6.1 Summary of the Arguments

"For I am well aware that scarcely a single point is discussed in this volume on which facts cannot be adduced, often apparently leading to conclusions directly opposite to those at which I have arrived." **Darwin**

"At any one moment one is presented with a wide variety of innovative ideas that might be followed up: not only astrology and such, but many ideas much closer to the main stream of science, and others that are squarely within the scope of modern scientific research. It does no good to say that *all* these ideas must be thoroughly tested; there is simply no time... Even if I dropped everything else in my life, I could not begin to give all of these ideas a fair hearing." **Steven Weinberg**

"Yet science seems to have driven us to accept that we are all merely small parts of a world governed in full detail … by very precise mathematical laws. Our brains themselves, which seem to control all our actions, are also to be ruled by these same precise laws. The picture has emerged that all this precise physical activity is, in effect, nothing more than the acting out of some vast (perhaps probabilistic) computation - and, hence our brains and our minds are to be understood solely in terms of such computations." **Roger Penrose**

"This kind of science goes by the name of Darwinian history, and it has been greeted with predictable ridicule by real historians. For them, wealth concentration requires no further explanation. For Darwinians, it must once have been (or must still be) the means to a reproductive end: no other currency counts in natural selection." **Matt Ridley**

"The price of these failures has been a loss of moral consensus, a greater sense of helplessness about the human condition. ... The intellectual solution to of the first dilemma can be achieved by a deeper and more courageous examination of human nature that combines the findings of biology with those of the social sciences." **E O Wilson**

"Or does Darwin's idea turn out to be, in the end, just what we need in our attempt to preserve and explain the values we cherish? I have completed my case for the defense: the Beast is, in fact, a friend of Beauty, and indeed quite beautiful in its own right. You be the judge." **Daniel Dennett**

"The world was all before them. Where to choose/ Their place of rest, and providence their guide/ They hand in hand with wandering steps and slow/ Through Eden took their solitary way." **Milton**

6.1.1 Things We Already Know

This book began from pointing out that many problems of the mind, brain, human evolution or behavior, have not so far been solved. Writers of books concerning this begin boldly enough, but their last chapter often has no real conclusion, or a weak one. Readers are entreated to believe that Darwinian forces shape human behavior merely because 'how else do we explain it?' Daniel Dennett requests that "you be the judge". Steven Pinker worries that there might be problems that a mind formed by evolution cannot solve. Some of this is just academic caution, but even so, how should this book conclude?

Well, some things are already known. Centuries ago Descartes noted that whether one is awake or asleep, 2 + 3 = 5, if that is how one defined the terms. Descartes' statement is imprecise. If the term a = a has a value 1 (true), and a ≠ a the value 0 (false), any problem that could be specified in 1's and 0's could eventually be resolved in those terms (as true or false). This would be so whether we were awake or asleep, whether we evolved or were created by God, or whether we were humans or aliens. A biological organ like the brain could not solve in a lifetime a problem it would take a trillion super-computers to resolve. However, a mind that could build a computer (human minds can) eventually can resolve all problems of this type. Evolution does not come into it.

However, evolution does come into, we might say, the facts of our existence. As far as 1's or 0's as logic, humans might all be figments of the Red King's dreams. Yet, as facts that we can measure, humans are biological organisms, formed by natural processes over billions of years of life on Earth. Now the fact that we evolved to be humans, and not fish, aliens, or angels, means that we cannot know by sentience certain things. We cannot know what it is like to be a fish, or another person, or move about in four dimensions. The fact of our evolution also stamps on our being biological motivators or regulators, such as hungers, drives, moods and emotions. So, it helps us understand our options to know why certain drives and hungers evolved the way that they did.

Even so, when analyzing human motive, one primary fact of how any organism evolved is often overlooked. Whatever an organism feels as mood or sentience, the feelings evolved at a cost, to provide a benefit to survival. If a complex sentience such as moral inhibition evolved there was more cost to evolving a complex sentience than a simple one that will merely avoid pain or gratify an urge. The corollary of this is that any sentience is a way of navigating opportunities. If we captured an aircraft with an incredibly specialized and costly navigation system, we would be curious as to what exactly this aircraft's mission was. So, if we discover an organism (ourselves) with an incredibly complex and high cost to evolve sentience, we should be curious as to exactly which evolutionary challenges this creature faced.

