Epigenetic Evolution:

A Theory of Cultural Evolution Through Directed Creativity

by Britt W. Hanson

EPIGENETIC EVOLUTION:
A Theory of Cultural Evolution through Directed Creativity

~

Britt W. Hanson

PREFACE

This is the second in a series of three books. However, each book can be read on its own. As a result, some material overlaps.

1. *Dynastic Theory: The Evolution of Altruism in Animal Societies (Replacing Kin Selection)*

2. *Epigenetic Evolution: A Theory of Cultural Evolution through Directed Creativity*

3. *Genetic Experimentation: The Adaptive Function of Sex and Conjugation*

—Britt Hanson

TABLE OF CONTENTS

INTRODUCTION

As a species, who are we? Why are we like that? What can we become? And do we have a choice?

This book builds a framework for addressing these questions. In doing so, it aims to solve a major scientific puzzle: how humans evolve, and why this process differs from Darwinian natural selection that accounts for the evolution of all other species, including our hominid ancestors.

From the perspective of our everyday lives the world often appears messy, rambling along in no discernible direction. Even the course of human history can seem like a sequence of folly compounded by folly. Civilizations rise, then fracture and fall, often to the benefit of no one, including those who advocate the fracture or cause the collapse.

Nevertheless, when we step back to gain perspective we see that our world is not ordered by random events. Human lives are usually fairly well-organized; there is structure to the societies in which we abide. *E pluribus unum.*

The same may be said of human history. Conflicts may pervade, but chaos does not. Patterns emerge. Bronze succeeds stone, iron succeeds bronze. From small kin-based tribal societies of hunter-gatherers come large agricultural civilizations with bonds far beyond kinship. Money is introduced, revolutionizing economic systems previously dependent on barter. Systems of government are transformed, sometimes slowly, sometimes by revolution. Systems of writing are devised; education is formalized to spread the word. A myriad of local deities presiding over local events of specific people are fused into universal religions, governing all events and available to all people. These and many other patterns have been repeated, often independently, in many parts of the world.

The specific historical sequences are in each case unique. Nevertheless, through lurches, lapses, and more lurches, large civilizations have emerged, spread and displaced, until a relatively few cultural forms predominate.

These are the broadest patterns of the history of the modern human species over the last several thousands of years. They have been accompanied by another: human population has grown immensely. From perhaps a few million human inhabitants not too many thousands of years ago, the Earth now holds around seven billion.

Population growth, in turn, corresponds with another stark pattern: a remarkable expansion in resources extracted, produced and consumed. Anthropologist Marvin Harris

summarized the direction of human evolution: "Anthropologists have long recognized that in broadest perspective cultural evolution has had three main characteristics: escalating energy budgets, increased productivity, and accelerating population growth." (Harris 1988, p. 395).

Why?

That this has been the natural course of human events can be taken for granted. But from the Garden of Eden, to Plato's Republic, to Rousseau, Buddha, Marx and More's Utopia, people have imagined a vast array of ways in which the human world might be ordered and the direction it might take. Of all the imaginable possibilities, why has the human story unfolded as it has?

And, in particular, why has the relentless growth in people, productivity and resources been the evolutionary trajectory of our species? Projecting forward to the future: is it inevitable that this trajectory will continue? From a population of 2.5 billion when I was born, to six billion when I began writing this book, to nearly seven billion as I write this: if continuing this trajectory threatened the extinction of our species, would it be possible for humans to act in concert to alter that trajectory?

These questions have been pondered by many others, so I expected that the social sciences would have developed some theoretical framework for addressing them. I was therefore surprised to find the literature devoid of any such framework. Philosophy, history, psychology, sociology, anthropology and sociobiology—these disciplines are rich in their understanding of the nuances of human conduct, approached from a multitude of angles. None, however, presents a coherent theory as to why relentless growth has been the human trajectory.

But these disciplines have put pieces of the puzzle in place. We know that population growth and resource exploitation have accompanied the shift from hunters and gatherers to agricultural, industrial and post-industrial civilizations. We know that this shift has been enabled by the remarkable evolution of human culture, which Tylor defined as "that complex whole which includes knowledge, belief, art, morals, law, custom, and any other capabilities and habits acquired by man as a member of society." (Tylor 1871). We know that the remarkable human brain, the pride of our species, has been responsible for devising the technologies, systems of government, and all the other cultural attributes involved in this shift. We know that the human capacities for language—speech and hearing, along with writing, and other media that have been invented by human minds—enable the swift spread of these cultural attributes. We store much of our cultural knowledge and beliefs in libraries, so that they are widely available. We teach them in schools, so that our children learn them.

We know that the big brain, speech and hearing, and other capacities for culture evolved biologically through natural selection in our ancestors. These capacities are

written into our DNA.

If we observed another species evolve as dramatically as modern humans have over past many thousands of years, we would presume that the change was genetic—the natural selection of genetic variation must be involved. But this has not played a significant role in the evolution from hunters and gatherers to the modern culture. We know this because, over time, we see little or no change in human biology, including the capacities for culture. The evolution of irrigation agriculture did not require genes for irrigation agriculture. When modern hunters and gatherers emigrate to an industrial culture, they can adapt, and vice-versa.

