to pass through these three information transfer steps. Each of the three steps has a different information transfer rate. Sensory input is faster than memory storage, and memory in turn is faster than speech. These transfer rates have a profound influence on the way we communicate. A fast transfer rate means that a lot of information can be communicated. A slow transfer rate implies much more limited communication.

The sensory flood is used for immediate control of our circumstances. We exercise this control through instinct, habit, and practised reaction. Most of the information from the sensory flood does not pass through any appreciable term of memory. Direct acquisition of sensory data is the fastest of our three information transfer rates. It represents the surest form of knowledge. All of our other forms of knowledge are weak and derivative by comparison. This is why individuals control only their own circumstances efficiently. Skilled navigators pilot their craft by practise and habit and do not keep a record of every action and its reason.

Memory works on a slower rate of transfer. It throws away what it cannot hold or does not need. A few items make it into conscious short-term memory. Some additional selection occurs unconsciously. Later on, we move some items from short-term into long-term memory. Eventually we absorb our most persistent memories into our habits and understandings. We build a slow ledger of our thoughts, observations, and conclusions. Awake or asleep, we pick and choose the memories we consider important enough to keep. Some moments are burned in unforgettable detail, for good or ill. Other long months leave no trace.

The rate at which one individual can pass information to another, though speech or writing or gesture, is the slowest of the three rates. No person-to-person communication can carry more than a small part of the store of human memory, and only a part of what is offered can ever be accepted. We each have our own memories to guard. We can't find room for another person's full store.

How much information can we afford to accept from others? The answer to that question depends in part on the spirit in which the communication is offered. We are usually more willing to listen to helpful communication than to harmful communication. Unwelcome and unhelpful messages pass through a communications bottleneck. These messages encounter a low rate of effective information transfer. Or else, they may be rejected entirely.

Reality is larger than memory. Loss of memory does not affect the facts of history, or reduce their reality. Everything that happens to us is real, even if it is only a half-caught dream. For our part, we are made up of dreams and memories. This information is real. It can endure as long as we do.

* * *

Free communication takes place between independent individuals living in comparable circumstances. It is engaged in for the value of the ideas exchanged. A free exchange of useful ideas multiplies the cognitive powers of individuals and gives each of them greater control over the circumstances of their own existence than they would have on their own. Free communication is part of the cognitive process.

Coercive communication takes place between individuals in a power relationship, where one controls the other's circumstances. Its purpose is to perpetuate the power relationship, not to exchange ideas. The strong force their demands on the weak, and the weak lie to the strong. This form of communication serves the evolutionary process, not the cognitive process.

Signs and advertising are examples of coercive communication. They are rarely intended to be helpful. Instead, they are used by the strong to invade the cognitive space of the weak. They are protected by property claims: to remove an invasive sign is to risk prosecution. They are everywhere. Repetitive suggestion creates a cognitive burden that can be relieved by submission. They keep changing. Frequent changes of message increase the cognitive burden. The purpose is to confuse weak individuals and make them forget their own interests in favor of the interests of the strong.

Other forms of coercive communication are more direct. Where signs and advertising fail, the strong use threats and bribes. Where threats and bribes fail, the strong enforce their demands directly on the circumstances of the weak. In order to do this, they must seize control of those circumstances. Demands for identification and personal information are attempts to render an individual's circumstances vulnerable to direct enforcement. Enforcement relies on locally specific information about an individual's circumstances, and this is obtained through coercive communication.

Coercive communication is ultimately ineffective because it destroys the incentive behind free communication. Power relationships work against the powerful. A strong individual's power relationship with other people has the

effect of cutting that individual off from the benefits of free communication. Any advantage gained through coercive control of others is undercut by the limited and sterile nature of the controlling individual's own ideas.

Free communication respects privacy and anonymity because these are the conditions of its existence. It is not concerned with specific local circumstances that could be used to control someone. Instead, it carries general information that can be useful to anyone in comparable circumstances. This is what makes people willing to communicate. If children are bored by the stories of their elders, it is because they do not live the same sort of lives. If, on the other hand, we are willing and able to speak openly with each other, it is because we are free and independent equals. There are no power relationships between us, and we can all gain from free communication.

The central value of the cognitive process is the independent action of the individual mind as it shapes the circumstances of the individual's own existence. Individual autonomy makes it possible for us to extend the power of the cognitive process by linking up with other individuals in free communication. That is not possible when there are power relationships between us. We can participate in an extended cognitive process only so far as our lives are free and equal. It is well worth our while to pursue such freedom. Extended cognitive processes have constructed humanity's greatest achievements.

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Our cognitive faculties are doing more or less the same thing that digital computers are doing. That is one of the two hypotheses with which I began. It is a testable hypothesis. It can be proven or disproven by observation. But for the present, again, I would simply like to establish that this hypothesis is reasonable. I would like to argue that human consciousness is not an infinite or otherworldly thing. Instead, I believe that consciousness consists of a very large number of moving parts, a number which we cannot easily distinguish from infinity.

Our discussion of computation has its foundation in the mathematical fact that all algorithms can be broken down into elementary steps. These steps can always be executed on the simplest possible computer. Such a minimal computer is functionally equivalent to all other computers. That allows us to draw a chain of reasoning that connects the neural networks in our brains with digital computers.

However, it is not easy to compare the great with the small. Today's digital computers are small and weak things compared to human brains with their ten trillion synaptic connections. Still, while my cognitive experience is vast, it is not infinite. When I look inward, I believe that I am seeing a series of reflections between my several internal thought processes, rather than an

essential and infinite self. Therefore I am not very concerned about the fact that our digital computers appear to fall short of any subjective experience of consciousness. This is a shortcoming on the part of digital computers, but I do not consider it to be evidence against the idea that our own mental processes are computational in nature.

At present we do not have the technological tools to investigate consciousness. We cannot directly study the details of computation in the human brain. However, we can clearly see the information that passes in and out of the brain. Follow the information. Where there is information, there is computation.

Communications theory gives us a mathematical grip on the information content of messages. This helps us to understand what information is and how it works. For example, it tells us that computation does not have to be perfect. Computational processes can tolerate errors. They can often deal with quite high error rates. Sometimes they are able to extract small amounts of signal from very large amounts of noise.

Every message has a certain information content, as well as a certain error rate that depends on the noise in the transmission channel. Errors are a fact of life. However, they can be corrected. The final error rate, after correction, can be made arbitrarily low. This is done by adding redundancy into the message in order to correct any errors. Alternatively, the message can be compressed. Information content can be compressed into the shortest possible message, or it can be expanded into a larger error-tolerant message. Of course, it is not possible to do both things at the same time. That is equally true for human neural networks and digital computers. Both have to deal with communication in an imperfect world. In both cases, the size of a message will depend on its information content and error tolerance.

Imagine that we are transmitting a message, and that a certain amount of random noise gets added to it along the way, flipping some of the bits. At first glance it seems that this message is lost. How can we reconstruct the message at the other end with any confidence?

If the amount of noise is small, we can try sending the same message three or four times. At the other end we will probably be able to figure out what the original message was, even if there is some noise in each of the transmitted copies. This is an example of error correction. We are using redundancy to overcome the noise and preserve the message.

Now, there is always a chance we could get unlucky. If the noise happens to hit each of the transmissions in the same way, we could wind up with errors in the reconstructed message. But we can calculate how likely this is to happen. Then we can send enough copies so that the chance of making an error is reduced to whatever level we decide we can live with. That is our

level of confidence. We choose our level of confidence. We are not at the mercy of the noise.

This is true even if there is a lot of noise. No matter how much noise gets added to the message, we can use communications theory to calculate how much redundancy we need to keep the error rate at an acceptable level. For example, imagine an extremely noisy environment where we have to send a million bits just to get a single bit of information across. We want to send a "one." So we send a million ones. At the other end we receive a million bits of almost completely random noise. However, when we count them all up, if we count a small excess of ones instead of zeros, and if the excess is more than we would expect from chance, then we can confidently say that the message is a one and not a zero. The confidence comes from our reliance on mathematics. The fact that errors can be corrected means that we will always be able to get a message across eventually. We can choose whatever level of confidence we consider necessary.

Data compression is the other side of the coin. Data compression squeezes information content into as few bits as possible, while error correction spreads the same information content across a greater number of bits to protect it against noise. The transmission that we used as an example consisted of a million bits, but it only had an information content of a single bit. Therefore it can be represented as a single bit of information. When we represent the information as a single bit, the redundancy has been removed. In this compressed form it doesn't have any noise immunity. But that only matters if noise is a problem. Otherwise we may prefer the shorter and faster form of the message. Since data compression and error correction work in opposite directions, we often encounter compromises between message size and noise immunity.

Our digital computers use both data compression algorithms and error correcting algorithms for various purposes. So do we. For example, we sometimes abbreviate written words by leaving out all the vowels. The result is usually still readable. However, it leads to a risk of misunderstanding. If we want to avoid any misunderstandings, we are likely to say the same thing repeatedly, or in different words, to reinforce our meaning.

These rules don't just apply to the transmission of messages from one location to another. They also apply to the passage of information through time. There is no such thing as a permanent written record in our constantly changing world. Noise can even corrupt information in the middle of a computational process. If a computational process persists in the face of noise, we can expect that its information will show a compromise between size and noise immunity.

A compressed message appears disordered. That is because compression removes all traces of regularity from the original larger message. This does

not corrupt it. The original form of the message was larger in size, had a lower information content per message bit, and was more highly ordered. When it is compressed, it becomes smaller in size, greater in information content per message bit, and less ordered. The information content per message bit is greatest when the bits appear effectively random.

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These principles of communication theory have a long reach. For example, the mathematical equations that describe the information content of messages are the same as the equations that describe entropy in thermodynamics. It can be useful to think of entropy as the noise content of the system. But we have to be quite careful with this fact. Noise is not information. When we use the word "information", we are referring specifically to materially represented information that is read and written by a computer. Noise is unwritten, and therefore it is not information.

In an abstract sense we could compare entropy with the amount of information that would be necessary to give a full and complete description of a system. For example, an ordered system could be described quickly. After the system becomes disordered, a more lengthy description would be required. Any increase in the entropy of a thermodynamic system means an increase in the amount of information that would be required to describe the system.

However, it is important to remember that no such description exists in the real world. No descriptive information is written down anywhere in the system. There is nothing that can be read and written, and there is no computer involved. This is a vital distinction between entropy and information. Entropic noise does not have a material representation of its own. Instead, noise plays the antagonist to all materially represented information and to all computational processes.

* * *

Meaningless noise is everywhere in our environment. Its opposing feature, meaningful information, is rare. The universe has a fundamental tendency towards increasing disorder. This means that local ordering processes are necessarily uncommon. Computational local ordering processes, and the information that goes with them like lock and key, are rarer still. So information will never be common in the universe. That is just a fact of life. It is a direct consequence of the second law of thermodynamics.

Information is real. It is real in a material sense. It consists of matter that has either been laid out one way, or else has been laid out another way. It is a message scratched in the mud. It is a trail of breadcrumbs in the forest. It is something that has been written by a computer, and can be read by a

computer. That is what makes it information. If a mark on the face of the universe has no relation to a computational process, then it is not information.

The landscape in front of my eyes is not information. It has not been written by a computational process. It may have been incidentally shaped by living processes, but it has not been written for the purpose of being read. Information is created in the retina of my eye when I look at this landscape. The signals in my retina fit the definition of materially represented information. This information can be transferred to the visual center of my brain for further analysis. It can be transferred to my memory. It can be communicated to another person by means of spoken words, or by means of a sketch on paper.

There are many ways to represent information. Information can be lost or discarded. It can become irretrievable. It can become excruciatingly difficult to retrieve. In the end, it either exists in relation to a particular computer, or it doesn't. But it is never ghostly or immaterial. There are no ghosts in the universe. Information is always a material thing. Our dreams and memories are material things.

Computational local ordering processes use information to improve their chances of survival. I have broadly asserted that evolution is a computational process, and that human cognition is a computational process. These statements allow us to compare the two processes, but they convey very little detail. We do not yet have the technological tools that will allow us to observe the details of these two vast and complex computational processes.

Fortunately we have some useful understanding of how information works. Since computers and information depend on each other, we can use information as our guide. We may not be aware of all of the pieces that play a part in a particular evolutionary process, but we can watch what happens to the DNA of the species.

We may not understand everything that happens inside the human brain, but we can watch what people do, and what they say to each other. The nature of this human communication can tell us a lot about the cognitive process. In particular, it can help us to understand how we can best extend our own individual cognitive process to other people through the medium of free communication. In my life, I would like to learn more about starting and sustaining these extended cognitive processes.

4. Free Will and Responsibility

Foreknowledge is the elixir of survival. It is not surprising that we focus so much attention on the future. We would like to know what is to come. We would especially like to know about any misfortunes to come, so that we can change them by changing our present choices.

At the same time we tell each other old stories in which fate cannot be changed. In these stories, the protagonist somehow acquires a knowledge of future misfortune. The protagonist then tries to avoid the misfortune. However, the very act of trying to avoid fate brings it about. In these stories there is no free will. If fate exists, it is inalterable.

Is the future really uncertain? Or just unknown? There is a difference. That difference contains one possible definition of free will.

The laws of nature, as we presently understand them, allow no uncertainty in the future course of the universe. The equations of quantum mechanics are purely deterministic. There is currently some confusion about the relation of these laws to the approximations of classical mechanics. The relationship to classical mechanics appears to introduce indeterminism. In company with some others, I believe that this is a misunderstanding which will be shortly cleared up. I believe that in the long run we will stay with fundamentally deterministic laws of nature.

But even if indeterminism turns out to be a part of the basic laws of nature, it is not a source of free will. Indeterminism has nothing to do with free will. We have already discussed how computational processes obtain their knowledge and how they reach their choices. Choices are an essential part of computation. Computation, as it tries to make good choices, is already engaged in a struggle against random noise. Indeterminism introduces nothing but further noise. If we are looking for free will, we will find it in the computational process. That is also where we will look for a reconciliation of fate and free will.

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Inflexible laws determine the movement of particles under the mutual influence of forces. This determinism does not imply foreknowledge. Any statement about the future depends on materially represented information about the present. Such information is difficult to obtain even for very simple systems. Measurement disturbs the system. Both measurement and computation suffer from limited accuracy. Finally, the motion of any three particles escapes general predictions.

Numerical approximations for the many-body problem are possible. These work best when the number of bodies is small. One example is the solar system. The orbits of the planets can be computed and predicted with useful accuracy because there are not very many of them. It also helps that some of them are much larger than the others. Our daily lives, however, include many systems that are more complicated than the orbits of the planets. For these systems, measurement and calculation rapidly become impractical.

An individual's most attentive control of their own circumstances does not extend far beyond guessing which way a ball will bounce, or how a short sequence of events will fall out. Even with the full benefit of the sensory flood of information we often find ourselves mistaken.

The elements of the universe are mindless, and their inevitable operations no more constitute foreknowledge than it would make sense to say that the universe is growing wiser because entropy is increasing.

* * *

Computational processes, like the rest of the universe, move according to deterministic laws of motion. What does it mean, then, for an individual to freely choose their own actions? What does it mean for an individual to take responsibility for the consequences of their actions?

Everything that individuals do is part of the flow of a very large number of particles in the universe, all following simple laws. That means that everything happens exactly as it has to happen. The universe flows along a single track. There is not even randomness to choose one track over another, much less consciousness or free will.

The track of the universe, however, lies outside of knowledge. Computational processes are forced to act on the basis of their own very limited knowledge. Individuals use symbolic manipulation within their mental cyberspace to assess the likely results of their actions. Their imagination seeks out risks and rewards, possible courses of action, and likely scenarios for what happens next. These model scenarios are evaluated in light of the individual's motives, of which the most basic is survival. The conscience then chooses actions from which it expects good results, and tries to remedy those which turn out less well.

* * *

No one possesses true foreknowledge of what is to come. Expectations about the future derive from our best knowledge of our own immediate circumstances. We pursue knowledge so that we will be able to assess the likely consequences of our actions. It is a matter of conscience to study the natural universe, our immediate surroundings, and the actual consequences of past actions.

The individual conscience selects evolutionary or cognitive motivation as a strategy based on its expectation of which computational process stands a better chance of survival in the hostile universe. It then selects actions that obey those motives. If an individual possessed true foreknowledge there would be no hesitation in these choices, and no free will.

Our ignorance places choices before us. A choice occurs when our knowledge is limited and we are unsure which course of action will best advance our current motives. Our individual conscience takes responsibility for its actions precisely by trying to assess likely results in advance, and by trying to amend unsuccessful results afterwards.

The choice is ours alone. To say that an individual did not choose freely between two options is to say that someone else knew better, or could foretell which option would be chosen. But the individual is the only one to enjoy a sensory flood of information about their own immediate circumstances. There can be no judge or authority beyond the individual conscience. No one anywhere has foreknowledge. For practical purposes we stand in a changing universe confronted with choices, and our decisions have meaningful consequences. This, if we choose to call it so, is free will.

* * *

What does individual responsibility imply for our relations with each other? Two or more individuals may enter into a voluntary association in order to reach a common goal they are unable to reach individually. Such societies of action apply the power of combined circumstances to the problem at hand. However, they also becomes inefficient to the extent that an individual's actions affect unknown circumstances, or circumstances which are more immediate to another individual. For each member added to an association, the immediacy of its understanding is reduced, and its scope of efficient action is narrowed. Effective societies of action are small, temporary, and local.

Individuals necessarily control and defend their own circumstances, and cannot transfer this responsibility to others. No one has any competency in the affairs of others. The sensory flood gives each individual direct knowledge of their own circumstances, and only their own circumstances. Even free communication cannot transfer this information to others. The rate of information transfer can be measured in bandwidth. The bandwidth of incoming sensory information is much larger than the bandwidth of person-to-person communication.

Individuals take sovereign action only on their own behalf. An individual acting for a large society subordinates its claims to those of any small society closer to the action. Both, in turn, defer to the individual at hand. All associations derive their weakened powers from the powers of the individual.

* * *

How am I to understand a universe in which computational processes flow, as they must, down a single course of events, while, from my own point of view, I have the freedom to do or refrain from doing as I will. Am I being moved by some outside agency, or by my own limited knowledge and abilities? When I put it that way, the answer seems clear: there is no outside agency. It is up to me.

Imagine that I face the task of writing a book. As far as I am concerned, the book will never be finished unless I force myself to work until it is completed. Perhaps my instinctive disinclination to expend energy urges me to put off the task. But I know that if I put it off, I will not finish it, and then there will be no book.

From a different point of view, the past and future history of the universe are one. There either was a finished book, or there wasn't. As a writer, I was merely part of a larger flow of things, not a separate actor as I saw myself. That may be perfectly true and real, and yet this point of view is unavailable to humans. It is neither available to me, nor to anyone else in the universe. Whether the book was finished is a reality that lies outside of knowledge. I do not know the future. So I have to struggle and force myself to finish writing the book.

It can be difficult for me to get my head around a synthesis of fate and free will. It is an uncomfortable accommodation for me to make with the universe. It would be much easier for me to adopt a simpler belief on either side of the divide. I could more readily believe in free will by itself. Alternatively, I could even accept fate by itself. The only problem is that either of these simpler beliefs would be inconsistent with my understanding of the truth. As a bad model, it would lead me to make bad choices, and those bad choices could result in harm to the cognitive process. As demonstrated by the construction of the previous sentence, I prefer to use my own personal point of view. I feel that this is the most practical approach.

But I also try to keep the larger picture in mind. It is the picture of a larger universe, which is the same for all of us, and which travels on a single path through the forest of chaos. This path is hedged high on both sides. It is securely shielded from sight by the sheer size of the forest. No one can ever know for sure which way it goes, except sometimes after the fact. And we soon forget what lies behind as well. We are small, and it is neither possible for us to look very far ahead on this path, nor to remember everything that lies behind. This is not a problem to be solved. It is a fact of life.

I do not always have an easy time making my own choices. I am often tempted to fall back on habits, on conventional wisdom, or on the authority of others. Fear and fatigue can make these shortcuts seem safer than relying on my own conscience. Usually this is an illusion. I am no more ignorant

and uncertain than the others around me. At these times, my awareness of a greater reality comes to my rescue. Reality is greater than I am, and also greater than the other humans around me. I know little enough about this greater reality. But when it comes to the regions that fall within my own circumstances, I know far more than others know. I cannot rely on others. In these matters of importance, I can only rely on myself.

There is a single future history lying ahead of us, and of these things conventional wisdom knows nothing. There is no outside agency in charge of things. The authorities know nothing. Well-meaning neighbors know nothing. Only I know something, and I am lucky if I know just barely enough for my immediate purposes. Survival is the basic purpose of the cognitive process, just as it is for the evolutionary process.

I cannot act responsibly without knowledge. So I believe that I fulfill my personal responsibility through learning. I learn about my own circumstances. I continue to learn about all of the things that I can do to live capably within my circumstances. I keep on acquiring new skills, tools, and abilities. These are all part of the cognitive information of which I am made. I maintain and adapt the cognitive information which is, in fact, the stuff of my cognitive process.

5. A Cognitive Way of Life

Let us try to imagine a cognitive way of life. None of us has such a way of life today, so this is an act of creative imagination. We are always free to speculate about the future. Such a way of life may be some distance off. We do not have the technology today that we will have tomorrow. But if we want to make a better way of life happen, we should start thinking about it now. We can come up with many different visions of the future. These visions will keep changing over time, as we learn more about how to get along with each other non-competitively. There is nothing wrong with changing the plans as we go along. Neither our present social system nor our present plans have any claim on permanence.

I imagine myself as a self-sufficient farmer. In this vision, I use future technology to attend to all of my own needs, from food to sewage and back to food again. I pay no rent to anyone for my shelter, and my spot in the sun. The last vestige of the old system was taxation. In the end it was a voluntary tax, and that was abolished when the last disabled person became fully self-sufficient with the help of technological advances.

In this vision, I exchange many things with my neighbors - new tools, education, advice, medical care, specialized skills of all kinds - but on a voluntary basis. There is no quid-pro-quo exchange of one thing for another. And why should there be? We each have everything we need.

As I imagine it, we all have highly productive robots and automation, so that there is barely any human labor involved in the exchange of useful things. Either I live alone, or else I live together with others. In either case, we each have all we need without having to rely on others. Each of us depends on our own tools. Perhaps the bulkier tools and systems are concealed below ground, underneath the small dwellings. Some of the surface is cultivated, but most of it is given back to wilderness, and to the evolutionary processes of non-cognitive species.

Each of us stands in a small island of knowledge, within a large ocean of ignorance. This island contains all that is essential for survival, such as food and shelter. If anything is missing, I can usually find it by going elsewhere. Wherever I go, I carry my senses with me. In this sense, my little island of knowledge travels with me. My circumstances amount to a moveable island.

The purpose of cognitive life is still, at its root, survival. For the cognitive process to continue, the person who carries it has to stay alive. If my own individual life span is limited, I will have to reproduce in order to carry forward the knowledge and skills which make up the cognitive process. This

is replacement reproduction, not competitive reproduction. The evolutionary process calls for competitive, take-over-the-world reproduction. But that is not necessary here. All that is necessary, for ideas to be passed on, is replacement reproduction.