The controversy of complexity of sentience for cost to evolve applies especially to moral theory. Again, it is futile complaining that we might never know why humans possess a morally enabling sentience. This has been known for thousands of years! Humans have moral sentience so that they can judge morally good from wicked acts. However, knowing the reason that humans have these feelings does not make it easier to explain. Even the religious explanation of moral feelings was difficult to derive the first time, using metaphors of gods, creation, and an afterlife. The explanation in scientific terms will be difficult for several reasons. One is that there is no comparable species confronting a range of choices that humans face, for scientists to test the theories against. The other problem is the complex interaction between biology, learning, and culture, such that creatures born in human form are not compelled by any property of DNA to adopt any specific moral behavior. Still, the problem should not be insoluble. These chapters have suggested a theory of how not only morals, but feelings such as religious awe evolved. People can dispute the ideas or provide alternative explanations. The issue is not a particular explanation, but the assertion that answers can be found, ones based on evolution and real human behavior.

The conclusion of this book then, need not be that its theories are correct, in that all ideas need criticism and development. The conclusion instead is that we live in an age when much is known, so there should be no obstacle of inherent facts or logic against formulating a hypothesis of how human behavior evolved.

Let us recapitulate how the problem is approached in these pages.

6.1.2 Evolution and Behavior

The central conundrum leading to a theory concerning options is that nobody has explained how modern, complex, psychologically motivated human behavior arose by evolution. Evolutionists themselves first posed the issue. If evolution could explain behavior in animals, it only seemed that the lessons could apply to humans. And evolution did enjoy amazing success explaining behavior in animals, starting in 1859 with Darwin's own intriguing chapter on instinct.

Where evolution theory has had less success is for issues apparently not connected with behavior, such as the evolution of sex, or the stepped pattern of change. Yet, if other difficulties in evolution theory would not hold back the explanation of behavior in animals, it should not hold back its explanation in humans. Or, there should not be anything 'special' to human evolution different from animals.

These chapters have tried to explain that there were many unique aspects to human evolution. There have been no large animal species that evolved as recently or as rapidly as humans did, or none that radiated to every continent while remaining a single species, or adapted features

such as language and a reasoning brain. Or while there is not much DNA difference between a chimp and human brain, the expressed effects of the differences are radical. Expanding the largely homogeneous circuits of the higher cortex does not take much change of neural DNA, which is why human brains could evolve so rapidly. Yet the large mass of free synaptic connections available, within the language and cultural context in which the human brain nurtures, results in not just a large-brained chimp, but a creature that can reason. The human brain is also bigger than required just for survival, which has never been explained. So, an ordinary transformation of brain size, speech organs, and group behavior, can result in a new creature in a phylogenic sense. Or despite genetic distances being small, human evolution at an advanced, saturated stage of life was still a radical change. This is why for human behavior one needs to consider all evolution, how it works, and not just successes explaining the pattern of behavior in lower animals.

The other point is that the biggest difficulty for evolutionary theory is explaining moral behavior, but this is a problem not just for evolution. If all that evolution theory contributed was that the motive of behavior is selfishness, this was suspected all along, but this still does not explain morality. If anything, it was hoped that evolution, being a science, could explain moral behavior where philosophical explanation had failed. But in 150 years evolution has not explained why human have morals, any more than philosophy could in 2,500 years.

Here it is argued that the 'gap' between a not quite perfected theory of evolution, and overcoming ancient conundrums such as the origins of morality, is too great to overcome in a single leap of abstraction. So, one uses an intermediate hypothesis, which works for both human evolution and modern human behavior. This is the *Theory of Options*. It argues that human behavior can be understood by considering that each individual strives to maximize his or her options in life. This hypothesis can explain a great deal of modern human behavior. One can even derive a method of counseling or psychology from the concept of options, a significant step for a theory based on evolution.

The next challenge is to explain how humans evolved. This is done by first supposing that hominids evolved along a fitness pathway that maximized the options of behavior, for the least cost to adapt. The fitness pathway requires some changes to the standard theory to explain it, but that does not invalidate the argument. All populations evolve along some type of pathway. And many facets of human evolution such as the large brain, skin, sensitive hands, posture, diet, or body covering, are difficult to explain via a 'walking chimp' type pathway. However, for any human attribute, one can inquire; "how would evolving this way maximize the options of behavior for a minimal cost to adapt?" Examining human evolution from this perspective provides many insights.