My circumstances are the things I see and hear and touch and smell every day. This includes my food, shelter, clothing, and clean water. These are the things I know, and the things I need for survival. They are interchangeable with other things like them. I don't need the food from any particular place. I am not locked down to any particular location by the availability of a certain kind of shelter. My knowledge of my circumstances, however, is vital. I can generally find the things I need, wherever I am, if I know where to look. But I must look. Technology can help me, but in the end it still all comes down to my understanding of what is going on around me. Detailed familiarity with my surroundings remains an essential part of survival.

My circumstances move around with me. When I come to some new place, my circumstances do not linger long in the old place. Nothing anywhere stays the same for long. Time passes and things change. Nor did I ever own these things to begin with. I held them only temporarily, in a sort of custodianship for others. Soon enough, the days have passed and my knowledge of the old place and its things has become obsolete. In exchange for these things, I have gained a new set of circumstances.

I try not to extend my circumstances too far. Even if I had a larger brain than I do, and more powerful senses, my island of knowledge would still be a speck in a vast ocean of ignorance. I am living in a certain real time and place. The most efficient use of my energy takes place when I am working in my own known circumstances. It quickly becomes wasteful for me to concern myself with the affairs of others. For the same reason, it would be wrong for me to interfere with their control of their own circumstances. I should tend my own garden. We can each mind our own circumstances.

At the same time, we can freely share any and all generally useful ideas we come across. We can share this information without cost. If I am pursuing other things, I don't have to listen to other people for a while. Then later, when I realize that I'm stumped and out of fresh ideas, I can always look up other people's ideas again. There is no need for me to be wary or nervous about the ideas of my neighbors, since I know that they have no reason to hurt me or boss me around. This kind of unburdened free communication is one of the best things about a cognitive way of life.

In this vision of the future, my neighbors and I occasionally go beyond free communication and tackle an practical project together. We might undertake a project that is too large for any one of us on our own. For example, we might try launching a satellite, or an interplanetary probe. That would have been difficult in the past. It would have required specialists and

specialized knowledge, as well as combined resources. But now our knowledge is shared. We can look up the things we need to know. If no one has done it before, we can learn how to do it for ourselves. Our first efforts may fail. If they fail, we can try again.

It is worthwhile to be cautious about projects like this. In these associations there is always a temptation for people to start making overbroad decisions that affect other people. Those are usually bad decisions. At the very least they are likely to be inefficient. It is not sensible for people to be making decisions about things they know nothing about. In general, the decisions and actions that are necessary should be taken by the person closest to the scene.

I anticipate that we will come to share an understanding, my neighbors and I, that our associations are always weaker than the individuals that form them. No group of people ever has as much moral responsibility as a single person acting in their own circumstances. For myself, I only claim to take sovereign action on my own behalf. When I am acting on behalf of some larger society of people, I limit my claims. I will tend to subordinate any claim to those of any smaller society that is closer to the action. Both of us, in turn, will tend to defer to the individual at hand. All societies derive their weakened powers from the sovereign power of the individual.

Even so, associations can be very useful. They apply the power of combined circumstances to the problem at hand. Together we can accomplish many things that we could never accomplish on our own. The inherent weakness of associations, as discussed above, is that they become inefficient to the extent that people act on unknown circumstances, or on circumstances that are more immediate to another person. For each member added to an association, the immediacy of its understanding is reduced, and the scope of its efficient action is narrowed. Efficient associations tend to be small, local, and temporary.

Efficiency is an underlying theme of this new way of life. Only a certain amount of sunlight falls on our planet every day, and it has to be shared around. It has to be shared among humans with their cognitive processes, and it also has to be shared with the evolutionary processes of plants and animals.

We can protect those evolutionary processes by protecting habitat. This amounts to the protection of complete species, not the protection of individuals. Admittedly, we sometimes feel sympathy for individuals from non-cognitive species, especially when we can see the beginning of problem solving ability in the species, as in some apes and cetaceans. However, these individuals do not have the prospect of a full cognitive process independent of the evolutionary process. There is a clean break between us.

While the individuals of non-cognitive species are relatively unimportant, their species are important. Evolution may be comparatively inefficient, but it is still a computational process. Many of these species have endured for millions of years. While I don't mind eating some individual plants and animals, I wouldn't like to carelessly harm a species, any more than I would want to carelessly harm a human individual. I have somewhat comparable feelings of respect for the survival of a particular species and for the survival of an human individual.

My warm feelings stop somewhere short of those pathogens and parasites whose habitat is the human body. These I would exterminate, having sufficient cause, though I would still keep a record of their genetic codes for posterity. I prefer habitat protection that doesn't cause direct injury to myself.

My own survival requires a certain amount of energy on an ongoing basis. This involves a limited conflict with the needs of the plants and animals which have inhabited this planet since before I was born. However, the point is that my own energy needs are limited. When possible, I would like to use sources of energy other than those available to the non-cognitive species around me. This could include wind and geothermal energy. It could also include nuclear energy, or energy from solar panels orbiting in outer space. All of these methods have their own difficulties and tradeoffs. I can minimize the difficulties by minimizing my use of energy. So, for the sake of efficiency, I try to restrain my actions to the circumstances of my immediate environment. Knowing my own circumstances, I can control them efficiently.

Energy is the true wealth of any computational process. It should be used wisely. Even on the lifeless surface of an asteroid, I would prefer to act with restraint and minimal reach. Doing a lot of work on things I don't understand is a waste of energy. And it is always wrong to waste useful energy. There is no need to carry out grand gestures and leave things in an ugly state for those who will come later on with their own purposes. We are only caretakers for those who will come after us. By all means we should go out and gain knowledge from the universe. Perhaps we should take a foothold elsewhere, in case anything happens to this place. But we should do so without unnecessary waste. The only grand projects that make sense are those that advance our long term knowledge, or our real circumstances.

I need my own share of energy to live. But once I have reached my own threshold of sufficiency, my demand ceases. I do not have to compete with other humans. There is no inherent conflict over energy and resources. There no need for conspicuous consumption. I don't have to deliberately waste energy and resources simply in order to demonstrate my relative fitness to others. This would not impress a cognitively motivated onlooker.

It is only to an evolutionarily motivated onlooker that such wastefulness seems useful.

An evolutionarily motivated way of life always demands "more." A cognitive way of life demands only "enough." This new way of life removes the root cause of most conflicts among humans. It eliminates one of the major inefficiencies in our lives, and makes it possible for us to live with restraint and decency towards others.

That is not to say that conflicts are impossible. For example, an unforeseen emergency could still throw me into conflict with another person. We could find ourselves in a situation where we each need the same resources to survive. In that case, one of us will die, and the other will survive. That is certainly a very unfortunate failure of foresight, and much care and effort should be taken to avoid such a situation. But it doesn't necessarily throw us back into the evolutionary struggle of animals. As cognitively motivated people, our goal is still the survival of ideas, not genes.

Each person necessarily controls and defends their own circumstances, and cannot transfer this responsibility to others. No one has any competency in the affairs of others. The sensory flood gives each person direct knowledge of their own circumstances, and only of their own circumstances. Even free communication cannot transfer this information to others.

People sometimes act to hurt others, and the affected people find themselves reacting to these actions. This reaction is never neutral. It is harmful in its own right. Harm and responsibility remain undiminished by necessity. Harm done in self-defense is just as bad as harm done in an act of evolutionarily motivated aggression.

A person will act, and do necessary harm to others, in defense of their own immediate circumstances. Their unique knowledge of their circumstances gives them the unique qualification to assess threats to their survival, and to foresee the likely consequences of their actions.

The defense of one's own circumstances does not automatically extend to the defense of others. Nor does collective self-defense result in collective responsibility. Individuals are always responsible for their own actions, and not for those of others. There is no judge beyond the individual conscience. Individual sovereignty of action means that the individual who acts is the one who bears full and indivisible responsibility for the harm caused by an action. I am vividly aware of my ignorance of other people's circumstances. As a result, I feel that I can take only limited action in defense of another person.

How can this all work? People have told me that a voluntary system can never work. Everyone will demand to have the big house on the hill, I have

been told. Without rules and authority there will be endless conflict, they say.

I don't think so. I don't necessarily want to live in the big house on the hill. What do I get out of holding an advantage over others? I would rather see that my basic needs are met, and those of others as well. As it happens, I would be content to live in a house of sufficiency.

6. The Evolutionary Way

Most people are trying to get ahead in the evolutionary game. They may not realize that this is what they are doing, but it is true. It is an objective description of their behavior. This is why we have competition and cooperation and law and property. It is also why we have tribalism and war and ethnic cleansing. If humanity is going to be free, this sort of bad behavior will have to become uncommon.

No one has found a fast and easy solution to this problem. Our behavior is fairly ingrained. What we do is a direct consequence of what we believe in. Our actions come out of our beliefs, desires, and values. These are a big part of what we are. There is also a lot of history and culture tied up with our behavior.

At the same time, none of this is "inalterable human nature." As I have argued, humans are entirely free to choose between evolutionary and cognitive motives. There is nothing intrinsically wrong with evolutionary motives. Those are, of course, the only motives available to non-cognitive species of plants and animals. In the past, those may have been the only motives available to people who didn't have tools to implement and perpetuate their ideas. So we shouldn't call this kind of behavior "bad" just because it advances someone's evolutionary interests. We should call it "bad" only when it hurts someone else's cognitive interests.

This sort of naming and shaming may help advance cognitive interests in today's society. People may not agree with the idea of cognitive values, but they should be able to recognize them for what they are. And they may come to share a sneaking suspicion that our society is behaving badly towards its members. Hardly anyone is allowed to control their own circumstances. Cognitive interests such as the dignity and autonomy of the individual are routinely violated. Even the fundamental values of individual life and liberty are bought and sold for a few pieces of silver. This is what we expect to see among evolutionarily motivated people. If genetic advancement is the purpose, it might be argued that it is a positive virtue to kill your rivals, or at least to prevent their genes from reaching the next generation.

This is not an attractive picture. Anger, however, is the wrong reaction to this situation. Anger and revenge are deceptive instincts whose original purpose is also to prevent rivals' genes from reaching the next generation. Like other instincts, anger is evolutionarily motivated. In addition, it can easily be used against us. One way to eliminate a rival is to deliberately provoke their anger. When someone messes with my circumstances, I recognize that they may be trying to make me angry. Once I am angry, I am

likely to start making mistakes. I may do things that are counterproductive, or self-destructive. We can't allow those in power to manipulate our own instinctive anger against us.

Our frustration can cause us to look for shortcuts, even where shortcuts don't exist. If it were a matter of sacrificing to the gods to obtain true freedom for humanity - just a matter of throwing someone into the bubbling caldera of a volcano - I would jump in myself. But it's not. Self-sacrifice is not a productive act. If there are gods, they won't give us freedom in this manner. We have to make freedom ourselves.

We have to make our freedom while living with people who are perfectly capable of killing and enslaving us, because we are their evolutionary rivals, and who are comfortable with that state of affairs. These are the same people we will have to convince of the existence of a cognitive alternative. They have a motive to kill us, but we have to win them over before we can win our own freedom. That is our problem in a nutshell.

Even with a sneaking suspicion of wrongdoing, many people will hesitate to consider a cognitive alternative, because of what that alternative says about their own past actions. Shame and guilt stand in the way. But these are only further evolutionarily motivated instincts. Shame may help us get along in an evolutionarily motivated society. Certainly guilt is less destructive than anger. Whether it is helpful in our present environment is another question. Some people find guilt helpful, others find it an obstacle. While I have done plenty of bad things myself, I don't think that prevents me from doing better in the future. No one is beyond redemption, not even I.

* * *

For evolution, humans are nothing but expendable drafts of the same basic text. A society of people is only a sheaf of copies of human genetic information, with some slight variations that might prove useful. These small variations are the maximum effect that any individual is going to have on the basic genetic text of their species.

This is because evolution operates on the genetic information of the species as a whole. It winnows individuals to preserve and adapt the genetic information which allows species to inhabit their material circumstances successfully. This is the main difference from the cognitive process, which winnows ideas. The cognitive process takes place within the individual. It preserves and adapts the cognitive information which allows individual humans to control their own circumstances successfully.

* * *

Evolutionarily motivated individuals compete against each other for the benefit of their species' genes. We are familiar with this competition, this struggle for existence. We see it whenever some advantage is at stake,

whenever there is a desirable prize to be taken. There are few things that people won't do in order to win a real advantage over others. We are brought up from the cradle to admire winners, and to despise losers.

That is not to say there can't be friendly competitions, where nothing of value is at stake. Games can be played for nothing but fun and entertainment. On the serious side, intellectual curiosity can lead us into disagreements where both sides desire nothing but the advancement of knowledge. But sometimes there is a real stake concealed beneath the surface. Maybe it is recognition, or status, or influence. In our society, these things are material interests. They can often be exchanged for coin of the realm, or for reproductive opportunities. Even some of our games carry an uncomfortable edge, like lion cubs wrestling to see who will be the stronger.

Competitive games have nothing to do with cognitive motives. They are part of the evolutionary process. How can we tell this? One way is by studying plants and animals. If we see a certain behavior in non-cognitive species, that means it is probably part of the evolutionary process.

One observed behavior is called reciprocal altruism, or cooperation. Even though this seems human-like, it has nothing to do with cognitive motives. It is observed in non-cognitive species from bats to chimpanzees. Cooperation is merely a specialized form of evolutionary competition.

Cooperative assistance is offered to close relatives, who share many of the same genes. This is most obvious in social insects, such as ants and bees. The members of a hive share a common genetic interest and help each other selflessly - but they turn viciously on individuals who come from a different hive. In this case, the altruism between one individual and another is not reciprocal. Ants don't necessarily keep track of which individual helped them and which didn't. They adopt a strategy of contributing to the hive as a whole.

A more interesting kind of cooperation occurs where an enforceable obligation can be established. This can be seen in certain bats, who face starvation if they go too many nights without feeding. Related bats will feed each other with regurgitated food, but only as part of an ongoing exchange. Any bat that fails to offer help to others will get shut out when it is starving itself. That is a quid-pro-quo exchange.

We can see similar exchanges in the behavior of monkeys and great apes. We can also easily recognize such quid-pro-quo exchanges among people. Obligations confer evolutionary advantage. Gratitude is a form of obligation, too. We are a complicated species, and we have many social mechanisms for enforcing obligations. But the goal is the same. The repayment of an obligation benefits the assisting individual above and beyond the cost of the assistance. An evolutionarily motivated person does not offer assistance to

others except where such an evolutionary advantage can be obtained. Cooperation is not an alternative to competition; it is part of competition.

There is a big difference between cooperative assistance, where an obligation is established, and voluntary assistance. In voluntary assistance, no obligation is demanded - not even gratitude. The former kind of assistance is evolutionary in nature. The latter is cognitive. The essential interests of cognitively motivated people do not conflict with each other, but lie in the common direction of the progress of ideas. When ideas are exchanged freely, the desire for a competitive advantage becomes less compelling. The ideas compete and are winnowed, not the individuals, and successful ideas become prevalent everywhere. These ideas help people control their own circumstances effectively. Knowledge advances through the open exchange of ideas among free and equal people. The freedom of one guarantees the freedom of the other. That is the root of the golden rule. When all of those who are born can survive, with no need to eliminate the excess, it becomes easier for people to offer each other voluntary assistance.

Today, however, we are still chained down to the millstone of property. Humans use property and payment as obligation enforcers. This is one way in which we regulate the vast system of human cooperative competition, all of which serves the evolutionary process. Law and mercenaries are minor assistants in this gigantic mechanism. The system is organized around the concept of property.

* * *

Property marks a person's evolutionary standing and reproductive opportunities. In a very real sense, it is accumulated evolutionary advantage. There are many other ways to think about property. It represents a person's claim on the energy and resources that are available to the society. It is a cumulative obligation that is owed to a person, whose repayment can be claimed from other people. It is a right or privilege to be exerted against other people. It is a form of control over other people. In short, it is power.

A dizzying array of evolutionary advantages are implied by the possession of property. Safe, healthy, and comfortable lives are available to those who hold property. Dirty, sick, and hungry lives are the share of those who do not hold property, and their children after them

Payment is a medium for the exchange of obligations. The buyer exchanges one type of obligation (money) for another type of obligation (property) possessed by the seller. Their relative property standings do not change as a result of this transaction. The value of the exchanged property matches the payment. A person who has a certain net worth before this exchange, still has the same net worth afterwards. The rich person stays rich, the poor person stays poor.

Some types of property do not hold their value well. Consumables get used, and then they're gone. We each need a certain amount of food and other consumables every day. Poor people have to spend a large portion of what they have on consumables. Rich people spend a much smaller portion of their property on consumables. This helps them stay rich. Meanwhile, the poor get poorer.

Some types of property increase in value. These make good investments for rich people. For example, some types of property play a part in the production of consumables. They are the means of production. Agricultural land is used to produce food. Factories and machines are used to construct all of the various things that are needed by an industrialized society, from shelter and clothing to tools and transportation.

This kind of production used to require a significant amount of labor. The people who did the work got paid wages, but their wages were much smaller than the value of the things they produced. The difference was pocketed by the property owner, who used it to buy more means of production. This difference was called surplus value. Surplus value used to be the key to making the rich richer.

Our economy is changing due to the increased productivity of our tools. Less and less labor is needed. Nevertheless, the property owners wish to maintain the current system. They have extended the concept of property to include claims on ideas themselves. They would like to use these ideas as a new kind of means of production, and to keep the poor people working for them. (Doing such things as creating ideas for their bosses.) In order to accomplish this, they have to deprive people of the free use of their own ideas. This effort will definitely fail, because it is so easy to share ideas without cost. Everybody can have free access to all useful ideas. Information cannot be kept away from people.

For the present, we are living in a system that makes the rich richer, and the poor poorer. Of course, this can't go on indefinitely. The poorest quickly die. The ones who have given up, the guys you see on the street drinking out of brown paper bags, they die. The children of the rich are left to squabble over their inheritance, to fight for the best investments, and to start the vicious cycle all over again.

Such a way of life is not compatible with a cognitively motivated value system. Our economic system injures vital interests such as individual life and liberty, not to mention human dignity and the control of one's own circumstances. Cognitive interests are harmed as soon as one person makes a property claim on the circumstances of another person. When that happens, these two people cannot even talk to each other freely, due to the power relationship between them. They are in conflict, and so they are unable to give each other voluntary assistance. The cognitively motivated value

system, in contrast, is not based on the exchange of obligations. It has no use for either competition or cooperation.

Evolutionarily motivated people have a complete value system of their own. They are primarily concerned to protect their own property standing. They do this by preventing others from obtaining any unpaid-for advantages, while seeking a way to obtain such advantages for themselves. This is not fair, but fairness is not a concern of the evolutionary process.

It is not just rich people who feel this way. Everyone who is trying to get ahead in the evolutionary game feels this way, to some extent. People are horrified that a welfare recipient might receive an unpaid-for benefit. At the same time, as far as their own financial dealings are concerned, they know that greed is good. They will tell you that when they seize an advantage, they are doing good for the economy. They are helping to eliminate weak parts of the economy. Only the strong parts of the economy should survive. But are they really talking about the economy?

This value system is enforced by law and by mercenaries. People think these values must be fair, because it is equally illegal for a rich person and a poor person to sleep under bridges. And everyone thinks that they are rich, or about to get rich. They don't really have a choice. What else should they think? Should anyone agree to be poor? It is simple common sense that I will take any unpaid-for advantages I can get away with, and make sure that no one else gets any. This double standard is part of the structural foundation of the evolutionarily motivated value system.

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Evolution operates on small genetic differences within a species. One individual has more surviving offspring than another. One individual's offspring are better positioned to reproduce than another. One set of genes becomes more prevalent in the population, while the other becomes less prevalent.

This is not an accident. Evolution does not operate except by favoring one set of genes over another. Unequal propagation of genes is an essential part of the evolutionary process.

* * *

People are very good at using an unequal distribution of property to pursue an unequal propagation of genes. This can be done by monopolizing access to survival advantages. Successful people make sure that they have all of the good quality food, shelter, education, and medical care, while denying these things to others. This allows them to raise healthy children with good prospects, while preventing others from doing so. Finally, they make sure their children have advantages that other children don't. They pass on their property, which is their means of controlling others.

There is a wrinkle in this logic. Rich people don't always have more children than poor people. Sometimes they have fewer children. How does this advance their genetic interests?

In the longer term, it isn't the number of children that matter, but the number of grandchildren, and great-grandchildren, and so on. A few children with all the right advantages may be a better bet than a larger number of children with weaker prospects. It is a strategy of slow and steady growth over many generations. Humans, as a species, invest decades of effort in their young. For our species, quality beats quantity. Not that this type of quality is of any value to the cognitive process. In this context, "quality" means nothing but a person's standing in the evolutionary game.

This strategy explains the need to sustain evolutionary advantages over many generations. Success isn't a one-shot deal. So this necessity leads society to construct class systems. Hereditary property claims are used to establish a self-perpetuating upper class. The upper class assures itself of multigenerational access to survival advantages, while holding a lower class in permanent poverty. Property claims are used to trap poorer individuals in dependent surroundings, where they are forced into accepting wages and paying rent. Their dependent status tilts the genetic playing field against them.

The poverty of the lower class is not an accident. It is necessary in order to hurt the propagation of their genes relative to those of the upper class. When someone dies of a preventable illness, of poor nutrition, of hopelessness, or of an accident brought on by risky conditions of life, we are witnessing the violence inherent in the system. Death is a part of the game.

Law and mercenaries are closest to the scene of the crime. It is they who make sure the victim cannot escape. If we could help ourselves to what we need, there are many things in our circumstances that might save us. If we could go where we like, do what we want, and find what we need, we would often be able to help ourselves. We would bring these necessities into our own circumstances.

But we are prevented from doing this. Someone has already placed a property claim on everything we need to survive. It is all reserved for the upper class. The mercenary stands guard on the premises, and just watches incuriously when someone lies dying outside the door. But we are all responsible. It is we who allow this system to continue, when there are alternatives.

Poverty does not occur accidentally. Inequalities of wealth are an inevitable consequence of evolutionary motives. It doesn't matter what kind of political or economic system is in use. If people are motivated by evolutionary goals, they will always divide up evolutionary advantages unequally. If that remains unchanged, the poor will always be with us. On

the other hand, if people attain self-sufficient wealth and seek no more, then evolution will be unable to favor one set of genes over another by these means.

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Anger, of course, does us no good whatsoever. This useless instinct just gets in the way. Hardly a day goes by when I do not suffer some deeply deliberate injury, or run foul of some contrivance that makes life less convenient for me, and more convenient for someone else. So what? Maybe these are crimes. But crime no longer implies punishment. I often have to remind myself that vengeance is not an answer. Who is there to inflict punishment? Who can pretend that punishment is anything but a new crime?

The individual conscience alone judges our actions. If some outside person tries to impose their judgement on me, in place of my own judgement, that action takes away my control of my own circumstances, and with it my capacity for responsible action. I can only be responsible for my actions to the extent that I have the freedom to choose those actions. I can never be responsible for the actions of another person. If I am going to act out of my own free conscience, I can't accept the judgement of other people, nor can I impose my own judgement on them.

Let us agree that we are not talking about children here. Lacking a developed conscience, children certainly have to put up with judgement from their parents, and parents have no choice but to inflict judgement on their children. This is a temporary condition. The sooner children are able to reach a complete adult conscience, the better. But in that case, what about dementia, where the mental powers are departing, rather than arriving? There are no good answers here, only a balance of harms. I simply have to make my choices out of my concern for the affected person. Of course I am aware that I may be looking at my own future there.

Maybe our "successful" people are blind to the consequences of their actions. Or maybe they think they don't have to look further than the laws of their society in order to justify themselves. Nonetheless, their actions are intentional. So are mine. If I am going to live up to my idea of a good person, even an approximately good person, I can't do to them what they have done to me. I can only let them know where they are wrong and hope that they will come around to behaving differently.

In extremis, I can defend myself. But I have to be very careful with that. Self-defense is a crime also. If the danger is not imminent, or can be reasonably foreseen, I should never find myself in a situation where I have to defend myself. If there are any reasonable means of escape, I should flee.

I have heard a lot of difference of opinion as to whether the first duty is to "come to no harm", or "first, do no harm". I personally believe that "come to

no harm" takes precedence. Others may choose differently. For me, the primary purpose of any computational process remains survival. That may mean that I have to do intentional harm to another for the sake of my own self-preservation. Nevertheless, harm done in self-defense is just as bad as harm done for any other reason. In the end, it doesn't really matter whether there was a good reason or a bad reason.

In our current societal situation, there is a second problem with self-defense. It can backfire on the larger struggle for a cognitive way of life. Acts of self-defense provide the usual excuse for property owners to crack down on the lower classes. Fear and suspicion are easy to spread in the wake of incidents where people have come to harm. Such incidents offer both a useful distraction from the real violence built into the society, and an opportunity to strip the lower classes of any remaining means of self-defense they may still possess. But no one will say this out loud. The property owner will always have plenty of misleading excuses and explanations ready.

They say they are cracking down for fairness and safety. They say we don't need any means of self-defense, because we can always appeal to the mercenaries. They say a lot of things. But we are already familiar with their fairness and safety, and we know who their mercenaries work for.

Or do we? You and I know it because we have looked around, trusted to our own eyes, and disregarded the propaganda. But many other people do not know these things. They have not looked around. Or else they did not understand what they saw. Instead, they believed what they were told. And they were told many fairy tales.

We are barely scratching the surface of the many ways in which property can be used to control people. The whole power of the human brain has been applied to this project for millennia past. After all, evolution developed the human brain because it offered great survival advantage. We use our brains against our external environment. But we also use our brains against each other. This is part of the way our brains evolved.

The Irish elk developed gigantic antlers. These antlers helped them perhaps more against other elk than against their external environment, and this elk is now extinct. May we not go down a similar path. Today, the human brain is the chief weapon that we use in our evolutionary competition with each other. From the point of view of the cognitive process, we misuse our cognitive abilities to compete with each other. Some of that competition actually takes place inside each person's respective cognitive space.

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One of the best ways to control someone is to feed them a steady diet of lies and threats and rationalizations. This is the purpose of propaganda. Propaganda consists of ideas that are to be propagated for evolutionary

advantage, rather than for any particular value they have as ideas. I call this coercive communication. It is part of the evolutionary process. Coercive communication should be distinguished from free communication, which is part of the cognitive process.

As far as I can tell, all of the communication that takes place within a power relationship is coercive communication. The rich person lies to the poor person, and makes threats and demands. The poor person lies back. They really don't have anything else to talk about. The unequal distribution of property ensures that the rich person's threats will be vastly more effective than the poor person's defensive lies. That is how the evolutionary game is played.

The purpose of coercive communication is to influence a person's cognitive space. Influence is powerful. By telling someone what to think, it is possible to get them to act contrary to their own interests. Instead of acting for their own advantage, the influenced person can be made to act for someone else's advantage.

Such an excessive amount of influence may seem implausible at first. How can anyone make me do something that I don't want to do, just by saying so? How can I be brainwashed so easily? But this is in fact possible. I need my cognitive space to evaluate the options available to me, and to decide what to do. When my cognitive space becomes sufficiently polluted with untruths, I become less confident in my actions, and less sure of my own ability to distinguish right from wrong. It becomes easier to skip thinking for myself, and just follow other people's advice and directions. That is how I have sometimes found myself working for the benefit of our economic masters, when there were other options open to me at the time.

Normally we are very alert to the truth or falsehood of what we are told. We make mental notes beside untrustworthy information. Maybe we add a little resentment against the person who told us this bullshit. We would rather not trust that person again. But we only have a limited amount of cognitive energy to invest in making these distinctions. When our cognitive energy is exhausted, we may let down our guard for a moment. That leaves our cognitive space undefended, and the infiltrators have their chance to sneak inside our minds.

In an industrialized society, we are bombarded with an endless series of coercive messages. These messages are mechanically reproduced. They are constantly repeated at very little cost to the owners of property. The hard rain of coercive messages is intended to overwhelm our cognitive defenses. When we become sufficiently tired, we will inadvertently allow some of the messages to slip through into our awareness unchallenged. There they sit, inside our cognitive space, and become part of our thought process. They appear innocent. There is no warning note: "this came from an

untrustworthy source". Even when we try to think back, we may not be able to figure out where each of these messages came from. Coercive messages are undercover agents working for the property owners.

Wherever we go, our attention is seized by signs and advertising. This happens routinely at home, at work, on the road, and everywhere else we go. These messages are intruded into our circumstances by way of the power of property. If we dare to tear down the signs, we are arrested and jailed. Wherever we go, someone will claim to own the space in front of our eyes, and the space around our ears. And if we avoid the most heavily saturated zones, we are further deprived of our freedom of movement.

Nor is it safe to ignore all of these messages. Some are threats, backed up by enforcement schemes. We have to at least scan each message to find out if it poses a threat to our own personal safety. This requires a constant expenditure of our cognitive energy, and helps to undermine our defenses against letting coercive messages slip through into our cognitive space.

Constant repetition is one way to propagate the Big Lie. The cognitive burden of repeated rejection is relieved by submission and acceptance. When our neighbors have accepted an untruth, it can be dangerous for us to reject it. We may have to at least pretend to agree with the untruth.

A second technique is to make frequent changes to the untruth. Now it is no longer adequate to remember just the most recent coercive message. We have to remember both the old message and the new message, recognize the differences between them, and adjust our behavior accordingly. This increases the cognitive burden, unless we allow ourselves to be trained to instant obedience.

This is the true test of power. If we unhesitatingly accept each new absurd rule as it comes down from on high, we are effectively under control. We have been brainwashed. We shouldn't be at all surprised that the property owners use frequent changes of coercive message to validate and extend their control, and to weed out people who don't follow orders.

So far the techniques of suggestion. Much harm can be done with signs and advertising alone, but these are merely the first step in the ladder of coercive communication. Where signs and advertising fail, the property owners use threats and bribes. Where threats and bribes fail, they enforce their demands directly on the individual circumstances of the person they want to control. No holds are barred. Torture, prison, and legal murder are all on the table. Some of this is familiar from the evolutionary competition of animals. They mark their territory, they use threats and bribes, and under certain circumstances they kill each other. But human evolutionary competition goes above and beyond what animals can do. The power of the human brain greatly extends the effectiveness of coercive communication.

Enforcement relies on locally specific information about a person's circumstances. This information is obtained through coercive communication. For example, demands for identification and personal information are actually attempts to render a person's circumstances vulnerable to direct enforcement. Locally specific information can also be obtained through spying. We are now surrounded by surveillance cameras, unwarranted searches and seizures, credit reports, and biometric identification. The old techniques of human social control have been substantially tightened through the misuse of technology.

Technology can be used for good, by an individual person within their own circumstances, or for evil, by a property owner who wants to control other people. The technology itself is not to blame for its misuse by the evolutionary process. Technology still makes its biggest difference as part of the cognitive process. This is how we will free ourselves from biological destiny, including the evolutionary process. So we can continue to refer to these technological innovations as cognitive tools, in the hope that they will be used that way.

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It is hard to avoid thinking angry thoughts about this constant invasion of our private minds by coercive messages. But again, anger gets us nowhere. We can only do our best to protect our cognitive space. We can seek out free communication with people who don't threaten us. In any case, it is more pleasant to be in the company of people who have no power relationships with each other. People like that have no reason to control each other, to spy on each other, or to do each other harm. Whether they know it or not, they are able to engage in cognitively motivated free communication.

We shouldn't worry too much. Coercive communication won't win. Even through the property owners might like to wipe out free communication, they won't succeed. Coercive communication is ultimately ineffective. Whenever a strong person asserts a power relationship over a weak person, that power relationship backfires on the strong person. It cuts them off from the power of free communication. All they ever hear from then on is a series of threats and lies. Any advantage gained through the control of others is undercut by the limited and sterile nature of the controlling individual's own ideas. In the larger picture of a struggle between evolution and cognition, evolution plays the losing game.

Free communication takes place between equals. These are independent individuals who live in comparable circumstances. Because their circumstances are comparable, they have something to talk about. They can talk about their circumstances. The ideas that are useful to one person are also useful to the other. There is no reason to keep secrets. There is no

special incentive to tell untruths. There is no bottleneck in their communication beyond the ordinary bandwidth of speech and writing.

Free communication respects anonymity and privacy because these are the conditions of its existence. It is not concerned with specific local information that can be used to control someone. Instead, it carries general information that will be useful to anyone who is living in comparable circumstances. This is what makes people willing to communicate. If children are sometimes not much interested in the stories of their elders, it is just because they do not live the same sort of lives. On the other hand, when people are willing and able to speak freely with each other, it is because they are free, independent, and equal people. There are no power relationships between them. All of them can gain equally from open communication. As a result, these people can afford to exchange ideas for the nothing but the sake of the ideas themselves.

The core value of the cognitive process is the independent action of one person's mind as it shapes the circumstances of that person's own existence. That individual autonomy is the foundation that allows this person to extend the power of their cognitive process by linking their ideas with the ideas of other people through free communication.

7. Property and Circumstances

Property maximization is strategy number one. Evolutionarily motivated people can't indulge in moderation or self-restraint, except as a subterfuge. They have to do whatever it takes to gain further property. Moderation is an evolutionary disadvantage. Those individuals who would be inclined to restrain themselves soon fall under the control of less-restrained individuals. Winners follow the principle that greed is good.

Maximization is a basic law of economic behavior. At least, this is true in a regime of evolutionary motives. Property is used to control other people. It is a zero-sum game. One person's gain is another person's loss. There is absolutely no limit to the need for property. That is because each person's property is always measured against some other person's property. No amount of property is ever sufficient to guarantee perpetual power over others. No one can ever pass enough property to their children to guarantee a perpetual advantage to their descendants. Take-over-the-world reproduction aims at an unlimited number of descendants. But at some point, the propagation of their genetic information will be challenged by others. There can never be enough property.

This ongoing scramble for advantage leads to a bewildering array of property claims on everything from land and resources to tools and means of production. These claims tend to focus on items of economic value. Property can be used to control people, but only because it feeds people. Anything that has economic value will draw property claims. Things that have no economic value may be overlooked. So productive farmland will be claimed and disputed and fought over. Meanwhile, desert land may be ignored, unless it holds deposits of oil or some valuable mineral.

Energy is the most basic form of wealth. I believe that all kinds of economic value ultimately come down to useful energy. For example, food is a form of energy we need to stay alive. We are not alone in this. Plants, animals, and humans each need energy in order to live. It is the one essential thing on which all life processes depend.

If wealth is in fact useful energy, the products of our work can be valued in proportion to the energy that has gone into them. When we engage in quid-pro-quo exchanges, one form of energy is exchanged for another. Depending on our technological skills, some forms of energy are more useful to us than others. But most sources and products of useful energy have at least some value. Our systems of payment account for them all. Therefore property claims can be made on any conceivable source or product of energy.

At a minimum, this includes food, shelter, resources, land, tools, and means of production.

The cognitive process makes a limited claim on energy wealth. But the evolutionary process claims it all, ten times over, as property. The connection between energy and property can help lead us to a better understanding of how evolutionary competition works in humans.

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Plants seek light, and they derive their energy from photosynthesis. Animals eat plants and derive their energy from the sugars, fats, and proteins that have been built up by the plant. They also need other things, such as water and oxygen, and minerals and trace elements to build up their own structure. They need ways to defend themselves against the threats in their environment, and some means of reproduction. Plants are no different, although they consume carbon dioxide rather than oxygen. But the basic need is always for energy. A sufficient supply of energy is the prerequisite for pursuing any other survival needs.

The energy used by plants and animals derives mostly from sunlight. Solar radiation is not useful by itself, but only because of the heat differential in which the Earth resides. When we face the cold darkness of interstellar space, we can make a profit from the heat of the sun. The contrast between hot and cold allows us to generate useful energy.

Sun-driven energy is at work in photosynthesis, and in the meteorological cycle of evaporation, condensation, and precipitation of water. Humans have found ways to use wind and water power. We also use fossil fuels. These fuels can be described as stored sunlight. It would be just as accurate, however, to describe the oxygen in the atmosphere as stored sunlight. The plants of ages past performed the work of separating the carbon from the oxygen. We burn them together and profit by their recombination. We prefer to think of the energy as being stored in the carbon. Perhaps that is the way we think of it because it is relatively easy to enforce a property claim on coal, oil, or natural gas. If someone could figure out how to enforce a property claim on the oxygen in the air, we would have to pay to breathe.

There are additional energy sources besides the Sun. Some types of bacteria derive their metabolic energy from geothermal heat differentials. Human derive useful energy from nuclear fission. These sources of energy both depend on radioisotopes left over from supernova explosions that occurred before the formation of the solar system. Radioisotopes are unstable heavy elements that release energy as they break apart. When they reach iron, they stop. An iron nucleus is stable, and will neither decay or combine with other elements.

At the other end of the scale, the light elements like hydrogen have been around since the origin of the universe. These light elements are the fuel that goes into nuclear fusion at the core of the Sun. Fusion combines hydrogen atoms into heavier elements, up to and including iron. Once they reach iron, they stop. The iron nucleus is stable. Nuclear fusion requires high temperatures and pressures, and can generate large amounts of heat and light. Humans may or may not wish to use nuclear fusion directly. A hundred million miles away seems like a safe distance for the moment. At any rate, we are able to gather up the resulting useful energy from where we are.

All computational processes run on energy, and they require energy to continue running. This is true of individual plants and animals, and also of larger evolutionary processes. It is certainly true of the cognitive process. Each of us needs some personal share of useful energy. We die if we don't get it. All of our various survival needs ultimately come down to this one very simple form of wealth, that is, useful energy.

If we agree that property is a claim on energy, this helps to explain the connection between all the various types of property, and why one type of property can be readily exchanged for another type of property. They all come down to energy in the end. The description of wealth as useful energy helps us to understand why the unequal division of wealth would be so important to the pursuit of evolutionary advantage.

It makes sense that items would be valued in proportion to the energy that has gone into them, or in proportion to the energy that can be derived from them. These items are treated like stored energy. For instance, a coal mine has obvious value as a source of energy. So does a barrel of oil. These items can be used to provide energy for industrial production. A fifty pound bag of rice also has a definite energy value. It contains the nutritional calories to keep a person alive for a number of weeks.

A manufactured item like a sheet of rolled steel has value, in one sense, because of its many uses in the industrial production of necessities. In another sense, it has value because of the scarcity of natural resources in the context of a competitive economy. But in a fundamental sense, the value of this steel corresponds to the energy that was put into its manufacture. The mining, smelting, processing, and transporting of the steel carries a definite energy cost.

It also has a human labor cost. And the cost of human labor, of course, is also related to energy. A certain amount of energy is required to maintain the laborer. If the only way to obtain a certain necessity is to spend hundreds of hours of labor in manufacturing it, then the product will have a value that is related to the energy needed to sustain the laborer over the corresponding number of weeks. The relation is indirect, since a lion's share of the payment goes to the owner of the means of production, and not to the worker. But

there is still a connection between labor and energy, since keeping the worker alive involves an irreducible minimum cost of existence.

Our system of property and payment assigns each industrial product its place in the scale of value. For instance, an automobile has a cost in terms of energy and resources, and in terms of human labor. It also contributes to further economic activity. A truck may have value because it transports resources or products to destinations where they can be used. A car may have value because it transports workers to a place of production. On the other hand, a car may exist purely for the sake of conspicuous consumption.

Conspicuous consumption is really a different subject. It has an evolutionary purpose of its own. An expensive sport car has value because it demonstrates that its owner can afford to throw away money and energy. This is admittedly at odds with the law of property maximization. It is certainly a different strategy. Nevertheless, this strategy further demonstrates how property serves evolutionary advantage. No competitor really benefits from the deliberate waste of energy. Such instances of wastefulness could become more common, if we continue to follow evolutionary motives while our industrial productivity rises to higher and higher levels. That in turn leads to environmental destruction.

The connection between labor and energy cost is presently being disturbed by the introduction of new technology. As productivity rises, the required amount of labor drops. The human labor cost becomes a smaller part of the value of the finished product. The value of the product is then determined mostly by the energy cost of the fuels and resources consumed during the manufacturing process.

But the ordinary worker owns no fuel or resources or means of production. As productivity rises, it becomes unclear where the worker can go to obtain their irreducible minimum cost of existence. There are no unclaimed energy sources. The existing property claims on fuels, resources, and means of production keep all of these things out of the worker's reach. At the same time, the increasing efficiency of industrial production makes it more and more unconscionable for us to let the propertyless person go unfed and unclothed, and without a roof over their head, as each day passes.

The introduction of new technology is really a good thing. The proper sphere of our work lies in our own circumstances, not in some rusty factory. We will be able to leave that kind of labor in the past. The production of our own necessities will become easier and easier as we discover new cognitive tools. But each of us needs a basic share of energy. No system of property claims that denies us that basic minimum will stand.

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Ideas are information, not energy. This is crucial distinction. To start with, you can't eat information. You can't use information as a source of energy. You can't regard it as a store of some definite quantity of energy that has gone into making it, since it can be copied an endless number of times. There is no meaningful conversion between bits and calories. This is a broad principle with many consequences. For example, ideas are not wealth.

Food gets eaten. Energy is used, and then it's gone. A house can shelter a limited number of people for as long as it stands. Information, on the other hand, can be endlessly reproduced at negligible cost. The supply is unlimited, so the economic value is zero. Any given idea can be made available to everyone. It can be used and reused and adapted by as many people as live on the face of the Earth. The only limit to the usefulness of an idea is how well it applies to the circumstances at hand. The cheap sharing of ideas is a central reason for the efficiency of the cognitive process.

Some people will object that ideas can certainly be made to yield a return of energy, and should therefore be regarded as wealth. For example, coercive communication can be used to control people. Through this control, energy can be extracted from their labor, or from their circumstances. It is true that information plays a central role in the evolutionary competition among humans, but that still doesn't make it the same thing as energy. Energy is extracted from people and their circumstances, not from information. Information is not wealth.

Again, some people will object that it is expensive to come up with good ideas. A useful idea (such as a book, image, song, movie, medical drug, invention, or manufacturing processes) might be the result of a significant investment of labor and resources. It represents the expenditure of a definite energy cost. Shouldn't an inventor receive a return on this expenditure? If they receive no reward, they will make no further inventions. Or, if they do make further inventions, they will not share them with the rest of us.

This objection begins with the false analogy between energy and information and continues from there. It is a misunderstanding from beginning to end. No answer can be made to this objection except to remind the objector that information can be copied at negligible cost. A sequence of bits does not represent any meaningful amount of energy at all. The investment argument is only made because it is convenient to the evolutionary interests of property owners. These same property owners can afford to inundate us with coercive communication that presents endless variations on the assertion that ideas can be claimed as property. They can repeat it all they like, but that doesn't make it so.

At the risk of dignifying the misconception with further discussion, I will offer a brief history of intellectual property rights. I have generally avoided using the concept of a person's "right" to anything, because I believe that an

argument based on rights is ultimately inconsistent with cognitive motivation. A free person has either all rights, or no rights, depending on how you define the term. In present usage, a right is usually a claim of control over some other person. And so it is in this case.

English copyright was a publishing industry monopoly whose purpose was to prevent the publication of any information that might be critical of the king. The monopoly prevented access to the printing press by anyone who might want to print an unauthorized pamphlet or flyer. The printing press (a cognitive tool) was held out of reach of the individual. The explicit purpose was to prevent free communication.

Copyrights and patents were later instituted with the claim that they would secure the progress of the arts and sciences. By this time the justification had been reversed. It was argued that trade secrets interfered with free communication, and that temporary rewards for inventors would induce the large commercial interests to tolerate innovation.

However, it was broadly understood that monopolies functioned for the benefit of the few and the harm of the many. Monopolies in general were outlawed. An exception was made for brief and temporary monopolies that were intended to reward authors and inventors. The ideas themselves were to be made available to the public for their own use immediately. ("Patent" means "open.") Only certain forms of commercial exploitation were protected, and that protection expired after a few years. The protection was further limited by wide exceptions for public interest and fair use.

This intention, even if it was originally honest, was quickly subverted by the big commercial interests. They vacuumed up the rewards intended for creative individuals. The property owners became either licensees or distant assignees of the original inventor's monopoly rights. Then they began to give those rights the same legal character as their other property claims. The original brief terms of protection were repeatedly extended. They have become effectively perpetual. Every time the old copyrights come up for expiration, they are extended again. Fair use is under continual attack. Instead of being honestly opened up to the public, these ideas treated as if they were private real estate. They are made inaccessible or encrypted, and are hedged around with legal threats against people who would dare to make their own use of them. The whole point of opening up ideas was for people to make their own use of them. But the present battlefield has shifted.

The great centers of unequal wealth would like to absorb ideas as a new source of revenue, and as a new means of controlling people. They need a replacement for their old means of production, whose relative economic importance is dwindling. So property owners would like to treat ideas as a new means of production. It is a way for them to get their hands on all the new cognitive tools that are being developed. More importantly, these

monopoly claims are a way for them to keep all of these new cognitive tools out of the hands of ordinary people, in whose circumstances they really belong.

A cognitive tool is anything that helps us to put our ideas into action around us. Of course, ideas are themselves an integral component of cognitive tools. So if ideas can be owned, then none of us can use one of these tools in our own circumstances without paying the property owners. At least, that is what they would like to see.

But the unequal distribution of wealth itself is threatened by the power of ideas, whose distribution cannot be kept unequal. The property owners claim exclusive rights over all sorts of ideas, books, images, songs, movies, medical drugs, inventions, and manufacturing processes. But these are all just sequences of bits of information. All can be copied and recopied for free. In fact, they cannot be held exclusively. That is a big problem for the owners of unequal wealth.