Still, the challenge is not that maximizing options can explain many human attributes, but explaining why this fitness pathway would arise at all. In one sense the mechanisms by which humans evolve should be no different to those of a mouse, an oak tree, or a lizard. But one should be careful to distinguish the mechanism from the pathway. The mechanism in evolution is maximization of the spread of DNA. The pathway is the conditions, both environmental and *phylogenic* (evolution of the species), under which favored individuals maximize reproductive fitness. If human evolution could have maximized the spread of favored DNA via an easier pathway or simpler behaviors, it would have.

Just that pathways in which simple behaviors, or simple adaptations, could be fit were already occupied. Humans evolved when advanced primate species could already adapt to their environment at the maximum rate of change that any large animal phylogeny could sustain. So, the next stage of evolution would be to move adaptation outside of biology into cultural and social forms. Any organism only has to be fitter than its rival, and change comes at a cost. Selection tends to drive organisms into specialization, because this is the easiest way to gain slight fitness for the least cost of change. However, with all the specialized niches occupied, it became fitter for hominids to specialize adaptation outside of biology, in culture and learning. Once it was easier to specialize outside of biology, within biology it became fitter to generalize for versatility. And versatile brains are motivated psychologically because as fitness costs, psychology is easier to modify than biology. Humans do not act out each biological drive impetuously, but they like to feel that they have choices.

So, the mechanism by which any creature modifies is the selective struggle and the passing on of DNA. But this mechanism, crucial at one level of explanation, does not explain all the complexities of the problem at another level. Humans evolved *as though* individuals were selected for maximizing the options of behavior, for the least cost to adapt. At one level critics can test this hypothesis, to see if it can help explain human evolution. At another level, researchers can test the idea as a separate model of psychology, to see if it can also explain how modern humans are truly motivated to behave.

6.1.3 The Use of Equations

Any theory about how evolution explains human behavior tends to end on a humanistic note. The topic begins from facts about selection or DNA, but ends with philosophical or literary arguments about ethics and human purpose. This book though, has emphasized the important role of equations, despite that no equations actually model human behavior, even in theories such as evolutionary psychology. It is even wondered why get into this highly specialized topic, which only brings further disputes over notation, qualifications, and methods of proof.

The issue, and it needs airing, is that many theorists draw freely from an authority inherent to equations, even when advocates of a view might not totally understand the equations either. The literature of mathematical biology itself tends to be cautious, but this is not how those outside the field often draw inferences. Equations show, and it always surprises, how amazingly fast a slight gain in fitness for a favored allele can spread. So the issue is not the equations, but whether rapid spread of alleles is the correct model for explaining human behavior.

There are two concerns. Firstly, even assuming that a behavior such as for cheating or aggression is expressed by a single gene or allele, it is hard to estimate the fitness value that such attributes would confer among humans, or how, among the global population such genes would spread, fix, or affect selection.[82] The inference then is that such genes might not affect selection today, but they spread when the population was small and evolving. Still, humans have only 1-2% of genes different from chimps, and many human attributes had to evolve, not just behavior. However, apart from genes, there is a 0-5% allele variety among humans that can affect temperament, and would alter by standard models among a small, evolving population. The question then is to which extent did variation stamp a permanent effect on the human temperament?

Again, individual humans have different temperaments. The problem with uncovering a general temperament, such as that humans are innately aggressive, is that it is only the reflex neurology, which expresses one behavior per allele per locus, that can be modeled in an equation. Yet in human behavior, learning dominates reflex by about 8:1, against 3:1 in chimps, or less than 1 in lower animals (such as birds) where these types of equations work best. Where reflexive behaviors can be isolated this way in chimps they exist in humans. Except very few genes for reflex altered during human emergence, in comparison to many other changes. It is the genes that enacted the gross transformations, such as increase in brain size, that are critical to human behavior.

This is the second concern. Genes that caused gross transformations of life strongly affect how humans behave, but these genes are mostly 100% distributed in modern populations.[83] However, the same equations for how alleles spread, say, from a 1% to 99% distributed, do not model how genes already 100% distributed spread further. So, reducing human behavior to how genes spread in equations concerns the less significant genes, or the attributes, of the entire human transformation.

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[82] Genes only work in an equation if they influence selection. Genes with lethal mutations affect selection, and genes that mutate as a statistical process affect the human gene mix. Or if AIDS devastated the population, a gene resisting it could spread by a standard model.