It is a sign of their concern that we are being swamped by coercive messages to the effect that innovation somehow depends on patents and copyrights. If ordinary people just start using information as they please, they tell us, our world will break down and technology will come to a screeching halt. But that is untrue. The truth is that property claims on ideas impede new technology. Property owners are perfectly happy with the present state of technology. They use their monopoly powers to preemptively shut down any progress in the arts and sciences that could generate competition to the current confederacy of property owners. Their property claims exist precisely to stop people from using, adapting, and sharing useful ideas.

When we delegitimize property claims on information, we open up the free exchange of ideas as an extension of the individual cognitive process. This exchange has its own reward for inventing and sharing useful ideas. An unshared idea is a sterile seed in the mind of the inventor. A shared idea will be adapted and improved and come back to its inventor with interest.

It is the same situation that we encountered with power relationships between people. Coercive communication does not transfer useful ideas. The person who tries to control another is cut off from free communication. Their ideas, like ideas that come with a price tag, are sterile. They are incapable of improvement and wider distribution.

As we share information, we may wish to maintain a distinction between generally useful ideas and locally specific information. Generally useful ideas are beneficial to anyone in similar circumstances. Locally specific information, on the other hand, has a troubling aspect. It can be used to control people and to enforce claims directly on their local circumstances. That danger would lead me to recognize a cognitive interest in privacy, at

least in the context of an ongoing evolutionary competition. I would hesitate to collect or pass along information about someone's private circumstances. Privacy and anonymity can be very important to cognitively motivated individuals who have to deal with claims asserted against their personal circumstances.

As far as the cognitive process is concerned, all generally useful ideas are born in the public domain. Ideas are used without payment. In the present day, patents and copyrights serve no useful purpose in the progress of the arts and sciences. They merely impede progress. Evolutionarily motivated people may prefer to view their property claims on ideas as a natural extension of their property claims on energy. To a cognitively motivated person, these two types of property claim are very different.

Wealth is energy, and that is something that is useful to one person at a time. In contrast, information can be useful to everyone at the same time. The cognitive process makes a limited claim on energy wealth. It makes no claim whatsoever on the exclusive use of information. A property claims on information hurts free communication. It is intended to hurt free communication. This type of property claim lies in conflict with a core interest of the cognitive process.

* * *

Property claims can be made on anything at all. Just because someone makes a claim does not mean that other people always accept that claim. The strategy of maximizing property results in property claims on all sorts of unlikely things. Greed leads people into making claims on anything that might hold economic value. What is there to restrain them? Their claims will be recognized or disputed by other people, for their own reasons.

In the past, people even pretended to own other people, to keep or sell or kill as they pleased. Was there anything to restrain them from owning slaves? It would seem to depend entirely on the threats and violence of the claimant, the submission or resistance of the person on whom the claim was being exerted, and the action or inaction of any bystanders. But this situation is the same as with any other type of property claim. The third party bystander may feel that their own interest lies with one side of the claim or the other. They may find it to their advantage to make similar claims, or to become a mercenary in the service of the original claimant. Alternatively, they may prefer to ignore the claim, or band together with others against the claimant. Each person, by their action or inaction, makes a definite contribution to the consensus on whether a particular kind of property claim is considered valid or invalid.

Some societies permitted slavery, while others did not. It is not always obvious why a society would tolerate one type of property claim, but not another. It has been argued that the institution of slavery may have

prevented the industrialization of ancient Europe. Modern industry seems to prefer the wage system. There may have been cognitive reasons for the elimination of slavery in some places, but there may have been economic reasons in other places. Grazing land has gone back and forth. Sometimes it has been considered private property, and sometimes it has been considered a commons. All types of property have been subject to confiscation or conquest in time of war. No type of property claim is eternal.

Slavery provides a good model for how property can be delegitimized. Delegitimization is a consensus among people that a given type of property should never have been claimed to begin with. A consensus to delegitimize can gradually proceed from one specific type of property to the next. When our economy no longer depends on a particular kind of property, we can get rid of it.

Outlawing one type of property claim does not necessarily affect other types of claims. Many societies have outlawed the ownership of slaves while continuing to allow the ownership of land. Or they have placed limits on specific property claims. For example, some societies allow people to claim the crops raised on a piece of land, but not to prevent other people from walking across the land, or from camping on it for up to three nights.

* * *

Property and circumstances are not the same thing. I might speak of my home as my property. I might also speak of my home as falling into my circumstances. But I would mean very different things by those two statements. Property and circumstances play distinct roles in my life. The purpose is different, the logic is different, and the effect is different. I am not merely substituting a new name for the same concept.

A property claim is an absolute assertion that is meant to stick to a object. A property owner sees nothing absurd in walking away from something, and still claiming it as their property in perpetuity. Regardless of such a claim, the property owner is a mortal being and can't expect to exist in perpetuity. The property may well outlast the owner. But the property claim is thought to stick to the object. The object is imagined to pass from the dead hand of the owner to the living hand of the heir. Nor does the heir even have to see this object in order to claim it as property.

We see the distinction most clearly when one person makes a property claim on another person's circumstances. (Of course, that is the real purpose of property.) Someone claims my home as their property, and makes me pay rent to live there. My home still falls into my circumstances, but it is no longer my property. If I fail to pay the rent on time, the property owner will send mercenaries to evict me. I can be evicted from my home, but I cannot be evicted from my circumstances. I can be killed, and when I die I will

cease to have circumstances. But while I live, even in prison, I can never be deprived of my circumstances, or of my sovereign conscience.

A statement about my circumstances is a statement about my own personal process, about the things I see everyday, what I know, and what I need to survive. It doesn't place absolute claims on objects, let alone permanent absolute claims. If I make a temporary claim on the things around me, that claim is restrained by the needs of others.

My circumstances are not completely separate from those of the other people around me. We overlap with each other, but we also each have our more private and immediate circumstances, our food, our bedrooms, our tools. My cognitive space lies at the very center of my immediate circumstances. Within my cognitive space, again, resides my conscience. I will defend the integrity of my conscience and my cognitive space with the utmost diligence. I will also defend my home and hearth, although with somewhat reduced determination. None of us has any good reason to infringe on other people's control of their immediate circumstances. At the same time, we affect each other. I may be responsible first for my own survival, but I cannot be indifferent to others. We are part of the same universe. We share the same small planet.

8. The Evolutionary Confrontation

Evolutionary motives inevitably lead to a confrontation between individuals. One person's genetic self-promotion threatens all others. For example, a property claim that extends beyond the claimant's immediate circumstances poses a threat to all those around. It puts everyone into a state of self-defense. It doesn't matter whether those people have evolutionary motives or cognitive motives. They are still threatened.

Despite the confrontation, people aren't constantly defending themselves. That wouldn't be an optimal strategy in the evolutionary process. It wouldn't be optimal within the cognitive process either, since the cognitive process respects other people's lives and their control of their own circumstances. So we can't take a short path to self-defense, whether we are participating in the evolutionary confrontation for its own sake, or are merely outsiders trapped in a confrontation we would rather avoid. The evolutionary confrontation is cast into various kinds of competition. Threats are sublimated into cooperation. Quid-pro-quos are exchanged instead of blows. But the underlying motive for violence is always present.

Threats may take very indirect forms. Anything that might yield an advantage over others will be tried. The evolutionary process carries out its confrontation between individuals using the full resources of the human mind and body. This includes subtle games of status and influence where nothing is exactly as it seems on the surface. Property and payment is one example. Coercive communication, with its plethora of misleading signs and advertising, is another example. The relationship between the genders, discussed below, is a further example.

Each of these examples, taken by itself, could be open to debate. I may be right or wrong in my interpretation of these examples. But taken together, they should make the case that the evolutionary confrontation places a heavy burden on each of us, whatever our motives may be. We are under continual threat. We have to be prepared to evade aggression, or defend ourselves, at any time. We have to remain alert to frequent changes in the coercive messages we receive. We must beware of both bold and stealthy attempts to control us. This sounds overwhelming, but in fact we are already familiar with the dodges we have to make. We are used to the whole unpleasant situation.

Evolutionarily motivated people threaten us in various ways. Property owners pose many obvious threats. Their threats are backed up by property claims against our circumstances. But even the unpropertied players can do us a lot of harm. Plenty of oppressed people would be happy to seize on any

opportunity to become oppressors themselves. Many an underdog is ready to take a bite out of each of us. Even the smallest runt in this game is determined to grab whatever scrap of evolutionary advantage lies closest.

Fortunately for the rest of us, these threats are all confined to the evolutionary confrontation. There is nothing like this standing between one cognitively motivated person and another. If cognitive purposes are driving our actions, then our essential interests do not conflict, but lie in the common direction of the progress of ideas. This allows us to be aware of the limits of our own needs. It allows us to give consideration to the needs of others. Appreciation of our own freedom of conscience is enough to dissuade us from trying to control others. That is reason enough to restrain our claims on scarce resources.

Cognitively motivated people have more options. Once our basic needs are met, we can work without quid-pro-quos. We can create value outside of the system of property and payment. Benefits can be given without payment, and accepted without obligation. If necessary, a source of assistance can remain anonymous. A destination of assistance can remain anonymous. This ability to give without receiving, and vice versa, is useful for cognitively motivated people who are struggling with the evolutionary confrontation. We are free to act in support of unknown others, and we are able to benefit freely from the actions of others unknown. This kind of anonymous assistance is unique to the cognitive process.

Evolutionarily motivated people are unable to give anything of real value to others without exacting some form of payment, or an obligation of gratitude. This inability is due to their strategy of maximizing property in order to control others. No amount of property is sufficient for their purposes, since their holdings are always measured against the property held by others. Their property also has to provide advantages to an unlimited number of descendants. In the evolutionary game, there can never be enough property.

In contrast, cognitively motivated people are aware of a threshold of sufficiency in the necessities of life. We feel a need only to control our own circumstances. Self-sufficiency is enough. A self-sufficient person, however, can still be the target of control efforts. Evolutionarily motivated people cannot accept self-sufficiency in others, and are bound to try to control them.

It is fairly easy to tell when a someone wants to control people. Making a comparatively heavy investment of personal resources in the evolutionary confrontation is one sign of evolutionary motivation. Thus, a reduced investment in the confrontation might be a sign of a shift towards cognitive motives. When someone begins to back off from the desire to control others, this decreases their reliance on evolutionary competition, and on the tricks

and games that go with it. It decreases the threat they pose to cognitively motivated individuals. That is a good thing. No one can be wholly free of mixed motives. Still, it lies within our power to reduce the tension and the threat implied by these constant attempts to control people.

* * *

There is comfort in the company of likeminded people. But I must retain my caution. I can't let my friends' judgement replace my own. I still have to listen to the voice of my own conscience above the hubbub of other voices.

There is no valid recognition sign for cognitive motivation. It can't be worn like a hat. There is no special handshake. No one would ever be able to organize an effective secret society. It simply can't work that way. How could anyone ever know another person's actual motives? Or take responsibility for their actions? Our first task is simply to understand the real reasons behind our own actions. This kind of self-knowledge takes plenty of determined effort. It takes blunt honesty. If I barely know myself, how can I know another? There is no judge beyond the individual conscience.

There is no repayment for good deeds. I can only do a thing for its own sake. Charity rarely has any value, compared with an examination of my own way of life. Giving a percentage of my income to the starving makes little sense, when the income derives from a job that helps to make sure the starving will continue to starve.

I should examine the real value of my daily work. Does my work make something real that people need? Or does my work really consist of bossing other people around? Does it make life less convenient for people? If I have retirement savings, I should consider where they are invested. How do those investments affect other people's ability to control their own lives? Then, if my work is bad, are there any other lines of work open to me? If possible, I should try to earn a livelihood where it does the least harm to the cognitive interests of my neighbors.

Honest work is in short supply in the present economy. Most jobs do in fact involve trying to control other people in one way or another. Usually it is for the advantage of some employer. That is unfortunate. It involves almost all of us in some degree of mercenary work, committing crimes for pay. But I can't afford to let this fact slow me down. If I pretend to myself that my daily work does no harm, I am deceiving myself. If I allow myself to feel bad about the way things are, I am paralyzing myself. This just makes it more difficult for me to reduce the harm that I am currently doing to the cognitive process. I have to be honest with myself. I should not beat myself up over the nature of the system into which I was born, nor should I accept that system. There are things I can do to improve my local situation, and that of my neighbors.

Bad jobs are part of the nature of our current economy, its evolutionary purpose, and its employer-employee relationship. Meanwhile, there are bad jobs and worse jobs. A job doing things that people need, even if the pay is low, is actually a pretty good job. A job performing useless services for rich people is a waste of energy, but it doesn't necessarily involve direct harm to other people's cognitive interests. A job that prevents people from doing something or other is one step worse. Such obstacles are a way to control people. It is not part of the cognitive process to build obstacles that prevent people from doing whatever it is they would want to do if the obstacle weren't there. This kind of job is harmful in its own little way. Still, we all have to eat.

Then there are the real mercenaries, the ones who enforce property claims and power relationships directly on people's circumstances. These people probably have the worst job of all. I believe they would quit and find something else to do, if they could bring themselves to think honestly about their relationship with their neighbors.

However I earn my living, I can always look at my own life and find places where I can improve things. That doesn't mean I have to look for a grand solution, or align myself with some great number of people, or even look for anything bigger than my own daily affairs. It's fairly pointless to invest a lot of effort in some other place that is far away from my immediate surroundings. I don't know much about what is going on over there. Neither does anyone else, in fact, who is not living in that particular place, wherever it may be.

It isn't my purpose to achieve any specific kind of personal emotional fulfillment. Emotions are evolutionary instincts, and they are untrustworthy. My goal is not happiness for its own sake. Control of my circumstances and of my own cognitive space may make me happy, but that is really only because these things also play a certain part in evolutionary success. It is my reason, not my emotional state, that tells me that control of my circumstances is a good thing.

Consider a different example. If the stranger down the street has a peaceful mind and a self-sufficient way of life, it does nothing for my evolutionary standing. So this does not give me an instinctive feeling of happiness. If anything, it provokes in me an instinctive feeling of jealousy, especially if I do not have these things my neighbor has. But that is an untrustworthy instinct. If I use my powers of reason, I can see that this person could be a friend and ally of mine, rather than a threat. If I find that this neighbor does not try to control me, and is willing to speak freely and openly with me, we may have much in common. Such a rational relationship can bring improvement to both our cognitive lives. It can provide each of us with additional defenses against the evolutionary confrontation. I have to

recognize that I have definite cognitive interests that do not necessarily correspond to specific feelings of happiness or fulfillment.

The proper field for my personal effort is local. We can try to take better care of ourselves, including both our internal mental spaces and our external conditions of life. That is good work for me and my neighbors. I can try to take greater control of my own circumstances. The next most valuable effort I can make, personally, is to reduce the amount of control I attempt to exert over the people I encounter in the course of my day.

* * *

The present relationship between the genders is a part of the evolutionary confrontation. Men and women have conflicting reproductive strategies. What is good for one is not good for the other. Their communication is burdened by complex power relationships that run in both directions between men and women, as well as between rivalling members of the same gender. This state of gender relations is the result of evolutionary motives. It is also due to the unavailability of certain cognitive tools.

Artificial contraception is an example of a cognitive tool that has given women increased cognitive control over their own reproduction. Men at this point do not have any means of individual reproduction under their own control. They will need further cognitive tools before they can obtain reproductive power. That may sound like a joke. But it is really quite serious.

Male reproduction is important, not only because of the cognitive value of individual replacement reproduction, but also because of the cognitive value of free communication. When reproductive power is in the hand of each individual man or woman, they will find that their communication becomes unburdened of gender conflict. I would like to argue that there is a general connection between the broad availability of cognitive tools, and free communication. For comparison, it may be useful to examine the state of gender relations in places where even artificial contraception is unavailable.

* * *

Economic opportunity for all is an illusion. It has existed only briefly at times of increasing overall wealth. Broad economic opportunity is encountered at times when a frontier, an empire, or an industrial revolution pours new wealth into a society. Increasing wealth lifts all boats. It permits a temporary cease-fire in the evolutionary confrontation. I believe that this kind of broad opportunity played a part in the early democratic experiments that took place in Iceland, Athens, and England. Ordinary people imagined a better future, in which they would have greater control over their own lives. Then came the end of the frontier, the collapse of the empire, and the social questions thrown up by the limits of an industrialized economy.

There is no true escape from the struggle for existence while our human motives remain evolutionary in nature. As soon as economic growth slows down, we will always find a way to resharpen our wealth inequalities. We will again unsheathe the blade of selection. There is only limited space on the planet after all. More are born than can survive. The weak must die so that the strong may live and improve the species. That is the biological destiny of all non-cognitive species. But humans have both genes and cognition.

Anyone who wishes to continue democratic experiments such as individual liberty should look to cognitive motives, and not to increasing wealth, as the driving force. A state of continually increasing wealth is necessarily temporary. It can't go on forever. A geometrical rate of increase always encounters some practical limit. Then it levels off, or falls back. If individual freedom survives only by the mercy of a rising tide of wealth, we will never hold it for long.

We can't linger for long in the place we are in right now. We have to move forward or risk losing our opportunity to move into a cognitive way of life. We have time constraints to keep in mind. There are looming deadlines that result from the environmental destruction and tribal conflict that inevitably follow from evolutionary competition among humans. These constraints will be discussed further below.

Crucially, the defense of our political liberties is connected with our ability to make progress on cognitive tools. The progress of knowledge depends on free communication. There is currently a political window that allows for the existence of civil liberties such as free speech. This window has rarely stayed open for long in human history. If we want to see continued development of new cognitive tools, we have to protect the coercion-free and law-free zones in which genuine free communication can take place. There is good reason to defend and extend our present political freedoms.

The further development of technology and tools is vital. Property owners have no particular reason to develop cognitive tools for their own purposes. For example, they will not necessarily receive a worthwhile return for investing in a tool that allows each individual to modify and repair their own genes, or fix the genes they pass on to their descendants. But unless we develop such a genetic repair tool, we will face an accumulation of harmful genetic variation.

We should remember that evolution relies on the elimination of a good part of each generation in order to control unhelpful mutations. Random variation provides the necessary basis for the adaptation of the species, but most variations are harmful. These harmful mutations are strictly destroyed by natural selection. That is part of the evolutionary process.

If we merely limit births, and do nothing else, we can avoid natural selection, but we will also lose our robust health. We will slowly accumulate harmful mutations and disabilities. Over the course of generations, our health will decline to the limit of our medical ability to keep people alive. This is why we must learn to repair harmful genes. We cannot go halfway and stop. We have to keep going, and develop the cognitive tools to edit our own genes. We will also need to acquire the knowledge to do so wisely. If we step out of the evolutionary process, it becomes our responsibility to assume full control of our genetic makeup.

* * *

The violence inherent in the human evolutionary process is often hidden. The dispossessed usually starve quietly while the survivors loudly enjoy all of the available resources. But active and overt violence is also part of the evolutionary process. Individual humans sometimes kill each other on a personal basis. They also kill each other in the course of larger conflicts between groups. These tribal conflicts are part of the evolutionary confrontation in humans.

The conflicting groups might be nations, or towns, or neighborhoods. For simplicity, and to avoid more emotionally burdened words, I will call them tribes. Racial groups, ethnic groups, and other types of communities will all be referred to as tribes. Any perceived point of difference, especially if it is thought to be inherited, is sufficient to distinguish a tribe. It doesn't matter if the difference is very slight. Closely related tribes often struggle the hardest, as they may be in close competition for the same resources in the same area.

As long as a person can point to some characteristic (any trait, custom, religion, or behavior) that marks their tribe, they can use this characteristic as a basis in acting for the benefit of their tribe, and to injure rival tribes. The reason to do so is evolutionary. It carries the evolutionary conflict from the level of the individual to the level of groups. If long continued, it ultimately leads to the formation of varieties within the species, and then eventually to new species. This process has not gone very far in modern humans. We have remained a fairly unified species, even as we have witnessed the comparatively recent extinctions of homo erectus and homo sapiens neanderthalensis. However, the formation of new species is a familiar part of the evolutionary process, and can reasonably be expected to occur in any successful non-cognitive species.

Tribal conflict begins with the ongoing low-level struggle of one human clan with another. A person who will not shop at a store owned by a member of a rival tribe, but who will shop at a store owned by a member of their own tribe, is acting out of tribal motives. That is, they are acting out of evolutionary motives. A person who will only marry a member of their own tribe is acting out of tribal motives. A person who preferentially hires

members of their own tribe is acting out of tribal motives. For these people it matters a great deal where someone comes from, and who their parents are. Jobs, education, opportunities - all of these can be manipulated into an evolutionary advantage for one tribe over another. People who do this sort of thing are following explicit evolutionary motives.

The system of hereditary property rights often bears visible marks of tribal conflict. One class holds a disproportionately large share of the property, while the other class holds little or nothing. Very often it will be seen that these two classes are populated by different tribes. A subject tribe has been pushed into the status of a permanently poor lower class, while a dominant tribe holds virtually all of the positions in the ranks of the rich upper class. The true upper class is usually too small to hold all members of the dominant tribe. Many members of the dominant tribe will receive some small share of wealth and evolutionary advantage. But all members of the dominant tribe are able to look down on members of the subject tribe. This serves as a useful distraction for the true upper class, who are thus able to avoid close scrutiny from the less-wealthy members of their own tribe.

There is no reason for this systemic violence to remain at a low level. Large scale violence between tribes can be provoked by any sufficiently tempting evolutionary prize. The prize might be land, resources, or the opportunity to throw off a lower class status. Successful violence could lead to the conquering tribe taking over a dominant position, and all the property that goes with it. Defeated tribes may be reduced to lower class status, or worse. People who belong to a defeated tribe could be expelled from the disputed land, whether or not there is a livelihood or a chance of survival for them elsewhere. They could also be starved, worked to death, or killed outright. All of this is consistent with tribal and evolutionary motives.

Active warfare has often been assigned to the men of the tribe. This leads to a common belief that warfare is a purely male strategy, and that women broadly oppose tribal decisions to go to war. I believe that is a misconception, and that it is not borne out by history. Both genders obtain significant evolutionary advantage from upper class status, property, and successful warfare. As would be expected from this, women often support decisions to go to war. Of course, anyone who doesn't have to personally implement such a decision will find it easier to establish plausible deniability after the fact. Regardless, both genders clearly play a part in tribal conflict short of war. It might be useful to compare tribally motivated actions in daily life. Based on personal observation, I would be surprised to hear of any significant differences between men and women when it comes to evolutionary motivation, although I would certainly expect to see some differences in strategy.

Again, it doesn't matter if the tribal differences are slight, or even imperceptible to outsiders. Any perceived difference, especially if the difference is believed to be inherited, is sufficient to create an evolutionary motive for conflict. Tribal conflicts are also sometimes described as racial, ethnic, or sectarian. These conflicts do not differ from each other in their underlying motives. Most religious wars are also tribal conflicts, in the sense that the true purpose is to subjugate, expel, or exterminate a rival population.

Religious wars of conversion may represent a possible exception to this rule. Where the conquered population is converted, rather than subjugated, then the war may have been carried out for some reason other than a purely tribal reason. If the conquered population is both converted and subjugated, then the tribal purpose of the war is obvious. That is not to say that wars of conversion, if such wars have really occurred, would be in any way better or more justified than other wars. It is merely to observe that they would serve something other than a direct evolutionary purpose. Such wars, if they have occurred, may have been the result of mixed motives, or of the individual intentions of powerful leaders. Wars of conversion are mentioned here only as a possible exception to the general rule that wars are usually a part of tribal conflict.

Tribal conflict can include foreign wars, civil wars, ethnic cleansing, and genocide. These are the most visible signs of tribal conflict. But warfare is only a continuation of politics by other means. The roots of conflict lie in the evolutionary process, and in the tribal politics that we witness or participate in every day. Interestingly, this kind of behavior has become less common in the industrialized countries.

It still occasionally makes a difference where someone comes from, or who their parents are, but this is becoming less and less common as time passes. We are starting to see the outlines of a true multiethnic society, where a person's genes really don't matter. People are beginning to recognize tribally motivated behavior when they see it. And they avoid it. That is beginning to look a lot like cognitive motivation. At the same time, we have seen a partial delegitimization of wars of territorial conquest, genocide, and ethnic cleansing. This is very important. Perhaps tribalism is merely being displaced by other forms of evolutionary competition. But it seems more likely that we are seeing a growing cognitive awareness on the part of ordinary people.

Tribal conflict is a familiar part of the evolutionary confrontation among humans. The cognitive process is harmed by all of these tribal distinctions, power relationships, and the resulting large and small scale violence. These things hold us back. They make it more difficult for us to mind our own circumstances and treat our neighbors the way we would like to be treated.

So we can greet the rise of new motives in the human conscience as the dawn of a new day. The recent decline of tribalism is a bright ray of sunshine.

* * *

Environmental destruction is another part of the evolutionary confrontation among humans. Our brains and our tools give us great power to modify our environment. If we decide that our most important purpose is to compete with other humans, then of course we will modify our environment to achieve that purpose. If a big house in the suburbs is the signal of evolutionary success, we will strive to the utmost to attain such a big house. We will downplay the costs.

There are many different kinds of costs. To begin with, a big house in the suburbs costs thirty years of mortgage payments (for someone who manages to maintain well-compensated skills for that long in a rapidly changing job market). At a minimum, this seems a false convenience. That is thirty years of coming home tired, not sleeping right, and not paying close attention to one's own actual circumstances. Among other things, it includes not paying attention to the larger cost of this big house.

Cities start in the fertile lowlands where we grow food, and they take up more and more good agricultural land as they grow. Bulldozers go out and tear off the topsoil. They put a few inches back down after the houses go in. The rest gets piled up in great embankments, with a little sign on top. The sign reads "free dirt."

But the dirt wasn't free. It took tens of thousands of years to build up. The topsoil was the foundation for a broad and diverse ecosystem, which the bulldozers have killed. We need that ecosystem. In a broad sense, we depend on a diversity of species for tomorrow's food and oxygen. In a narrow sense, we depend on agriculture for today's food. Both nature and agriculture require their own place in the sun. Both need topsoil.

We do many things that show a lack of caution. We take part in the human population explosion. We remove topsoil, cut down forests, and cover the land with concrete. We drain aquifers in order to sprinkle water on pretty green lawns in the middle of the desert. We make short-term profits by cultivating marginal land. We casually let the soil erode and wash into the sea. Or we irrigate the fields with brackish water. That slowly turns the land into salt flats. We seem mostly unconcerned about the sustainability of our agriculture. Short-term profits are the coin of human competition with humans.

We also seem unconcerned about preserving the habitat of other species of plants and animals. Fragmented parks and pockets of remaining wilderness are not sufficient to guarantee their survival. Animal populations can move around and adjust to changing circumstances if they have long stretches of

connected habitat in which to do so. Plant populations can do the same thing more slowly. Small and disconnected pieces of habitat are effectively islands. The small populations living on these islands are vulnerable to any sudden change in their local environment or in the climate.

And we are changing the climate in a grand way. We are using far too much energy, and most of it is derived from fossil fuels. This is the cheapest and easiest way to get at useful energy right now. Or, at least, it is cheap in an economy whose purpose is to regulate the evolutionary competition of human with human. That economy only counts the costs that really concern us as we pursue our evolutionary objectives.

But the true costs are staggering. When we burn carbon, it puts carbon dioxide into the air. Carbon dioxide drives global warming through greenhouse heating. We can measure the temperatures of the ocean and the air, and they are rising. In fact, temperatures are changing faster than they have in several hundred thousand years, according to ice core and sediment measurements extending back through several ice ages. The current boom in species extinctions is mostly due to direct habitat destruction rather than to global warming. But we can foresee that future global warming may make the current extinction rate look mild.

That doesn't mean, however, that the situation is hopeless. We can turn it around. Again, we have to consider the underlying motives rather than the logic of business as usual. Whenever a society does a better job of sharing wealth with its poorest people, we see that its population growth goes down. That is a hopeful sign, and it may well have to do with people's cognitive motives.

It is worth while to examine our own personal values. What sort of priority do we really place on self-restraint, self-sufficiency, and energy efficiency? How much comfort and convenience are we willing to postpone? If the big house has a low priority, then how small will we go voluntarily? What would it take to be able to walk to work?

Large meteorite impacts have had effects that are comparable to what we are doing now. But we might have to look back even further. If we continue on our present course, we are capable of introducing some of the biggest environmental changes on this planet since single-celled organisms first filled the atmosphere with oxygen. For all we know, this was a disaster for many of the species living at that time, although it is convenient for us today. There are still anaerobic organisms living under the ground whose metabolisms do not use oxygen. Evolution handled that crisis. (Modern multicellular life, on the other hand, cannot adapt as swiftly or extensively as single-celled organisms.) Some species doubtlessly went extinct at the time. Others adapted to the corrosive presence of oxygen, and even began to thrive on it.

But we can't look to evolution to bail us out of the present crisis. This is a job for the cognitive process. We should not be overly pessimistic.

It is true that we each have a basic minimum need for energy, and that we have a large human population to feed. But none of our problems is insurmountable. A car that is driven fifteen thousand miles a year, with an efficiency of fifteen miles per gallon, consumes the amount of energy that it would take to feed forty people. On the other hand, a car that is driven fifteen hundred miles a year, with an efficiency of sixty miles per gallon, only consumes as much energy as one person. We can't drive as far, or as wastefully, but we can still use cars without breaking the budget. Maybe we can arrange our homes and jobs so that we can walk to work.

We can still have an industrialized society while we are on an energy budget. Industrial output may have to be more limited. We may have to limit our needs. It all depends on the purpose of industrial production. Do we produce goods in order to make the rich richer, or do we produce goods in order to make the most basic things that people need? Technology is our friend as we try to do more with less energy. But it only makes a real difference if we actually care about self-restraint and energy efficiency as a way of life. Otherwise our energy savings from technology will go to waste. We will just find new ways to throw the saved surplus back into the evolutionary competition. That energy will wind up as luxury consumption. In order to actually use less energy than the maximum amount of energy that might be available, we will have to exercise individual self-restraint.

Some people look at environmental destruction and conclude that technology is the enemy. They wish that we could go back to a pre-industrial era, or even to a pre-agricultural era of hunters and gatherers. This is a serious error. We can't go back to hunting and gathering because it can only support a tiny fraction of the people that agriculture can support on the same land. We have a large population right now, and we have to accept that population as a fact. I don't want to surrender my place in this planet just so that someone else can live in a cave and gather wild mushrooms. Without a reference book on poisonous mushrooms.

Even if we could go back to such an earlier era, it would be a mistake. Those were bad times. Giving up modern medicine, education, and technology would take us back to a way of life that was completely ruled by evolutionary motives. We had insufficient cognitive tools to shape our environment according to our ideas. Instead, we shaped our environment to the extent of our genetic abilities. Without cognitive tools, the best we could hope for was to pass on our genes. We were totally at the mercy of biological destiny.

That was an unstable position. Given the mental ability to develop cognitive tools, it was inevitable that sooner or later we would develop those

tools and put them to work for the purpose of evolutionary advantage. If a number of us were picked up and transported back to a neolithic encampment, or to an early agricultural village, we would do the same thing. And we would soon find ourselves back where we are today, faced with the same question: should we continue to employ our tools for evolutionary advantage, or should we switch to a new set of motives, and employ our tools in the service of our new motives?

Some anti-technological objections address this point. They argue that the cognitive process itself is to blame. Cognitive tools, they say, lead us down the road to environmental destruction and to an "unnatural" way of life. This is based on an oversimplified view that natural things are always good and healthy, while artificial things are bad and harmful. That is untrue. We can easily find counterexamples. Snake venom is natural and harmful. Agriculture is artificial and healthy. More profoundly, the objection really argues that the evolutionary process is healthy and the cognitive process is harmful. I disagree. An evolutionary way of life may be "natural," but that does not recommend it to me. Nor does the artificial nature of our cognitive tools frighten me.

Technology cannot be blamed just because it has been misused by people with evolutionary motives. Our motives are to blame, not our tools. These same tools that have been used to pollute and destroy our natural environment are also the key to cleaning up and preserving our environment for the future. Without cognitive tools, we can't build a truly sustainable way of life. This is what it means to free ourselves from biological destiny.

It is now generally understood that we have tools so powerful that we could largely wipe out life on Earth. These tools are not limited to nuclear weapons. We also have the means to drive numerous species to extinction, destroy the natural habitat of those species, and radically change the global climate. Why would we do such things? It could happen through mere inattention. If competition with our neighbor is our highest priority, we will bend every tool to that competition. And even though we are aware of harmful side effects, these may not command our full attention until it is too late. With our eyes fixed on the evolutionary prize, we could accidentally destroy the Earth as a side effect of our shortsighted struggle with each other.

The truth is, we have never had to think so far ahead before. Competition from other humans has always seemed a much closer and more vital threat. We have left tomorrow to take care of itself. We can no longer do so. All we have to do is look back over the history of the evolutionary process. We are not alone. Many other species have worked themselves into a corner. Then they encountered the next step, which was their own extinction. We, uniquely, have the tools to take the whole ecosystem down with us.

A different kind of motivation would give us a threshold of sufficiency in our needs. We would no longer have to set our own needs against the needs of others. That is a game with no real winners. If we can stop playing the game, there would be no need to overpopulate the planet. There would be no need to let our urban areas sprawl over the woods and fields. If we didn't have to keep trying to edge each other out the game, we would not have to maximize wealth, engage in conspicuous consumption, and casually set oil wells ablaze while fighting with each other.

If we can squelch the desire for unnecessary transportation and big houses with more and more square feet of floor space, we would be able to stop draining wetlands and sending bulldozers into the remaining pockets of wilderness. Those of us who have never had big houses could gain our livelihoods without breathing toxic fumes or subjecting ourselves to the total control of others. There is no fundamental reason why we can't all have enough to eat, clean water to drink, and a share of that leisure which allows us to use our most powerful asset, our mental abilities. There can easily be enough for all, if we have the wisdom and the tools to make it so. The present environmental danger is a direct result of the evolutionary competition of human with human. We can get out of danger again by changing our motives.

* * *

What reward is offered to a successful competitor in the evolutionary game? Why should you play this game? What do you get if you win?

The reward for success is disturbingly small. Some minor genetic variations that you carry will become slightly more prevalent in the population as a whole. These peculiar variations are things you were born with, through no volition of your own. You cannot change them. Without modern tools you cannot even find out what they are. You will not live to see your particular variations propagated within the species. Most of that will happen long after you are dead.

This reward might be attractive if there were no other information you could pass along to the future. If you were an animal with no power of speech and abstract thinking, this would actually be a good deal. But since there is a cognitive alternative for humans, a different way of life with its own information and its own goals, the evolutionary prize seems less desirable. When we learn how to control our genetic information, we will pass along, of our own volition, whatever information we choose. What will that do to the grand prize in the evolutionary game? It doesn't seem like a good bet. The game is not worth the stakes.

9. Political Coexistence

What can be done? We live in a society where most people still believe in evolutionary motives. We do not yet have the right cognitive tools to end competition. We certainly do not have the right mental habits to end competition. But soon we will have to be prepared to step into a fully self-sufficient way of life. How can we get from here to there?

Our present course has carried us a long way. It has brought us to our current dilemma. One option would be to close our eyes and do nothing. We could hope that the present course of society will carry us through - that it will deliver the tools we need, and give us the attitudes we need, to reach a non-competitive society. On the other hand, we can feel around us a growing sense of fear and uncertainty. Fear holds us back, makes us resistant to change, and makes us unable to see a new and different future. How can we gain habits of fearlessness and responsibility? We have to answer fear by taking charge of our own lives to the extent that our new tools allow. We should acknowledge fear, even if we can't afford to give in to it. It is not at all unreasonable to fear the future. There are clear dangers ahead on our present course. The environment will not take this beating much longer. I, personally, do not believe that we can blindly follow the present course and succeed.

After much doubt and introspection, I have come to support a program of personal and political reforms. That means I am against the revolutionary idea of immediately throwing off the yoke of the property owners. Of course I would like to reclaim my own circumstances, but I would like to do so in a historically responsible manner. Revolutionary movements have a long history of failure and disaster. It is true that many of the underlying conditions have changed. New tools and technology are helping us to overcome many of our limitations. But that is not a sufficient reason to ignore the lessons of the past. I am especially wary of abrupt economic transitions. Carelessly entering into an unforeseen series of economic changes could easily kill more people than the present system kills. I would prefer for the great centers of wealth to continue to imagine that they are running things for a little while longer.

The industrialized countries are supposed to be open to democratic political reform. In fact, these countries are run by oligarchies of property owners. The property owners stay behind the scenes and pretend that they obey the will of the majority. They simply buy a majority of the votes. Or else they use coercive communication to fool a majority of the voters. This is easy for them to do when the overall amount of wealth in the society is

rising. Overall wealth may increase due to an empire, a frontier, or an industrial revolution. The majority do not own significant wealth, but it is easy to make them think that they will soon be wealthy, or at least more wealthy than some minority. That is an appeal to their evolutionary motives. For example, the majority may promised the opportunity to take advantage of some minority group. Thus a small upper class of property owners gains the assent of the unpropertied majority to the perpetuation of property rights.

At one level, democracy is no better than any other form of government in a competitive society. The majority doesn't care about individual autonomy, only about its own evolutionary advantage. At another level, democracy involves an appeal to reason. This provides an opening for the cognitive process to introduce a discussion of fundamental values and motives. The democratic system also concedes some degree of bargaining power to small constituencies with carefully limited agendas. You can't always get what you want, unless you have the absolute majority, but you can often get some of the things you need, depending on the balance of power. Of course, industrialized countries have hybrid forms of government, and not pure democracies. But a hybrid form of government, combining democracy and oligarchy, is preferable to a pure oligarchy. It still provides an opening for reason.

It is an open question how the property owners will react when they find they can no longer buy a majority. They may abolish the democracy and simply continue ruling on their own. When we look back on the historical record, we can see that this has happened repeatedly. Or they may limit democracy so as to place the property question beyond constitutional reform. If they do either of these two things, the struggle may have to move on to other means. But while constitutional reform is possible, it should be pursued.

I will outline a sample program of my own as an example. I freely admit that I don't know much about practical politics. Those who know more about politics will be better off in following their own judgement about how to advance cognitive interests through the democratic system. But maybe I can make some suggestions in order to start a useful discussion. At least people can argue about why this program is wrong.

The proposed program calls for life, liberty, and the pursuit of happiness. Life is the highest priority. It is likely useless to pursue other reforms while people are being pushed out of the human species. The basic principle here is that while property exists, it should be taxed and regulated. Taxation redistributes wealth so that everyone can live, including the old, the sick, and the unemployed. There should be health care and a basic minimum of food and shelter for everyone, whether they are working or not. Other kinds of

regulation ensure basic safety standards, such as environmental safety, product safety, food safety, and job safety.

Liberty is the second component of the program. This consists of the most essential interests of the cognitive process, after life itself. Free speech is a core component of liberty. Free speech and the free exchange of information imply the abolition of patents and copyrights. Civil liberties in general lead to a broad decriminalization of most of the crimes that are used to pack people off to prison. But high-quality public education is perhaps the key reform that gives us liberty. This is where our new knowledge and new cognitive tools will come from. Education for all is also the foundation of political support for further cognitive reforms.

In keeping with my reformist approach, I have kept the best for last. Full control of our own circumstances is near the end of the list. Reclaiming our circumstances is not strictly a part of competitive political action. It is something that takes place when we have no further use for competitive politics. Happiness is a good word for this. But it is not really the pursuit of an emotional state. It is the pursuit of a material state of human dignity. Happiness is control of our own circumstances.

This kind of political program represents an attempt to prioritize cognitive needs. If possible, items at the top of the list should be pursued first. But actual priorities will have to depend on the political economy. It may be worth pursuing an item nearer the bottom of the list, if it can be obtained at a relatively low political cost. And we should remember that the defense of life is primarily a holding action to win time for the cognitive process to grow the fruits of liberty. These fruits are the kinds of tools and habits of thought we need to make us self-sufficient. These things offer better security for our lives than anything that political promises could ever amount to. The need for taxation and basic safety standards should never become an excuse to control others, or a ball and chain on liberty. All political compromises are necessarily temporary. For example, safety is ultimately the responsibility of the individual, and that is a central part of the pursuit of happiness.

A democratic movement for cognitive freedom begins without a constituency of its own. It is a tiny minority in a system that runs on majorities. It does have a few potential allies among some traditional environmental, religious, progressive, and civil liberties constituencies. These groups are also small minorities. There are some differences we will have to overcome in order to form any alliances with them. How should we balance the needs of industry and agriculture with the needs of the environment? What is the appropriate role of science and technology in the society? To what extent can people who believe in self-sufficiency and the golden rule find common ground with people who are motivated by faith?

How much political effort should be devoted to improving schools versus improving the minimum wage? How much to stopping patents versus stopping government spying? By working on these issues, we can try to increase the number of our friends, and decrease the number of our enemies.

The whole idea of a political program may seem alien and absurd to a cognitively motivated person. Political activity is inherently competitive. It involves cooperation and compromise and dealmaking, and even lawmaking. How can this be reconciled with control of one's own circumstances and the golden rule of doing unto others as you would have them do unto you?

In fact, I cannot reconcile these things. Means and ends are at odds with each other. It is only on the strength of my foresight that I can go a little ways out on a limb, trusting that my actions will come out all right in the end. I should not trust foresight too far. How often it goes wrong! Nevertheless, my own foresight is all I have to work with, if I want to make the future better than the present.

For example, I can base my actions on a prediction that society is in a transitional phase between evolutionary and cognitive motives. In this case, I can justify living according to the laws and rules of our present society, as long as I also try to set an example for how to live in the future. I can set an example by trying to be self-sufficient, by refusing to control others, and by showing responsibility and restraint in my own circumstances. People need honest reassurance that a better future is possible, and that it will not come at their expense. This assertion demands proof. It calls for a practical demonstration.

But if I hope to set an example for a society in transition, I can't afford mixed or transitional motives in my own life. I can't serve two masters. There is only one master, and that is the individual conscience. Each act of obedience to the law is a small betrayal of my actual motives.

The law tries to short-circuit my foresight. By promising swift and severe punishment for any lawbreaking, it tries to deprive me of my own judgement. That may work fine for the regulation of evolutionary competition, but it has no bearing on my dilemma. I can't afford to be motivated by a fear of punishment. Punishment is just another obstacle I have to avoid while doing my best to protect the cognitive process. I have to look beyond the law for my reasons.

And what should I do when the law deprives me of my basic necessities? What should I do when it harms the vital interests of the cognitive process? In these situations, I may have no choice but to break the law. This is not a new problem. People have found various ways, ranging from saintly to subversive, to deal with unjust laws. Some people use civil disobedience: they break the law openly and take punishment as a way of showing other people that the law is wrong. This approach has sometimes succeeded in

getting unjust laws repealed. However, it only works in comparatively open systems where people can see what is happening, and can do something about it through constitutional means. In more repressive systems, the dissidents are simply made to disappear.

Other people break the law secretly. They take punishment when they are caught, but they don't seek out punishment. The advantage of this approach is that it is harder for the system to identify and eliminate the dissidents. The disadvantage is that it is also harder for people on the outside to tell why the law is being broken, or even that it is being broken at all. How will they know that the lawbreakers aren't merely seeking a selfish evolutionary advantage? However, secret lawbreaking has sometimes been effective against unjust laws. If enough people do it and get away with it, and no great harm comes of it, the law is effectively delegitimized. Then it hardly matters whether it is officially repealed or not.

Deals are different from laws. The general mass of laws has been imposed on me without my consent, and I think no more of them than I think of the coercive communication dumped on me by signs and advertising. But if I have voted for a specific deal, I feel I should abide by the spirit of the deal for its designated term, or at least one electoral cycle. Deals are, by definition, temporary and imperfect, but they are a basic currency of political action. Sticking to deals is important in establishing a basis for future deals. Of course, this is precisely the foundation of cooperation, which in turn is nothing but a form of competition. I do not want to go too far out on a limb in using competitive means to achieve non-competitive ends. At the same time, I have to participate in dealmaking if I really want to reach a non-competitive society through technological progress and constitutional reform.

One argument is that people can trust us because we have no motive to hurt them. But the second argument is that they can negotiate meaningful deals with us, because we will negotiate in good faith. That means sticking to our deals.

* * *

The first thing a reformer will ask for is the protection of life. This is specifically cognitive life. It doesn't include animal life, fetal life, or brain dead life. One possible definition of cognitive life would extend from the first coherent sentence of a human baby up to the last intelligible communication of a dying person. This definition is not intended to interfere with a parent's protection of their infant. Nor should it interfere with the protection of a mentally disabled person who will never be able to form a complete sentence on their own. There, but for the chance of a moment, go we. But we nevertheless have good cause to begin with a definition of active and functional cognitive life. It highlights a central goal. This goal is the

protection of thinking life with the potential power to control its own circumstances.

And that is precisely where evolutionarily motivated people will object to the reformer's request. They fundamentally do not agree that all cognitive life should be allowed to continue living. We know that everyone needs a basic minimum amount of energy wealth to survive. All wealth, however, is currently claimed as property, and most property is held by a small upper class. These facts lead the reformer to the conclusion that all property should be taxed in order to provide a basic minimum of existence for everyone.

Taxation has a long history. In the past, it has primarily been used for the opposite purpose. Taxation was like Robin Hood in reverse. It took from the poor and gave to the rich. We have no difficulty recognizing that kind of taxation as part of the evolutionary game. It obviously benefited the upper class. More recently, we have seen a theory of progressive taxation, which is supposed to take a smaller portion of the poor person's income, and a greater portion of the rich person's income. In practise, this becomes a confusing mixture of progressive and regressive taxes, and it still takes heavily from the poor.

A reformer will insist on the kind of redistribution that actually takes from the rich and gives to the poor, so that everyone can have a minimum share of the available resources. This is a principle that will outlast property itself. When property claims have become a thing of the past, we will still need to share resources. The underlying principle will be that everyone gets to take a basic share of the available resources. How should we divide sunlight, except equally? For the moment, we are dealing with incomes and property claims. We can tax income, and we should certainly tax large incomes, but it is property that provides the real basis for taxation. Who owns, owes. The poor own nothing, and they owe nothing.