[83] It is recently suggested that BF-1 and BF-2 genes control brain size, but humans share these genes with fruit flies. Whatever the case, many gross attributes will be controlled by ancient, widely distributed genes

Even so, it is perplexing that within a small population (from 0 to 100% spread of genes), selection proved so adept at the mathematics that biologists now use. Yet selection could not solve the "math" of spread of genes beyond 100% distributed, because for humans to solve it requires an equation with $\sqrt{-1}$. Even more perplexing, from billions of years ago, selection physically did solve this problem. The majority of genes in any genome *radiate* outside of any small population under study. This could only be explained if genes already 100% spread over many populations, used new adaptations to spread further by conserving their own sequence, while forcing other genes to bear the cost of change. This way, human evolution was very successful. Some 98% of genes in the human genome found new ways to spread with their sequence unaltered, for only a 1-2% change of other DNA. Again though, while Chapter 2.4 suggests it, there are no proven equations of how this works.

There is a similar debate over whether a property such as choice can be reduced to equations. Suppose that from a given set of inputs one can get a computer to produce certain outputs. If another computer would reproduce identical outputs from identical inputs, one could not claim that the first computer made choices. Some people apply this argument if an individual acts with moral reprehension. They would claim that one need only prove that another individual under identical circumstances would act the same, to show that no choice was involved. Or one might presume there was choice, whereas if the person were following moves constrained by a Laplacian trajectory, there was no choice.

While this argument sounds recondite, present knowledge of how brains make choices is inadequate. Brains that abstract are analytical, but these depend on a program to run, and programs themselves must evolve. For analytical brains to work there must be a transformation of the type;

$$(E, d, x) \rightarrow (E, d, p, x),$$

(Where p is the electronic program E is energy, d is the design, x is the input-output. See page 132.) Yet, there is no equation of how this works, although neurology explains learning. Moreover, mathematics itself is a choice of axioms, which has been shown by theorem's such as Goedel's. (Mathematics depends on a program to isolate its inherent logic from the rest of the universe.) Brains capable of abstraction are disconnected from the outside universe too, by the synaptic mass acting as an information insulator. However, because this effect cannot be modeled by existing equations, it does not prove that choice cannot exist as a quality other than those describable within existing concepts.

The approach used here then, is to take the crucial transformation for humans, as evolution of the ability to abstract. Language, culture, and a

large brain allow abstraction, but abstraction itself maximizes the options of thinking. The highest form of abstraction is organizing its processes in formal methodologies such as equations or logic. That is why, though it is a descriptive theory, this book has included certain equations, not just of evolution, but any that have led to deeper understanding. However, while existing equations can explain facets of evolution, the evolution of abstraction was itself another major transformation of life, which existing equations do not model that well.

Without equations available to explain it, the argument is forced, as in every other theory, to rely on observational descriptions of how the most complex properties of the universe; choice, morality, abstraction and options arose. So what can a theory about maximizing options say, that other explanations may have overlooked?

6.1.4 Options and the Universe

The theory in this book emphasizes the role of the individual, not in a selfish sense, but as a locus of accountability and change. Knowledge, even of how people behave, ends in choice. This precept is not new, but it is novel in a theory using evolution. Science studies nature, but without intelligent creatures in it nature does not exhibit choice in a moral sense. In the primal universe there is no choice, just as there are no naturally occurring elements with more than 92 protons, or no machines and artifacts. Such entities come into existence when creatures with culture, intelligence, and language come into existence. Choice in a moral sense only comes into existence with intelligent beings. Moral choice is an emergent property. It exists only after other properties exist first in certain relationships, but does not exist when they do not.

If anything, the very concept of evolution is that properties arise by progression. But the further the progression, often the more complex the properties become, so the harder it becomes to explain them by simple models. This is especially for explaining evolution of the very creatures, ourselves, carrying out the analysis. Daniel Dennett say, claims that all living entities, which includes humans, are "nothing but" algorithms. All he means is that life evolved by a series of algorithmic-like steps. But he infers that the algorithm itself is a physical force, like gravity, that exists independently of consciousness. All natural processes in the universe exist independently of consciousness, but analysis of those processes into symbolic rules is another emergent property, which comes into existence with intelligent beings. It is an historic process. Choice, intelligence, will, and options come into existence first. Tools of those attributes refined, such as formalized methodologies (like algorithms) come into existence as an aid to extending the range of understanding.