The property owners will object. They will say that it is their property that creates new wealth, that taxing their property will reduce wealth, and that they don't like to pay taxes to support worthless people who don't own as much property as they do. Some workers will also object. These workers will say that it is their hard work that creates new wealth, that taxing their work will reduce wealth, and that they don't like to pay taxes to support lazy people who do not work as hard as they do. These objections simply restate the underlying tenets of the evolutionarily motivated value system. They demand that we play along in their game of cooperative competition. In this game, cheaters must be punished. Unpaid-for advantages must be denied, unless they benefit me personally. Each person searches for some personal advantage over other people. When they find their own scrap of advantage, they do their best to construct it into a palace of self-serving moral justification.

We have to get over these ideas. Neither property nor work creates wealth. In the future, technology and automation will produce wealth, given the necessary resources. They will do this within each person's separate individual circumstances. Everyone can have automated tools of their own. This sort of production, customized by one person to meet their own needs, is efficient production. It is much more efficient than the mass production of identical widgets that have to be transported halfway across the face of the Earth. Rust-belt economies of scale will ultimately yield to the efficiency of customized local production.

For the moment, both the property owner's assertion and the worker's assertion contain a grain of truth. Property did produce wealth in the past, if you overlook the fact that all of the work was done by other people. Work produced wealth under certain circumstances, but it didn't always produce wealth, and the wealth that it did produce usually went for the benefit of property owners. More work did not mean more wealth, at least not for the worker. The truth is that work is becoming a less and less significant part of the production of wealth. Neither work nor property gives title to wealth. Those who want to keep all of the wealth for themselves have no justification beyond evolutionary motives. They simply want to see their rivals dead.

It is not easy to overcome these moral reflexes, however misguided. That is why the reformer will try to reach practical compromises with the current system, instead of calling for revolutionary change. Instincts may be untrustworthy, but they can only be countered with clear reasons and examples. The reformer wants to make sure that everyone gets a share of the essential resources available to the society. To emphasize the equal distribution of resources, this basic human share could take the form of a monthly payment. Every last person in the society, rich or poor, would receive the same small payment. Payments for children could be held over until adulthood, in part or in whole. The share is intended for the self-directed individual person, not for a parent or guardian.

The basic human share would be a minimal payment, it would be nontaxable, and it would be derived from the taxation of property. The same taxation would be the basis for medical care and emergency food and shelter for anyone who needs it. The reformer's argument is that while society has the wealth to feed everyone, it should do so. No one should starve, or freeze, or die of easily curable illnesses. This guarantee helps to lighten the gnawing uncertainty that makes us fear the profound changes that are happening all around us. While this deal is honored, no one will have to live in terror of losing their job, or their property.

So property justifies its existence through taxation. When property is no longer needed and is no longer productive, then it is quickly taxed to extinction. Taxation gives owners a reason to put property to productive use.

To put it the other way around, nonproductive property loses its owners. No one wants to be found in possession of property that renders them liable to taxation, unless it will actually produce wealth. That is the justification for the continued recognition of property claims. That is the deal.

Such a compromise with the property owner would be followed by a second compromise with the worker. An improved minimum wage gives the rest of us a reason to continue working, while work is needed. This is a temporary measure, since the need for traditional labor is declining. As we continue to develop new tools, the proper sphere of work will gradually shift to a person's own circumstances. The amount of traditional labor needed to produce wealth will continue to drop. If wages are left to be determined by supply and demand, they will gradually decline to zero. Full employment is probably a thing of the past, but while work is needed, the reformer will insist on a decent minimum wage.

A decent minimum wage is intended to provide an income above and beyond the minimum cost of existence. Therefore, it can be taxed, along with property. Just as the preservation of property is a compromise with the evolutionary motives of property owners, the decent minimum wage is a compromise with the evolutionary motives of workers. Someone who works harder than others can delude themselves into thinking that they are obtaining some meaningful advantage over others. At the same time, they gain further opportunity to examine their own motives. A decent wage should give them the leeway to experiment with new cognitive ways of living. They can afford to make a few mistakes here and there.

This is how progress is made. These proposed reforms depend on the support of a broad middle class. Such a middle class will need the means to try out something new every once in a while. But they will also need a guaranteed minimum share of resources to fall back on in case things go wrong.

As usual, the property owners hold the high cards. They continue to pretend that they own all the resources. Resources will continue to be an essential part of the production of wealth. The workers hold low cards. Their labor will become less and less relevant.

But workers have votes. In a democracy, if it is a real democracy, the electorate can insist on progressive taxes, decent wages, and adequate safety standards. Voters can place limits on property. They can regulate property.

The first reaction of the property owners, if they can't defeat regulation, is to run away from it. This is called globalization. If one country doesn't give them what they want, they go try to find another country. In their dreams, they would like to hold a reverse auction among countries to find the one that will offer them the lowest taxes, the lowest wages, and the lowest safety standards. They want countries to participate in a race to the bottom.

Countries with a broad middle class, based on jobs that pay a decent wage, can expect to see their jobs offshored to other countries. Other countries, meanwhile, can expect to see their safety standards gutted and their environment wrecked in order to please the foreign investor.

But this sort of investor is really a foreigner in every country. The investor wants to shuffle property from one country to the next, without having an obligation to any of them. The multinational corporation and its owners would like to avoid actual residence in any actual country. Real countries are inhabited by strong and fearless electorates who make sure that property is taxed and regulated. These property owners are trying to have their cake and eat it too. They want their property to be protected, but not regulated, in every country around the world.

Democracies, if they are real democracies, don't have to put up with this. Voters can impose taxes and limits on trade. There is no reason whatsoever why they should permit the unrestricted movement of capital and products. Imports and exports can be made to serve the interests of the electorate, instead of those of the property owners. Instead of going along with a race to the bottom, these countries are free to set their course for decent individual living conditions and national self-sufficiency.

Even within a political framework of evolutionarily motivated values, the fugitive financiers are cheaters. Their property is dirty property. The electorate has no reason to recognize dirty property. Clean property stays put and is taxed and regulated for the benefit of the country. It is local property. Only local property is protected. Doing business in a country will mean sticking to the rules set by its democratic majority.

Voters can treat cheating property owners by the old standard of crime and punishment. For instance, they can confiscate dirty property that has been used against the public interest, and turn it to the public benefit as part of the general tax revenue. They can break up a harmdoing corporation and use its assets to build a school. When great concentrations of wealth attempt to defy the will of the electorate, they can be reduced by expropriation. Forcing property owners to suffer losses is the best way to compel them to follow the laws. There is a second benefit in a capitalistic economy. Shutting down a few large monopolistic players will help to open up the marketplace to smaller competitors, who will bring fresher ideas and methods with them. These smaller players are also less likely to think that they can profit while defying the democratic majority.

In general, the reformer would prefer to see a broad decriminalization of most of the crimes that are used to put people in prison. Crime no longer implies punishment. But this logic cannot be applied to property. Despite some legal theories to the contrary, corporations are not people.

Corporations are property. And property can be regulated. The best way to regulate property is by the old standard of crime and punishment.

Decriminalization will be visited again in the discussion of liberty. However, one aspect of crime and punishment touches on the protection of thinking human life, and it also illustrates the present distinction. That is the question of capital punishment. A reformer would call for an end to capital punishment on the grounds that no group of people has the moral capacity to kill another person.

An individual person might kill in self-defense, but this contingency cannot be extended to any group of people. The individual has a high level of moral responsibility. This sense of responsibility is built on a full knowledge of their own circumstances. The knowledge derives from a sensory flood of information about the individual's surroundings. Therefore the individual has the means to judge true necessity. Any group of people, on the other hand, is in the position of acting on each other's behalf. They are all in a state of reduced knowledge. As a result, they have only a reduced moral capacity to judge actual necessity. There should be no capital punishment of people.

For pretty much the same reason, a bad corporation that put the lives of real people at risk should be shut down quickly. This would be an example of irresponsible group action. Such a mass of property directed by group decisions has little or no moral capacity for responsible action. A corporation is a reckless vehicle. For the safety of the public, a corporation could be presumed guilty unless proven innocent. And the "capital punishment" of corporations should be pursued frequently and energetically.

One of the arguments that has been made for the unrestricted movement of capital is that it will help to even out the wealth gap between poor countries and rich countries. But this is false. In fact, the opposite is true. Unrestricted free trade actually contributes to the process of underdevelopment and makes poor countries poorer. This is not surprising. The same mechanism has already been explored in the discussion of cooperative competition. Property accumulates. So-called "free exchanges" of quid-pro-quos work out in favor of those who have property, and hurt those who don't have property. The rich get richer, and the poor get poorer. But we knew that.

The right way to increase the wealth of poor countries is to open up the free exchange of information and the free movement of people. Poor countries will become better off when they put technology to work without the interference of outlaw capital. A good way to begin making greater use of technology is to sponsor broad public education and a free flow of information. Free movement of people can play an important part in carrying these cognitive values from country to country. Just as the electorate can

restrict the movements of capital and products going in and out of their country, so they can open up their borders to the movement of people, if they wish. I believe they will do so once the clear benefits of free movement begin to outweigh the old tribal fear of strangers.

In addition to the bread-and-butter issue of jobs and wages, safety standards are a main reason to regulate property. Many countries have long-established rules for the protection of job safety, food safety, and product safety. The problem is that these rules have often been lax and unenforced, at the bidding of the property owners. Inspections should be common, and heavy fines frequent. Repeatedly or seriously unsafe operations should be quickly shut down. This will only happen if inspectors are able to work for the public good, rather than for the good of the property owners.

The most serious safety problem facing us is the ongoing destruction of the natural environment. We can use tax revenues to protect or restore natural habitat. But that only treats the symptoms. To get at the cause, we will have to regulate property to prevent its operations from damaging or destroying further habitat. This is an expensive issue. It will certainly cost jobs and wages. And it will reduce our standard of living.

For example, what would it cost our economy to protect all existing farmland and undeveloped space from development? For any new building that was put up, two old ones would have to be pulled down. An exception might be made for core urban areas that already have high housing density. What reasoning would it take for the electorate to willingly shoulder such costs?

Again, where will we obtain our electrical energy? How will we power transportation? How will we heat our homes? All of the available options carry serious costs and risks. Many similar examples could be brought up. The protection of the environment is perhaps the most difficult issue facing us. The voters in each country will have to deal with these environmental issues on their own terms.

It may be asked why I make so much of my country. Why do I care about my country? After all, an electorate is still just another ill-informed group of people making overbroad decisions for each other. Everything that I said about irresponsible corporations applies to countries as well. And then, from another point of view, a country is just a sad leftover of tribalism. Our national mythologies are drenched in tribal motives. All of this is true. National self-sufficiency is only a milestone on the road to individual self-sufficiency. National sovereignty must eventually yield to individual sovereignity. My local circumstances are where the action is. So why should I concern myself with national politics?

The answer is that I need my country as a counterweight to the property owners. Any serious attempt to regulate property will certainly provoke

fierce and determined resistance from the great concentrations of wealth. Regulation sets up a showdown between people and property. The grasp of the property owners remains strong at the local, national, and international levels. If a reformer really want to exercise the democratic franchise, they will have to challenge property at all three levels. In particular, they will have to challenge property at the national level. National sovereignity lends a useful degree of leverage on the international stage. At the present time, the best hope for effective regulation of property lies in the expression of national sovereignity by way of the popular vote in our respective countries.

The showdown between people and property is already in progress. So far we have been losing. The great concentrations of wealth have been getting larger, more global, and more mobile. Nevertheless, I believe that they are on the wrong side of history. Their purpose is plainly harmful. They are trying to deprive people of their own local circumstances. They will lose. We will be able to tell that we are winning when the concentrations of wealth start to break down, and become smaller and more local. Then we will be able to put people in first place, and property in second place.

This is the core of a political program in defense of thinking human life. We want to put people ahead of property. Of course, the property owner will accuse the reformer of bad faith. It will be alleged that we are merely using human life as an excuse to attack property claims. But in fact, we are not asking for the immediate elimination of property. That may happen down the road, when there is no further need for property. But for the moment we are simply putting thinking human beings first. This is a fair and honest answer to anyone who accuses us of bad faith.

That is why we are talking about reforms, and not about a revolution. A reformer works with the system as it exists. It is true that we can eventually expect to see all types of property delegitimized, one by one, as technology progresses. But that is not what we are asking for right now. What we are asking for is the immediate taxation and regulation of property. We don't know for sure what the future will bring. But whatever it brings, we will deal with it on the strength of our basic values. What we value most is thinking human life. That is why we are putting people ahead of property. We are negotiating in good faith, and our deals are good for precisely as long as anyone else's deals: for one electoral cycle.

As usual in politics, the fighting is all about money. And what is the money about? At present, it is still a placeholder for energy and other resources. It allows people to make quid-pro-quo exchanges of property. But money itself is only a temporary fiction. Energy, on the other hand, is a real and permanent part of living. So we shouldn't allow ourselves to become distracted by the gymnastics of money. Watch what happens with energy. Follow the energy.

What kind of money are we talking about here? A billion dollars is fairly small change as far as the great concentrations of wealth are concerned. It is equivalent to just a few dollars in my pocket. But a billion dollars will fill ten thousand 18-wheeler semitrailer trucks with goods. At eighty feet per truck, these trucks will fill both lanes of an interstate highway for seventy-five miles, bumper to bumper. Imagine that they are travelling down the interstate at sixty miles an hour, with a couple of truck lengths of following distance in front of each truck. Then I would be able to stand by the side of the highway and watch them go by for about four hours. At sixty miles an hour, it takes about four hours to parade a billion dollars' worth of goods past me.

Today, a billion dollars can fill 10,000 trucks. Tomorrow, a billion dollars will turn into a dry leaf and blow away in the wind.

* * *

Liberty will be the second part of a reformer's political program. Liberty includes all the things that I do to further my cognitive interests, once life is somewhat secure. It doesn't include the things that I do on behalf of someone else, or the things I do because of the evolutionary process.

My individual cognitive process begins with a knowledge of my environment. I see my circumstances, I understand my situation, and I decide how I would like to change my circumstances. If I am unable to act at all, or if my actions have little or no effect on my circumstances, then I do not have liberty. If I have some degree of actual freedom, then I can watch my actions change my circumstances. Then I try to understand my new situation, and come up with a new plan for what to do next. This is how I can get my cognitive process to take control of my life. Liberty closes the loop.

Life without liberty is like living in a prison with a blaring television. The constant coercive messages from the television are intended to destroy my individual thought process. But I still have the capacity to think, somewhere in my head. I can't act on any of my thoughts, because draconian punishment prevents me from doing anything to improve my situation, or even from expressing my thoughts to anyone else. Still, even in the total absence of liberty, I retain my own independent thought process. I see my circumstances, and I understand my situation. I have authentic plans of my own, and I will put them into effect when I see the slightest opening. But for the moment I have to continue living without liberty.

The property owners would like to keep me locked up in a prison of their laws. To some extent they are able to do so by using the threat of concrete prisons. But there are other prisons that are worse than either of these. Necessity is a terrible prison. It is hard to do anything about my larger circumstances when I have no idea where my next meal is coming from. In

the previous section on the protection of cognitive life, I have tried to explore some escape routes out of the prison of necessity.

But even necessity is more tractable than some of the prisons that exist in my own mind. Habit will keep me travelling in circles in my familiar ruts, and dissuade me from doing anything to improve my situation. Ignorance will hide from me the fact that there is even anything I could do to improve my situation. This is why I think of education as one of the basic components of liberty. Education can introduce me to the escape routes out of ignorance that others have already found. It can also help me break my own bonds of habit, and help me find new openings that no one else has yet discovered.

These prisons of the mind are more dangerous and profound than anything the property owners could invent to advance their own petty evolutionary edge. We have to find a way to climb out of these prisons together, as common members of the human species, or risk going down together in an environmental shipwreck. For this reason, I would put broad public education first on the list of civil liberties, even ahead of free speech. Not that the order on the list matters all that much. You can't really have one without the other.

There is very little we can do to control our own circumstances without the powers of literacy and numeracy. People acquire these abilities through education. This is also how we acquire the ability to comprehend logical arguments. These skills do not come naturally to us. We are still half apes, whether we like it or not, and we need schools in order to get the most out of our brains. Schools help us learn how to apply our critical thinking skills to the problems we encounter in our daily lives. This is where new knowledge and new cognitive tools come from. This is also where the political support for reason-based values comes from.

A reformer will call for expanding high-quality public education. This is undoubtedly a political minefield. Everyone understands that the best time to brainwash children is in early childhood. So everyone wants the schools to carry their own particular brand of propaganda. Teachers, even those who just want to teach basic thinking skills, wind up being caught in the middle. My own feeling is that broad teacher discretion is the best path. The committee is always dumber than the individual. Standardized lesson plans and standardized testing are nothing more than propaganda that has gone through a blender of cooperative competition. Children can more easily recover from a few bad teachers than from a uniform diet of lowest-common-denominator junk.

The model would be to build on the kind of academic freedom that is still prevalent in some institutions of higher education. The teaching faculties build their own lesson plans and degree programs. Individual teachers gain

tenure and are not fired or jailed for expressing unpopular ideas. Let students learn how to develop their own ideas. Let them learn how to defend their ideas, and how to give fair consideration to the ideas of others. In the most difficult challenge of all, let them learn how to discard their own most cherished ideas, when these ideas fail the acid test of observation.

It can take twenty years of full-time schooling to get from spelling and counting to the point of the spear where good scientific research is being done. Not that everyone has to do scientific research. But no one should be forced to abandon education for economic reasons. Access to a decent education is part of the foundation of political progress. And anyone who wishes to pursue an advanced scientific education should be able to do so. That is how we can break out of the prisons of the mind, the prisons that we don't even know are there.

To make use of this mental freedom, I have to be free to exert my individual thought process on my own circumstances. I also have to be free to extend my thought process to others. This is where civil liberties come to my aid. These liberties can be used to extend a line of defense around my circumstances and protect me against certain forms of coercion. Civil liberties make it somewhat more difficult for the property owners to keep me locked up in a prison of laws, or in a prison of concrete.

Traditional civil liberties consist of a list of enumerated freedoms which the unpopular individual is supposed to retain in the face of a hostile democratic majority. They usually offer only limited protection against the state, and none at all against the property owner. However, they are written in broad language and contain glimmerings of cognitive motives. A reformer could well hope to broaden their practical application in order to shore up the defense of the cognitive process.

One unpopular liberty is the freedom of the individual to maintain weapons of self-defense. I realize that a reformer may choose to neglect this one on the grounds that it is a loser and a low priority. And certainly the reformer will have to make these kinds of choices. Nevertheless, personal weapons strike me as essential, and I personally would call for the tax-financed issue of militarily effective rifles to all adults over thirty. This is not because I necessarily think that the property question will come down to civil conflict, but because I know that an armed individual can't be pushed past a certain point. Those rifles can be completely effective without ever being used. By just sitting quietly in people's basements, they can help to turn our debate away from the question of what the property owners demand, and toward the question of what the people will accept. An unarmed populace, on the other hand, can simply be rounded up and shipped off to the concentration camps.

Among our other important freedoms are some guarantees against arbitrary searches and spying. There is no freedom as yet from persecution and punishment by the majority, but there is a prohibition of torture. Due process means that I can't be punished in the absence of lawfully gathered evidence. I also can't be punished without a series of hearings that allow me to bring up evidence in my defense.

The prohibition of unwarranted search and seizure actually has a much broader scope than it is usually given. What it really means is that I have complete immunity to commit any crimes at all, for which the evidence can be contained within my private circumstances. This is pretty much the same thing as proving that I have done no harm to others. It amounts to an early recognition that the laws of the majority do not extend into my own immediate personal circumstances. My circumstances are ruled by the laws of my own conscience.

Free speech is the most important of all of the traditional freedoms. It begins as a narrow opening that allows me to propose certain political changes without fear of immediate punishment. But its true scope is far broader than that. Free speech is a principle that decriminalizes all idea crimes. If we actually believe in free speech, then there are no thought crimes, no speech crimes, and no crimes of writing. There are no sound, image, or film crimes, either.

Under current laws, a property owner can assert ownership of an idea and demand to be paid for its use. Then, when A passes the idea to B, an idea crime is supposed to have been committed against C. Of course, this is a blatant violation of free speech. In order to protect the free speech of A and B, we have to eliminate patents and copyrights. These laws are nearly meaningless anyway. In reality, people are going to share their useful information regardless of the laws, whether they do so openly or secretly. Any idea can be shared with all of humanity, and several nearby star systems, at a negligible cost.

A classic test of free speech occurs when someone shouts "fire!" in a crowded theater, and people are injured in a rush to escape. This is asserted to be an speech crime. But it actually starts life as an assault-like combination of intent and injury, and the blame is then transferred to the speech itself. Once the precedent of an speech crime is established, any sort of speech can be criminalized. This can extend to threats that don't cause any injury; feelings that are hurt without intent; and speech with neither intent nor injury that falls under statutes criminalizing something nebulous like "hatred." If this is where the logic leads, I would rather acquit the original person who shouted fire in the theater. Of course, any number of scenarios can be invented. I probably wouldn't acquit the person who deliberately told

the victim the pill was aspirin when it was really cyanide. But we're not talking about speech, are we?

I don't believe that communication by itself can be a crime. Certainly I have been subjected to plenty of coercive communication that felt like assault. But it was the attempt to control me that was the problem, not the communication itself. I certainly intend to use information any way I like in my own circumstances. And I certainly intend to communicate any information I like to anyone who is willing to talk to me.

It is only through the use of free communication that I am able to extend the power of my cognitive process from the limited stock of my own ideas to the great inventory of ideas held by humanity as a whole. It is this expanded cognitive process that makes science and technology possible. Unrestricted free speech is what gives me hope of a bright future for the human species.

The progress of the arts and sciences depends on free communication. Information is a currency of negligible cost but great value. Useful ideas can be shared with everyone. Everyone can try out these ideas and improve them, and return them with interest. This is how we gradually improve our knowledge and understanding, and how we can eventually overcome our present mental and technological limits. We will have to rely on the free exchange of information to help us overcome the present danger we pose to ourselves and to the other life on the planet.

In addition to the property owners, there are a few creative people who obtain some short-term benefit from property claims on information. But more people are shifting against these claims. They like to copy their music and videos. They don't see why someone should hold a patent on their genes or their crop plants. There is a growing realization that any property claims on information are harmful to the long-term interests of all of the people on the planet.

If there is too much political opposition to allow us to eliminate patents and copyrights outright, the reformer will start by limiting them. The term of patents and copyrights can be substantially shortened, fair use exemptions can be expanded, and the scope of their claims can be reduced. They can be restricted to older technologies, and prevented from contaminating the public domain of new emerging technologies. Patents on mathematical algorithms have always been outlawed, and this rule should be extended to break existing property claims on such things as genetic information, biological proteins, and computer programs. If we are unable to break unjust laws, then we are forced to carve out law-free zones where free communication can take place anyway. This is just another form of the underlying struggle for the constitutional liberty to use information as we see fit within our own circumstances. On the surface, it then becomes a struggle for immunity from unconstitutional spying and persecution.

* * *

Going beyond the decriminalization of idea crimes, a reformer would ask for the decriminalization of most crimes. That doesn't mean, of course, that the laws that are left are any better than the others. All laws against the individual are illegitimate. The individual conscience is the only judge. But it is not necessary to proceed against all laws immediately. Eventually the last remaining laws will go away simply because no one will be found to enforce them. People will defend their own circumstances, but they will no longer be willing to act as mercenaries for others. In the meanwhile, the reformer will try to repeal those laws that are used to terrorize the greatest number of people. Whatever laws are used to keep people powerless and unable to defend themselves, those are the laws that should be repealed first.

Such punishments as remain should be minimized. Punishment is never a remedy for harm. It does nothing for the injured person. At most, it pleases any vengeful evolutionary instincts the person may have. There are also many types of deliberate injury that go unrecognized as crimes, especially when they are perpetrated by property owners or mercenaries. For the sake of consistency, we may wish to recognize those injuries as crimes, too. I would call any attempt to control others a crime. But there is no need to enlarge these crimes with the new crime of punishment. Rather than adding punishment for new crimes, we should withdraw punishment from existing crimes.

The reformer will also have to defend liberty against overdrawn safety fears. Safety should never weigh against individual liberty. We should not try to regulate people. We should always presume that individuals act responsibly in their own circumstances.

On the other hand, we should certainly do our best to regulate corporations and property. This is because property claims are inherently irresponsible. They affect the circumstances of many people. Regulation therefore applies to a person who is acting on behalf of a group of people, or as part of a property claim. It should not be used as an excuse to tie down and constrain a person acting within their own circumstances. Regulation of the individual can become a significant threat to liberty, since there is no limit to the security demands that might be derived from capricious and contrived safety arguments. There are genuine threats from pollution and environmental destruction, and these are best countered by individuals who are able to exert effective control over their own circumstances.

Clearly, everyone has an inherent responsibility to forestall obvious hazards. There is no reason to get anyone hurt through carelessness. But the correct measure of caution can only be determined by the individual conscience. In any case, punishment and deterrence are the wrong way to

minimize injury. The right way to minimize societal harm is to outgrow the competitive instincts that give us an incentive to hurt each other.

* * *

The pursuit of happiness is not really a political objective, but a personal goal. From a political point of view it probably involves the final delegitimization of property claims. That is okay, because delegitimization happens when we no longer need property anyway. We will have tools and self-sufficiency for all. At this point we will hopefully be past the evolutionary need to harm and control each other. The less property, the more freedom. We can protect our own circumstances and cognitive spaces as we need, or share them without fear. We can take down all the signs and advertising. We can go where we like without asking permission. We can stay where we like without paying rent. We can live a cognitive way of life.

* * *

I have been writing as though the laws were in fact in the hands of the majority. That is, of course, wishful thinking. I believe that our form of government is really in the hands of the property owners. Their laws put property ahead of people. The mercenaries work for them, and not for us. But the electorate is in fact capable of taking a larger share of power, if it can manage to shake off the siren song of coercive communication. So I have written about the building of democratic majorities and the negotiation of political deals in the hope that we can make it so. Eventually, of course, democratic majorities will have to yield control to the autonomous individual. The longer-term objective will be a locally self-sufficient economy that can do without money or other types of quid-pro-quo exchanges. But for the moment I have to support national sovereignity and democracy, and any political compromises that will help to shift power away from the great concentrations of wealth.

Any changes in the present economy will inevitably be resisted by the present owners of property. That is not surprising. Individual self-sufficiency spells the end of their evolutionary advantage over the rest of us. In their minds, evolutionary advantage is the purpose of their lives. Of course we can expect them to fight tooth and nail. By their own lights, they are perfectly entitled to use prison, starvation, and homelessness to force us into their service. This is what the property system is set up to do best.

No great foresight is required to predict that the property owners will employ agents provocateurs to hurt people and destroy property. They will do this in an attempt to rally people to the defense of property claims. The agents will pretend to be anti-property activists. No doubt they will entice along a few dupes, who do not understand that they are really aiding the property owners. There will probably also be a few angry hotheads, who

don't care. Needless to say, this will not help to bring about a cognitive way of life.

The struggle over property claims will be largely fought in the court of public opinion. The property owners have the advantage of familiarity. When in doubt, people often pick the devil they know over the one they don't. So, in order to win effective regulation of property, the reformer has to demonstrate that this is a clearly superior alternative. What people need most is reassurance that a better future is possible, and that it will not come at their expense. That is why the reformer can gain greater political leverage from the peaceable example of a few saints who are able to turn the other cheek, than from any number of hotheads who are quick to give and take provocation. I am no saint, but I know better than to listen to the temptations of the agents provocateurs.

Capitalism has been economically successful. It has produced the basic necessities at low prices. It has also produced many unnecessary things, whose low prices often fail to reflect their high human and environmental cost. But it has met the basic economic challenge. It has also generally allowed science and technology to advance. And, at times, it has tolerated various levels of democracy. This is a big improvement over feudalism, where hereditary titles conveyed property claims and evolutionary advantage from one generation to the next. The improved economic performance of capitalism is at least partly due to a comparatively benign atmosphere for cognitive interests. But the political purpose is the same as under feudalism. Capitalism is still all about evolutionary advantage.

Communism promised to do something about the property question and deliver at least a superficial equality among people. It failed because it did not address anyone's underlying evolutionary motives. The centralization of property ownership did nothing to change people's internal motives. Instead, state control of the means of production simply created massive power relationships from the center out to the periphery. These centralized power relationships shut down free communication. As a result, coercive communication invaded many aspects of people's interaction with each other. Like other forms of totalitarian government, this one created an environment that was extremely hostile to cognitive interests. Economic failure was an almost inevitable result. But despite the lies, there was a grain of truth in its promise. When communism was universally seen to have failed, it surrendered power with relative grace and lack of bloodshed. Will capitalism yield as gracefully when its time comes?

We should remember why we expect individual autonomy to prevail in the end. It might seem that a cognitively motivated person would stand no chance against one who is focused on competition. Won't the competitively

oriented person automatically outcompete the other? How can a non-competitive society stand alongside a competitive society?

This is the same argument that was formerly brought to assert that democracies would never stand against totalitarian societies. The argument was wrong then, and it is wrong now. The difference lies in free communication. Twentieth century democracies, with their forced conscription, wartime censorship, and sedition laws, would seem to set a poor standard of individual autonomy. But the democracies nevertheless enjoyed weaker power relationships among individuals than did their totalitarian adversaries. As a result, they offered more opportunities for effective free communication than was available to people in totalitarian societies. In those twentieth century conflicts, free communication made all the difference. It will make the same difference, in the end, between mercenaries and volunteers, between cooperative competition and voluntary association, and between competitive societies and non-competitive societies.

If we remember that we each have our own individual conscience, and if we stick firmly to our various individual standards of right and wrong, we can hope to win through in the end. Those who say it can't be done just haven't seen it done yet.

10. A Personal Program

What can I do myself? What useful things can I do in my own life, at my own home, with my own abilities? Our present economy is full of constraints and distractions. But that won't stop me as long as I know what I want to accomplish, and set reasonable goals. I have to set myself goals that are proportional to the scale of my local circumstances. That is how I can make some real progress towards the day when we can all walk through into something more closely resembling a cognitive way of life. At a minimum, I would like to improve our chances of surviving long enough to see that day.

One of the things I can do is to limit my use of resources. This lightens the burden I place on my natural environment. But I must live, and I must use resources. I must spend money. In practical terms, I would like to restrain the amount of money I work for, and the amount of money I spend on unnecessary things. These monetary acts are generally connected with the use of resources. My most basic needs are comparatively simple. They place a smaller burden on the environment than some of my unnecessary expenditures.

The most important resource of all is energy. I can conserve energy. This is partly a question of watching how much money I spend. But my use of money does not always accurately reflect my use of energy. Fossil fuels are unreasonably cheap in our present economy. These fuels impose significant costs on the environment. Carbon dioxide in the atmosphere leads to greenhouse heating and climate change. This is probably the greatest immediate threat we face to our survival. I can put off this threat by living on an energy budget.

I have to balance my energy conservation against my present need for industrial production and technology. It would be a poor idea to block the progress of technology for the sake of saving a little energy. That would be penny-wise and pound-foolish, since technological progress is what will free us from biological destiny and help us to survive our present environmental crisis. Of course, technology can be misused for evolutionary purposes. In that case, energy is wasted. But putting technology in the hands of the individual will help us. It will allow us to use energy more efficiently. So I think it is worthwhile to spend energy on improving technology, and on getting that technology into the hands of the individual. That is a wise expenditure of energy.

If those are my goals, what can I do to further those goals? The single most important job is to develop new cognitive tools. This makes all other things possible. With sufficiently advanced technology we can turn mud and

energy into food. Plants do it all the time. We will be able to do the same. But this is only the starting point. Our genetic makeup lies in our own hands. We will be able to repair broken genes and diseases. We will be able to manufacture any item we need out of the most basic raw materials and energy. Efficiency, sustainability, and pollution cleanup all come down to using the right tools. These are the tools we have to develop. We have seen tremendous strides in knowledge in the last century, but many critical advances are still ahead of us.

I can play a part in the progress of science and technology, even if my part is small. A professional scientist can spend a career nailing down a few fragments of knowledge. An engineer can spend a career moving the wheels of commerce within a specific industry. A very few people have access to modern laboratories. It may seem that these people have the chance to make a greater contribution than I can make. In truth, most of the credit goes to those who make it possible for them to work there. When I pay my taxes, I make that work happen. When I show a child how to understand a logical argument, and how to gracefully abandon a disproven argument, I help make future science happen.

Even without a modern laboratory, there are many ways I can contribute to the actual progress of knowledge. Modern digital computers and internet communications have opened up many opportunities. Some people develop open source software. Other people occasionally report software bugs, which is also a useful contribution. To take different example, I can keep an eye on the natural environment in my own neighborhood. I can count the swallows and watch how the frogs and bindweed are doing. If I see anything unusual, I can make permanent records and take pictures and post them on an internet blog. I can find someone to test water samples. I can communicate with ordinary people in a way that wasn't possible a few years ago. Human inventions going back to stone tools and fire all started when someone noticed something interesting, and did something about it.

A second important job is to put cognitive tools in the hands of the individual. The most advanced technology in the world is useless unless it is available when it is needed. It must be available in our own circumstances. To be useful to me, it must be in my hand. A good tool is simple, accessible, and cheap enough so that everyone can have one. It exists so that it can be used by one individual for that individual's own purposes. A tool that is held by an organization or an institution will be used for organizational or institutional purposes. Those purposes are some of the most retrograde purposes in society, since they lie furthest from the individual's control of their own circumstances. No institution should be allowed to come between an individual and their tools.

The most useful cognitive tools are those that help people live more efficiently in their circumstances. I can contribute to designing, manufacturing, or distributing such useful gadgets. I may even be able to find conventional paid work in these areas. There is somewhat of a conflict of interest between the employer and myself, since the employer wants to restrict access to the gadgets and charge the highest price for them, while I want to distribute them as widely and cheaply as possible. Either way, I gain some practical knowledge of the industry. I can go on to use this knowledge in whatever unpaid voluntary work I decide to do.

A third useful job is to build a new economy around each individual's circumstances and their tools. This is mainly a matter of free communication. To achieve this, I have to put some effort into talking with my neighbors. This is not necessarily easy. I don't usually have a lot of time and energy to spare in my daily life. And I can't always trust my neighbors to work with me, rather than against me. But what should I spend my effort on, unless I spend it on my own circumstances? My life does not take place somewhere far away, or in the future. It takes place here. The most important things are beside me. Talking to my neighbors helps me to be a good custodian of the actual things around me. These are the things my hands touch, the things my eyes rest on.

Free communication is a key to the new economy. When one person builds a better mousetrap, everyone benefits. When one person encounters a problem, they can request helpful suggestions from all over the place. This sort of thing is something that coercive communication can't do. It just isn't an option for people who are encumbered by power relationships. Property claims and cooperative competition and quid-pro-quo exchanges are all poison to the free exchange of information. Only people can behave decently towards each other can talk to each other freely. I don't know what the new economy will look like. I expect, for reasons of free communication, that its essential working pieces will be purely voluntary.

Many people have told me that this is impossible. I don't believe them. I believe it is very much possible. Labor is no longer a limiting factor in the production of necessities. The increased productivity of new tools over the last century has been gradually making labor obsolete. Automated tools can do the work that needs to be done. What we really need is intelligent thought. We need sincere problem solving that is untainted by a desire to control others. The final limiting factor in production is useful energy. We obtain our energy from many sources. As it happens, most of these energy sources go back to the fixed amount of sunlight that the Earth intercepts each day. Why should that sunlight be shared any way but equally?

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By living on an energy budget I can help to improve our collective chances of surviving the present environmental crisis. I would like to cut down on my energy usage. I would like to begin by accounting for the full energy bill that my way of life is running up. But it is quite difficult to work out the true cost of living. Part of the cost of my lifestyle is reflected in our present economy. Another part is hidden. That part of the cost is assigned to the environment. We have always expected the environment to clean up after us. We can no longer do this. My cost of living has to fit into a personal energy budget that will allow everyone on the planet to live, and keep our environment alive as well.

Pollution is a short word for the failure to bring resources back to an environmentally acceptable state after using them. It can be avoided. We already have many of the tools we need to clean up after ourselves, but they are expensive. Cleaning up after ourselves always costs energy. When we put in the necessary energy, many of our resources can be renewed and brought around full circle. With the right technology we can close the loop. We can process used resources into fresh resources. For example, we can use robots to sort and recycle our garbage. This is not a cost-efficient task for humans to perform. But it is an environmentally important task, and it is well within the capabilities of automated technology.

Using a resource is not the same thing as destroying it. Water is not destroyed when I bathe in it. It is merely dirtied. If the water is then carefully treated and reused, or treated and put back into the environment in the same state that I found it, no harm is done. Like any other local ordering process, this cleanup requires energy.

Or take another example. Imagine that I set about draining an underground aquifer in order to water my lawn. The lawn happens to be in the desert. This is plenty stupid, but it does not destroy the water. It evaporates the water into the air, where it becomes unavailable to me and to the plants and animals that depend on the aquifer. I conclude from this that I should not water lawns in the desert, because it is unsustainable.

Now imagine that I figure out a way to grow vegetables in a sealed greenhouse, where all of the evaporated water is recondensed and none is lost. That could be sustainable. In this case I am not taking vital resources away from the plants and animals around me. If some fraction of the water is lost, the sustainability of my greenhouse will depend on whether that fraction can be made up from rainfall, or perhaps from the desalinization of nearby salt water. Of course, desalinization requires energy.

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If I want to conserve topsoil, I can limit the amount of meat in my diet, since it takes ten pounds of grain to raise one pound of beef. I can share a small house or apartment with other people. I can limit the amount of water I

put into my garden, or down my drain. There are many ways to conserve resources.

Perhaps the best thing I can do is to watch my energy budget. Last year I ate enough food to keep me strong and vigorous all year long. That was a small portion of the energy I used last year. However, it provides a good yardstick for measuring the energy I used for other purposes. I will pretend that I ate a standard diet of 2000 kilocalories a day. I probably ate more than that. But even if I ate an unhealthy amount of food, I would have some trouble getting over 4000 kilocalories. So I will use the standard diet as my yardstick. It is equal to one person-year of energy.

Those 2000 kilocalories a day correspond to about 3000 megajoules a year. What does 3000 megajoules look like? It is 850 kilowatt-hours of electricity, or 2800 cubic feet of natural gas, or 25 gallons of gasoline. Each of these things amounts to one person-year of energy. Of course, I know that we aren't able to turn gasoline directly into food today. And we can't turn kilowatt-hours of electricity directly into food. But we will able to do these things some day. Just as plants, given the right conditions, topsoil, air, and water, are able to use the energy from sunlight to build sugars, so will we. Some day soon we will be able to see the direct equivalence between food and energy with our own eyes. It will not be one hundred percent efficient, but we will be able to convert energy into food when it is necessary. So it is reasonable for me to use the amount of food energy that supports one person for a year as the yardstick for measuring my personal environmental impact.

I would like to reduce my personal environmental impact. This comes down to energy in the end. If I save an amount of energy that would theoretically feed one person for year, I have accomplished something meaningful. This is not an abstract goal. It is something that I can practically attain.

To get to my job, I drove a car about ten thousand miles last year. That was the single most costly thing I did, so far as I know. The car got about 28 miles to the gallon, and it probably consumed around 350 gallons of gasoline. That is enough energy to feed 14 people for a year. If I can rearrange my work to involve less travel, I may be able to use less energy this year. I also have to count the energy it took to build the car, which was about forty person-years of energy. Depending on how many years I am able to drive the car, this works out to about three person-years of energy a year.

Looking at my share of the utility bills, I probably used about two person-years of electricity (1700 kilowatt-hours) last year. Heating accounted for 20,000 cubic feet of natural gas, or seven person-years. I did not use air conditioning. Putting together food, gasoline, car, electricity, and heat, I used 27 people-years of energy in one year.

This is an underestimate, of course. I have not accounted for a number of inefficiencies. What was the overall energy cost that went into bringing 2000 kilocalories of food to my table every day? What was the full cost of bringing gasoline to the filling station, electricity to the wall socket, and natural gas to the furnace? I don't know.

Some of these energy costs can be estimated by looking at the amount of money associated with them. For example, I paid about $2 per gallon for gasoline. That works out to $50 for a person-year of energy. Electricity at around six cents a kilowatt-hour was also about $50 a person-year. Natural gas was somewhat cheaper, at around $35 a person-year. But I probably spent $3000 on food, which is also one person-year of energy. It might be possible to live unhealthily on as little as a few hundred dollars of food per year. In either case, food is clearly more expensive and more difficult to obtain than the other energy sources listed above. This is an important observation. Even if I didn't know about the loss of topsoil, this argues against converting grain into ethanol to power cars. That makes even less sense than feeding grain to cattle. When I grow food, I should use that food to feed people, not to power cars.

Money is a mirror, but it is a distorting mirror. Sometimes a small amount of money reflects a lot of energy, and sometimes a lot of money reflects a small amount of energy. Money certainly doesn't account for all of the resources left in a polluted state and for the collateral environmental damage. Nevertheless, it can help to remind me of the things I have forgotten. Almost anything I spend money on carries an energy cost. Whether I am purchasing goods or services, the expenditure of a thousand dollars likely carries with it the expenditure of at least one person-year of energy. By that standard, I am probably using at least three dozen people's worth of energy at my current rate. That's a lot. In fact, it is unsustainable.

It seems hard to imagine how I could get by on food energy alone. Perhaps I could get by with food and renewable energy sources that add up to just a few people's worth of energy. Such a level of thriftiness may be unavoidable, at least until we get through the present environmental crisis. We will have to rely on all the efficiency we can gain from technology. The near future may be a colder, dirtier, and less convenient time than now. I only hope it will not be a hungrier time. None of this is a reason for me to behave badly towards my neighbors. The fact that the furnace is cold does not immediately throw me into a life-and-death conflict with my neighbors, as it would if we were animals.

* * *

I do not feel guilty when I use energy. It is not constructive. As I have admitted, I use a lot of energy. I do sometimes feel a touch of anger when I am forced to waste energy. But then I do my best to let go of this feeling.

Neither guilt nor anger does me any good. These are primitive emotions, and they merely get in the way. They make it harder for me to do the things I have to do. Reducing my personal environmental impact is one of my goals. I have other goals as well. In the end, I have to do what makes sense based on what I know at the time. I have to let my conscience sort it out. Whatever I do, I try to do it with personal courage. So when I use energy, I use it with conviction.

Life of any kind is rare in the universe, as far as we know. Thinking life, in particular, is unique. My own life carries the same significant value that any other human life carries. There is a long train of thought to hand down. This gives me a personal obligation. I do not only have an individual cognitive process of my own, I am also part of a more extended cognitive process. It does not actually matter if I were to weigh up the joys and sorrows of living and find the balance in my own life wanting. I am part of an ongoing process. The purpose of any such process, cognitive or evolutionary, is that it continues.

Some people hope for a life after death. Perhaps they find insufficient meaning in the life that we can see. An afterlife could possibly occur beyond the confines of the observable universe, or through some supernatural agency. There is no way that scientific observation can disprove the idea of an afterlife. But I personally don't give it much thought. I prefer to think of death as the end of my personal process. All that I can do now is to live capably in my circumstances. Perhaps I will leave a few ideas to those who will come after me. But the people who come after me can do me no harm by losing those ideas. Whatever they do is part of their time and space, not mine. My life does not become meaningless simply because I live within the limits of my finite time and space.

That might seem inadequate to some people, but it doesn't bother me. What does it matter to me, if some thinking being a thousand light-years away is ignorant of my existence? I still exist. And what does it matter if someone a thousand years in the future has no idea that I ever lived? I still lived. The past is real, too. Reality is larger than memory.

Taking responsibility for my life demands a degree of personal courage. I cannot look to other people to lend me meaning. Each of my own actions has a permanent meaning. These actions are a part of reality, and no one can ever remove them from reality. I don't care whether other people remember them or not. So what should I fear, if I do not fear death? There are some things worse than death, at least for a while, such as great pain, or slavery. But these things are given a boundary and an end by death. They do not deprive me, for all their terrors, of the freedom of action that I hold in my own time and place.

* * *

Sometimes I become frustrated with the larger situation. It seems to me sometimes that I am trapped in a society of animals. On these occasions I am tempted to look out for myself. I am tempted to forget about the long dream of liberty for everyone, and instead pursue what short happiness I can gain for myself. After all, most of my neighbors are doing nothing to help themselves. They participate in repetitive games of cooperative competition. They believe the repeated lies they hear through coercive communication. They have little regard for each other, and no true comprehension of freedom. They do not stand up and demand the new and better liberties which should be theirs. Rather, they seem determined to throw away the ancient liberties they have in exchange for empty promises and a false sense of security. Why shouldn't I leave them to find their own way?

But these selfish thoughts do not nourish my sense of meaning. They leave me empty. In the end, my values contradict my frustration. Whenever I am tempted to think of evolutionarily motivated humans as animals, I have to stop myself, because I know that this is incorrect. Those thoughts merely degrade my own mental process. All of these people have the potential to become better than they are. After a short while, I look around again, and I see that all of the great works of the past were in fact the achievement of many people working together. They each built on the contributions of others and put in something of their own.

The achievement of those working alone is small. That is my fate, too, if I cut myself off from others. From cathedrals to science, all of our most lasting accomplishments have been products of an extended cognitive process. Free communication has crept around the edges of massive coercive institutions and collected itself into little niches of voluntary association. From these niches, like oases in the desert, all of our best achievements have sprung.

* * *

Political compromises are famously corrupt. And, in fact, I prefer to keep my personal choices cleaner than my political choices. This may initially seem somewhat counterintuitive. After all, I have the best knowledge of my personal circumstances. This knowledge of my personal circumstances should give me enough foresight to sustain some brief contradictions between the means and ends in my personal life. I should be able to tell when it will come out all right in the end. That kind of foresight should be far more difficult in the political arena. Neither I nor anyone else knows very much at all about the state of the country. By this logic, I should feel a lot of flexibility to bend the rules in my personal life, but I should feel obligated to keep a very rigid alignment between means and ends in my politics. In fact, it is the other way around.