Perfect knowledge exists when formal logical manipulation such as mathematics becomes coincident with all the facts of our existence. Yet,

such perfect knowledge would close off further choices, because it is always within the difference between facts and logic where intuition and judgment lie. If humans do not have the present understanding to close the gap, it must be sought in further knowledge. The power of abstraction comes from its generality, and the power of mathematics comes from the logical connection of its rules, plus its physical *disconnection* from the remainder of the universe. Rigorous abstraction is tautology, so outside of its physical significance, any equation can prove no more as logic than "a = a" to a being who is infinitely wise.[84] All abstraction must be verified against facts that humans can measure. This has been proven in philosophy. These chapters have suggested that the human brain evolved to work the way it does, on broadly the same basis.

The large human brain, which has never been explained in orthodox theory, did not evolve to the size it did because of the stupid peacock's tail, or so that humans could gossip about sex! Humans evolved along a pathway that maximized the options of behavior, and that pathway stayed open until a brain evolved that could fully abstract. The large brain was a critical mass of free synaptic connections that could act as an information insulator, to achieve the abstraction effect.

Human reflex, which was selected for fitness, did not evolve abstract thoughts in the higher cortex, which has a homogeneous neural circuit structure anyway.[85] Instead, reflex in humans selected for the refinement of the senses, aural, visual and tactile communication, leading to the gathering of facts for evaluating situations. The brain evolved reflex feelings for moral empathy, judgment, and emotions. From a range of information, transposed by tautology into situations about which humans can abstract, tempered by judgement and intuition, the choice of a course of action to maximize options could be made.

The purpose of knowledge, including about evolution or behavior, is to delineate for humans real choices in the most unambiguous way. Each individual, even one in deep personal crisis, has a set of options from a given point forward. This idea can be developed as a method of therapy, without negating facts about psychology already known. Every day at the home, in business, or politics, we could not understand human motives as a striving to maximize the spread of each individual's DNA. Striving to maximize options though, makes sense. Humans have options, and the deepest satisfactions will come from feeling in control of a situation, and that the choices in life are real and viable.

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[84] Notational logic can prove say, that the series $E = mc^2 + mv^2/2 + {}^3/_8\, mv^4c^{-2} + ...$ will reduce to $E = mc^2$ for certain conditions. However, the physical significance of E, m, c and v can only be verified not via logic, but experience.

[85] The neural structure of the upper brain is highly 'proximity mapped' to specific functions, but it is not genetically mapped in the same way that the reflex neurology is. See comments at the end of Chapter 3.3, and other references.

Moreover, humans are at a point where they must maximize all their available options, if the species, or the ecosystem of the planet, is to survive. The argument begins from a premise that humans are a product of evolution, and that the biological disposition of modern humans was selected from fit ancestors. It allows too that genes strongly motivate behavior. (Or, even if motivation is more complex than genes allow, the explanation is encoded in DNA.) Yet it is also unimpeachable that most human behavior is not motivated by genes directly. It is an absolute truth too, that symbolically organized thinking, which humans use everyday, is not encoded in DNA. If it appears contradictory then, to say that human motivation arises from genes but is not directly a product of them, it is only lack of deeper explanation that makes this seem so. It is neither the facts of how humans evolved nor the facts of how they behave that are incongruous. It is how people interpret those facts.

Even then, any evolutionary explanation of abstraction, choice, or free will, still comes with a caveat. Humans evolved along a pathway that maximized the options of behavior, but any change is at a minimum cost to adapt. Because change only advances along any pathway as far as the minimum cost is met, humans never achieved complete liberation from their primal past. The final conundrum of the human condition is that we are never totally free from the forces that shaped us, but have only struck a perilous balance on the edge of that freedom. We need today a science of human behavior, because human behavior for the next few generations will determine if our species, or the planet, is to survive at all. However, we must embark on our study from concepts that balance both the perils and opportunities of our evolutionary origins. This means using all of science to reveal to humanity its real choices in the coming age. The knowledge is to confront humanity with the moral courage it needs to make those choices, in the best interests of the species.

A theory about humans maximizing options, or a variation of it, arises when science uses evolution to explain human behavior. Evolution explains how life and thought arise from mechanical processes. Yet we study these processes precisely so that we will not be trapped by them, but can modify and change. Mechanical theories of behavior do not tell us how we will behave for certain, but only how we will behave if we do not use wisely the knowledge that such theories reveal.

Knowledge increases options. Humans should seek knowledge about themselves not just in a theory of what humans are, but an argument of how humans, from all their options, choose themselves to be.