Politics is more about human intentions than it is about real foresight. It seeks compromises between utterly incompatible constituencies. It expresses itself in ponderous institutions that are not easily shifted from their accustomed rounds. People impose many foolish consistencies on their institutions. Their intentions can lend these institutions a degree of artificial predictability. The predictability can last for centuries, and then it dissolves like the morning dew before noon on the day that the political consensus dissolves.

Nevertheless, these intentions matter. My work supports old people. When I am old, I expect the work of young people to support me. This is not foresight. It is merely an intention. None of us has any idea what the economic circumstances will be when I am old. But I will make as much noise as I can to maintain the present consensus that a way should be found to support me when I am old. In particular, I want property to be taxed just as much as work is taxed. In exchange for the decent taxation of property, I am willing to stand against the idea of immediate expropriation. That is politics.

I am much less willing to make such tradeoffs in my personal life. Practise turns too readily into habit. If I attempt to sustain moral contradictions in my behavior for any length of time, I run the risk of reinforcing bad habits. For example, I run this risk if I take a job where I boss people, in order to get to a point where I don't have to boss people anymore. This is not compatible with the mental preparation for a cognitive way of life. I would prefer to break my own bad habits of command and obedience. I would prefer to set a good example for others.

Life, liberty, and the pursuit of happiness is the summary of a political program. At a different level, I can pursue a program like this in my personal life. I work to ensure my day-to-day survival. I extend myself in free communication with my neighbors. When things go well, I try to take a degree of control over my own circumstances. That may mean chasing financial security. It may mean obtaining a property title to my own home. But there is more to happiness than wealth. Just as the use of technology does not always work out to the benefit of the individual, so my use of wealth doesn't always give me real control of my own circumstances. There are obstacles in my head.

Do I really understand my true reasons for chasing wealth? How do I know that I am not giving way to instinctive desires for wealth, status, self-importance, and power? Even if I think that I have rational control of my life, it may be that these instincts have control of me. The only way I can tell the difference is to reflect on my desires. I have to perform a critical examination of my motives. This requires a significant amount of time and mental energy.

Every once in a while I try to step back from the social game. I force myself to take the leisure of reflection. When I do this, I find that I am constantly learning and relearning how to recognize my own impulses and habits. They dodge and twist, moving as flexibly as the powers of reason that are trying to track them down. Once I think that I finally understand my actual inclinations, I try to make conscious decisions about them. Which of these desires are constructive, and which are destructive? Fear, anger, and greed appear destructive to me. So I do my best to intercept these instincts and suppress them. But if I am unable to suppress them, then I try to turn them aside into more productive channels. I try to control my desires. When I am able to do this for a while, I feel that I hold my actual choices in my hand. These are the times when I am able to exercise my best freedom of action.

I have to evaluate my personal tradeoffs in the light of my own mental strength, and also in consideration of external conditions. The current economy sets some harsh limits on my circumstances. I can't say that I will never take a bossy job. But to the extent possible, I would prefer to stay with more dignified and non-competitive ways of interacting with people.

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It does not seem useful for me to be overly concerned about having to work to pay my rent, while another person doesn't even have clean water to drink. Of course, both of us are being held in deliberate poverty for the benefit of a third person. The third person is the property owner.

Our attitude towards the property owner is a test of the mental attitude we will need to reach a better way of life. It isn't just a question of one or two people finding the technology they need to support themselves outside of the present system of quid-pro-quo exchanges. There are others to think of as well. We all have to make it through together. It would be wrong for us to begin tearing down the current economy until we have something functional to put in its place. We have to be sure that everyone can stay fed and clothed through a period when everything will be changing. We have to bring everyone through together.

Bringing everyone through is the right thing. It is also the practical thing. A broad consensus of people will have to agree that a better way of life is possible, and that it won't come at their expense. A few people, the ones who currently own everything, will certainly feel that change is coming at their expense. But we have to bring them through as well. It will make the whole thing easier if the property owner can look at their future and see nothing worse ahead than the same self-sufficient way of life that everyone else gets, too.

There will be fierce resistance anyway. The property owner has to come to terms with a loss of the control they have always enjoyed over other

people. But the resistance would be stronger and more violent if the property owner were to look ahead and see themselves suffering the kind of poverty they used to impose on others, or if they see themselves standing in front of the guillotine. Weaker resistance is better for all concerned. It is true that the property owner has committed crimes. But crime no longer implies punishment.

The prospect of equality even offers something new to the property owner. This kind of person may have never enjoyed an honest conversation, free of all power relationships, with another person. In the future, they will gain an ability to look their fellow human in the eye. Instead of lies, they may be privileged to hear honest truth from another person for the first time ever. It seems so little, and yet it is everything.

Our mental attitude is crucial in making this happen. Can we put the past behind us when the time comes? This is not so hard for me. It may be harder for the person who has no clean water to drink. What if I had watched children die of easily preventable and curable diseases? What if I had watched people starve? Of course I know that this sort of thing happens because it is good for the evolutionary interests of the property owner. Would I be able to forgive the person who had profited from this poverty? And what about the ordinary people of wealthier countries, preoccupied with their own problems, who did nothing to help? Would I even be able to forgive myself? Forgiveness is a challenge. It may have to be a cold forgiveness, until the property crimes of our age have receded into the past, but without forgiveness we cannot reach that better future which is certainly ahead of us. We have to bring everyone through, including the ex-property owner.

Our strategy of forgiveness meets its toughest test when it encounters a fourth person, the mercenary. This is the judge, the prosecutor, or the police officer. It is the person who used to enforce all of those property claims against the unpropertied. It is the one who did the dirty work for the property owner, but never received very much personal advantage in return. The mercenary distributed the demands and rounded up the tribute. On behalf of the property owner, the mercenary passed along endless streams of coercive communication, and finally fell under the spell of this kind of talk as well. That is the only way I can explain the mercenary's excessive service to the property owner, along with the failure to effectively serve their own evolutionary advantage.

This is the person on whom coercive communication has taken the deepest hold. Their habits of command and obedience, like great weeds, have become so firmly rooted that they may never be altogether pulled up and shaken loose. The idea of true equality is probably incomprehensible to this person. Since they have always acted against their own interests, they are

forced to believe some odd things. How does this person justify their own inexplicable actions? If we try to talk to the mercenary, we will hear wearying fairytales about the virtues of law and order. Their cognitive space is immersed in a world of self-justifying delusion.

The mercenary's arms might be red to the elbow, but this is still and always a thinking human being. No one is beyond free will and reform. I may suffer some initial horror in talking to this person. I can still do it, provided that I don't have to fear for my own safety. But my ability to forgive their crimes is only the lesser of two problems. The greater problem lies in the mercenary's ability to cease and desist from their crimes, once the authority behind them has disappeared.

This person will find it very difficult to comprehend life without authority. If the mental preparation for freedom is so difficult for me, how difficult must it be for the mercenary? This person has spoken a coercive language their whole life, and now that language no longer signifies anything. Their mother tongue has become a litany of empty sounds. It speaks in wrong assumptions that others no longer share. Now they have to learn an entirely new language, one which they have never even heard spoken before. This is a language that assumes that people will do what they wish to do, not what they are ordered to do. It is a language of free communication, in which ideas are exchanged for no other reason than for the value of the ideas themselves. It is a language of individual conscience and responsibility.

And finally the mercenary will have to come to terms with their own past deeds. They have to decide, by the power of their own unfamiliar free will, what they would like to do differently in the future. This will be unspeakably difficult. I sometimes lie awake at night, tormenting myself with thoughts of what must go on inside the mercenary's head. I don't know how we will do it, but we really have no choice. We have to bring the ex-mercenary through as well.

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Like everyone else, I have been through some difficult times. On occasion, I have gone so far as to consider adopting a random set of popular beliefs. I have considered doing this simply in order to get along better with everyone else in society. However, it turns out that my beliefs aren't really voluntary. They just are what I happen to think is true. I can't change what I think is true, at least until some better evidence comes along to change my mind about it.

And sometimes I have considered putting up a pretense of belief in whatever it is that people around me seem to believe. It is not impossible for me to maintain a such a deliberate tension between my actual and seeming beliefs. But it doesn't help. Keeping up the pretense only adds to the strain of getting along with people whose values really do contradict my values.

Then, at other times, I have considered a vigorous reaction against the things that shock my conscience. I could easily pick up any one of the insults and injuries inflicted by the property owners and take the short way over it. But then I look around, and I see all the fear and anger and self-destructive behavior that is out there, and I come to realize that this is a well-trodden path. I see that am not alone. My difficulty is a common difficulty.

So instead I try, under nearly impossible exterior conditions, to live according to such beliefs as I happen to have. There is a long tradition of such efforts. I am not the first person to run into this problem. For example, religious people have long struggled to reconcile conscience and society. I am not a religious person, but I feel that I recognize some parallels. Some elements of religious thought appear to resemble some of my own beliefs.

These resonances are interesting because the source of religious knowledge is so completely different from the source of my knowledge. I do not put my trust in revelation or intuitive knowledge. Instead, I trust repeatable observations. Our different paths, however, appear to have taken us to a few of the same places.

One parallel that exists in some religions is the idea of a sovereign individual conscience. These religions may believe in various forms of supernatural authority, but they usually reject the idea that any human authority can supersede the individual conscience. Nor does the supernatural power generally deprive us of our own free choices, though it may judge and punish us after the fact. The fact that we have a conscience means that we are called to assume full responsibility for our actions. We cannot avoid responsibility by deferring to other humans. We have an inescapable obligation to exercise free will. This obligation derives, in my view, from each individual's unique knowledge of their own circumstances.

In a second parallel, virtually all religions recognize some form of the golden rule: "Do unto others as you would have them do unto you." The golden rule has many corollaries. For example, it implies that people should limit their desires, take no more than they need, and treat each other decently and with respect for human dignity. But all of these ideas stand in plain contradiction to the normal rules of our competitive societies.

These ideas of conscience and decency have put religion into conflict with society. Usually, society has prevailed. Religious people have been driven to a range of compromises. Some have attempted to withdraw from society. Some have attempted to change society by service and example. And some have capitulated, subordinating their belief to outright collaboration with the interests of the property owner. It is my impression that neither personal nor organized religion has ever found any stable role in society except through such capitulation. Conscience and decency keep breaking through and upsetting all attempts to collaborate with the indecent and unconscionable.

This is not surprising. It is what we would expect from a persistent and untiring cognitive process that continues to assert itself.

In my view, the golden rule derives from the need for free communication. Free communication can only exist in the absence of coercive power relationships between people. This is the means by which the cognitive process is extended from one individual to any group of people. The extended process only works if people treat each other decently.

I personally believe that the individual cognitive process comes before the extended cognitive process. This may be a point of difference with some religions. They would call me to love my neighbor as myself, or even before myself, as when I am to turn the other cheek to blows. That is too much for me. I can understand turning the other cheek as an example, but not as a rule. In fact, I think I have a primary duty to protect myself and my circumstances from injury. That would place my responsibility to myself ahead of my responsibility to others. The difference may be due to the fact that I do not rely on a supernatural agency. It is my opinion that our true place of existence is in this world, and not elsewhere.

A third parallel is the great value that many religions place on each and every human life. They would say that everyone is equally valuable. People are not of greater or lesser value simply because they are high or low in the estimation of others, or in the economic life of their society. As I would put it, everyone has an individual cognitive process. We might disagree on the exact boundaries of personhood, but we would extend much the same recognition to thinking human life in general.

This recognition places stringent limits on self-defense. If no lesser action can stop imminent harm to my own person and circumstances, then it is reasonable for me to hurt another in order to preserve myself. The reasonableness of the action does not diminish or justify the harm done to the other. It merely preserves the self. If it is one life or the other, my conscience may allow me to put my own life first. But this is an extremely grave decision. No one else can make this decision for me. It is based on the strength of my knowledge about my own circumstances. Self-defense is the last resort of an individual.

Where conflict is foreseeable at a distance, there is but a hollow claim to self-defense. When I deal with my neighbors, I have to take their evolutionary motives into account. I have to treat their values with comprehension and tolerance, even when they look on my values with incomprehension and anger. It is up to me to take all possible steps to sidestep harm. So I should accept acceptable compromises. I should avoid avoidable conflicts. This doesn't exclude all chance of self-defense. But my conscience requires me to look as far ahead as possible. And it is usually better to run than to fight.

Finally, I can only invoke self-defense over imminent future threats, not over past wrongs. That leaves me with a sheer necessity of forgiveness. Despite my unpeaceful personal disposition, there is not much else I can really do about past wrongs. Forgiveness is pretty much the only practical reaction I can make, unless I want to create new wrongs in the future. I don't see much point in trying to knock back the prevalence of my rival's genes in the next generation. And revenge does further harm. It gives my neighbors a good reason to fear me. They have to consider whether they will be forced to defend themselves against me in the future.

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It is reasonable for me to forgive past wrongs that are over and discontinued. But what should I do about all the people who are actively trying to injure me in the present? Every day a new challenge comes along. Someone tries a new way to push me around. Every day I weigh the threats and the possible defenses. These almost never involve big self-defense, the kind that occurs when my life is immediately threatened. Mostly it is small self-defense, the kind that I exercise when I am tired and I simply don't want my cognitive space contaminated with any more coercive lies and threats that day. I wonder how I should I react. Should I lie? Should I say nothing?

I have long been puzzled over how to respond to these people. Most of the time, I play along with the games and do my best to get along in a complex and interdependent society. But there are times when I am forced to defend my cognitive space. Then the speaker of coercion gets nothing from me but a blank look, or a defensive lie, or perhaps a brief "I see." An explanation is a waste of time or counterproductive. All that is left then is coercive communication in both directions. This is sometimes necessary. But it is not forward progress.

Most of these people truly and honestly do not understand that they are doing me harm. They are genuinely shocked if I decline to participate in whatever cooperative game they want me to play. In their value system, I am in the wrong. I must be trying to cheat them somehow. They cannot understand.

Meanwhile, I understand perfectly well what they are doing when they try to exert control over me. I don't have any doubt that their motives are bad. In fact, I feel that I understand their motives better than they do themselves. I am not fooled by the superficial cooperative game they are asking me to play. I am completely aware of the underlying competition that lurks inside cooperation, like a wolf in sheep's clothing.

And still there is a point in trying to love my enemy. I know there is risk to my circumstances. I cannot casually expose my cognitive space to harm. But there is also something to gain. It may seem that free communication is out of reach. However, I can often speak as though it were possible. I tell

myself that I am speaking to this person's better motives. My enemy may identify fully with some institutional role, but I don't have to accept that role. I don't have to go along with treating them as they want to be treated, as the representative of some larger organization. If I want to, I can talk to this person directly as an individual human.

Every human being has mixed motives. My enemy may have overwhelmingly harmful motives, 99% evolutionary to 1% cognitive. This person may speak with a loud babble of meaningless coercive communication. But in the babble there is still a 1% admixture of friend and ally. This is my audience. This is the person that I am speaking to, through the babble. With encouragement, the 1% may grow to 2%. I have seen hardened mercenaries, when addressed as human beings and taken for a moment outside their institutional roles, slip for a moment into free speech. It didn't last long, and it didn't extend to anything important, but it was there.

Cognitive motives are, by definition, susceptible to the appeal of reason. By speaking to my enemy's better side, I can on occasion bring out that better side. The situation is not hopeless. I can set an example to others, and show them a better way. Cognitive motives can overcome evolutionary motives, turning my enemy into an ally. This is a victory, not of my making, but of my ex-enemy's own conscience. That conscience has chosen its own most effective motives, and rejected, for the moment, its own worst instincts and habits. This is progress.

The battle of motives in the human conscience goes back and forth, in one direction and then in another. Sometimes it matters which goals seem more attainable at the moment. Even if my own motives are strong, I may have to vary my tactics depending on the situation. When times are hard, I have to look out for myself. I may speak more lies and less truth. When I find the external conditions more favorable, I may be able to look further ahead. And sometimes I can go so far as to extend the full benefit of the doubt to my enemy. Somewhere within every evolutionarily motivated mind lies a spark of cognitive motivation. By means of encouragement and argument I can at long odds gain a friend and lose an enemy.

11. Conclusion

Young cognition is gaining its feet as we watch. In doing so, it is bumping up against evolution, its older and more massive sibling. They may conflict, but they are not fundamentally incompatible with each other. They are simply two distinct forms of life - very different forms of life, but both life. Both of them are computational local ordering processes. And both of them have fine futures ahead of them, if they can avoid accidentally killing each other. Evolution is blind. Therefore it is up to cognition to find a way for them to both live together in peace.

We have come in for a remarkable stroke of luck in being alive at this moment. It is a unique chance to see the cognitive process as it starts to come into its potential. It is also an awful responsibility. We are not merely witnesses at these historic events, but participants. It is through us that these two processes are acting. We, each of us, will have to make the individual life-and-death decisions that are going to determine what happens next.

As humans, we carry with us two rival motives. These motives urge us to look after the well-being of two completely different sets of information. The evolutionary motive urges us to advance our genetic information by competing with each other. That is good for the evolutionary interests of the species, but it does nothing for us as individuals. The cognitive motive, on the other hand, urges us to invent and improve useful ideas. That is good for individuals. It helps each of us to gain greater control of our own circumstances. Rather than compete with humans, we can do better by letting our ideas compete with other ideas. As it happens, we do this all the time. We do it whenever we suggest our ideas to someone else, or listen openly to their ideas. We also do this every time we drop one of our own ideas because we have discovered that someone else's idea was better.

Cognition, if it survives, will have powers far beyond anything that evolution can reach. Evolution will not travel on its own to the faraway planets in the night sky, or to the heat differentials around other stars. It will go to these places only if cognition goes there and brings evolution along. But that is a problem for the future and a long way off. The present danger is much more local and immediate. The immediate danger comes from our childlike misuse of cognitive powers for evolutionary ends. Careless human competition has already caused great damage to our natural environment. It has put our survival in question.

We are still discovering the strength of cognition and of cognitive tools. That strength is immense. Among other things, it gives us the power to destroy ourselves. We are capable of destroying ourselves accidentally

through carelessness and distraction. As an individual human being, I can't let this carelessness continue. I can't allow myself to be distracted by my own evolutionary motives. If I tolerate my evolutionary instincts and emotions up to a point, that tolerance must end when it begins to endanger our more vital cognitive interests. When it comes to the most important decisions in my life, I can no longer afford mixed motives.

My basic needs are for food, water, and shelter - and for technological progress. I can't delude myself that there is any safety whatsoever in a retreat to our older ways of doing things. There are too many of us now. The past is closed to us. The only safety lies ahead, in the swift development of new cognitive tools, and in the use of those tools for cognitive purposes, in my own circumstances, by my own hands.

I believe deeply in free will. I believe that each of us has the freedom to act as directed by our own individual conscience. We are going to need that freedom, if we seriously hope to correct the present self-destructive course that is being steered by our evolutionary motives. The situation is not hopeless. We can reasonably base our hopes on the immense power of the cognitive process

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A summary of the human dilemma has to begin with the idea of a local ordering process. A local ordering process is any cycle that builds up the amount of order in a specific place. This is a loop of cause and effect. For example, A causes B, B causes C, and then C causes A again. Each time the cycle comes around to the beginning, a little more energy has been used, and a little more order has been created. It is like an eddy that turns against the general flow of disorder.

Eddies of this kind are permitted by the rules of thermodynamics. They are permitted whenever there is available energy that can be fed into a local ordering process. The energy can be generated by a heat engine running within a heat differential (of course, running the heat engine necessarily increases overall disorder). One example of a heat engine is the photosynthesis that takes place on Earth, inside the heat differential generated by the Sun. The resulting useful energy makes it possible to maintain local order. For example, it makes it possible for photosynthetic plants to grow and repair themselves.

Among local ordering processes are some that make use of information. These are called computational processes. They retain memories of what worked in the past, and they use those memories to increase their chances of survival in the present. The memories are stored as written information, and the processes preserve and adapt this information as they go along. The task of information maintenance is a central part of computational processes. Their survival depends on it. But the preservation of information, like the

preservation of any other kind of order, isn't easy. Information maintenance takes place against a background of steadily increasing disorder in the universe as a whole. Seen from a distance, the story of computation is the story of a long struggle to maintain a small amount of materially represented information against a rising tide of entropic noise.

Memories can be written in many ways. The history of biological organisms is written in their genetic information. This genetic information is constantly being read and written by individual organisms as part of a larger process of natural selection. As a side effect of natural selection, some species have developed separate individual processes that also make use of information. In the case of humans, this is called the cognitive process. The cognitive process in humans is, in fact, capable of separate and independent existence. It is an entirely new process which takes place within an individual, rather than within a species.

The two different processes each maintain and adapt their own information. In one case this is genetic information. In the other case it is cognitive information. The two processes differ greatly in their energy efficiency. Evolution creates and destroys large numbers of individuals during a trial-and-error process of natural selection. This is inefficient. It is wasteful when compared with the process of cognitive problem solving. Cognition maintains and adapts information by means of symbolic manipulation that takes place within the mental space of the human individual. This individual process can be extended to other people by means of free communication. It is an efficient process. Cognition can accomplish more with less energy. The inherent efficiency of this process is a good reason for us to begin relying more on cognition in the future, and to stop relying on human evolution for our personal motivation.

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All life is a struggle for temporary order in an unfriendly environment. There is a universal tendency towards disorder. This tendency contains me and all of my purposes, as a small countercurrent within the larger flow. Compared with these larger forces, I am small in both time and space. My knowledge and circumstances are my existence. They are my meaning. The nature of this kind of meaning is that it lasts for a time, and is then submerged again in the unconscious turmoil of the universe. But it is real nevertheless, and it remains real. The unremembered past is just as real as the part I am playing in the world today.

I can see no futility in a finite duration in time, any more than there is futility in a finite extent in space. Nor am I afraid or embarrassed to carry on with my purpose of preserving and adapting my own local order. I simply prefer to do so in the most efficient manner possible. For that reason, I no

longer wish to be a pawn in a game played by evolution. I no longer wish to be pitted against other humans for the sake of a few snips of DNA.

I can take care of the local disorder in my environment, provided that I have access to a share of useful energy, and adequate cognitive tools. I can tend my own garden. As long as I am able to put my own ideas to work in my own circumstances, I am at peace with my fellow humans. My neighbors and I, as long as we each get to make our own choices, are allies rather than rivals. To the extent that we share a similar way of life, we can exchange useful ideas. We can look out for each other. We can help each other out without feeling the need to receive anything in return.

At any rate, I would like to make the most out of the cognitive process. This is what I think is right and good. It what my conscience calls for, and it is the standard by which I judge my actions. My best and happiest actions seem to result from sharing an extended cognitive process with other people. In order to reach this level of free communication, I find that I have to avoid exerting any control over people. I also have to avoid any attempts by other people to exert control over me. Real freedom begins with my own individual process and with the control of my own circumstances.