The cause of the evolution from stone to bronze to iron and beyond—and thus the trajectory towards more, more and more—must therefore rest in the capacities for culture, as they evolved in our pre-cultural ancestors. Hence, if we can identify what has caused our capacities for culture to be put towards these ends, and understand the process by which culture evolves, we might also be able to ascertain whether we are able to control our future evolutionary trajectory.

That is the object of this book: to elaborate a theory of human cultural evolution. This theory builds on certain key concepts of anthropology and sociobiology, rejects others, and fills in gaps.

This is an evolutionary approach. Such an approach offers a broad perspective. It helps us to step back from daily life, from our own observations of humans during our own brief lives, and view the human species in the larger scheme of things. For the questions I was asking, it wasn't necessary to determine why one group of people was nomadic while a neighboring group was agrarian, or why Rome rose and fell. Instead, it was necessary to identify the broad patterns of human evolution and tease these apart from the interesting vagaries of human history.

Moreover, the human evolutionary direction corresponds with the evolution of life itself: from some simple beginning, towards more, more and more. That seemed unlikely to be a coincidence. Indeed, if we judge our own species by the same standard we set for others, we would regard it as a remarkable evolutionary success—thus far.

An evolutionary approach is made possible by Darwin. Our pre-cultural ancestors evolved through Darwinian natural selection. Since our biology is more or less the same as theirs, there should be some ongoing connection to our Darwinian roots. In fact, Darwin's theory explains some very basic aspects of human behavior: why we eat, drink, sleep, avoid death, enjoy sex and love our children, as well as the competitive spirit that animates much of human interaction. These can be taken for granted, but they should not be. Until Darwin, philosophers and scientists either had to defer to theology or just start in the middle with the observation that humans in fact do these things. Darwin's theory explains *why* we do them, and does so with ease.

There is a connection between Darwin's theory and modern humans, but it is not straightforward—as evidenced by the absence of significant biological change, while culture has evolved enormously. "[N]o evidence exists that the human genome is changing in any overall new direction." (Wilson 1998, p. 271). And although genetic variation exists among individual humans, between societies these differences "wash out." (Id., p. 143).

Thus, a theory of cultural evolution must carefully delineate the relationship among culture, human biology and natural selection. Criteria for such a theory include:

- Explain the general direction of cultural evolution, the long arc.
- Account for diversity among cultures.
- Describe the process by which culture evolves.
- Accomplish all of this while holding human biology constant.
- Explain how natural selection of genetic variation could give rise to the biological capacities for culture, yet does not appear to be significantly implicated in cultural evolution for the past many thousands of years.

I will add one additional criterion. A previous book, Dynastic Theory: The Evolution of Altruism in Animal Societies, set forth a theory of the biological evolution of group adaptations in all other species—including our pre-cultural, hominid ancestors. A key component of this theory is that animal societies are structured through natal philopatry—what I call dynastic structure. Members of an animal society are related by descent to a common founder of the society. Human societies are not structured dynastically. Although families are central to social structures in all societies, group bonds in large modern societies extend far beyond kinship. A theory of cultural evolution must explain why human societies are an exception to the rule in other animal societies.

The theory is called epigenetic evolution: a theory of cultural evolution through directed creativity. In brief, the theory holds that human minds create, select and build the "library" of culture, which exists above the level of individual humans. Because culture is communicated from minds to minds through language, culture evolves separate from the pathway of biological reproduction and inheritance—and, thus, is decoupled from natural selection. But as minds create, select and build culture, they are biased in a Darwinian direction. This is because, as the human brain evolved through natural selection in our pre-cultural ancestors, the psychology that motivates the brain to action co-evolved with it.

For this theory to work, however, it is necessary to jettison certain core axioms of sociobiology. These include: i) all individual organisms are entirely biologically selfish; ii) group adaptations, including altruism, cannot evolve; iii) natural selection hones individual organisms to maximize reproduction. The effort of jettisoning and replacing

these axioms was laid out in Dynastic Theory and, in this book, dynastic theory will be linked to the psychology of modern humans.

It is also necessary to replace the neo-Darwinian model of an organism as a string of genes that program the organism's phenotype. It is necessary to do so because this model misleadingly implies that biology fixes an individual's phenotype, which is a barrier to understanding how humans have evolved diverse cultures while our biology has remained more or less constant. In fact, an organism's DNA contains a wide, flexible repertoire of adaptive possibilities. This adaptive flexibility is embodied in the epigenetic model of an organism, which began to be developed in Dynastic Theory, and will be elaborated here.

Dynastic theory led to a revised theory of non-human nature, applicable to all other species, including our pre-cultural ancestors. The present book will show how, with the advent of cultural evolution, the nature of humans has shifted. This will result in a theory—an evolutionary theory—of human nature.

I will then turn to the question of whether our species can choose to control our evolutionary trajectory. This invokes the knotty issue of free will. And this means addressing the scientific premise of determinism, which has been viewed as preventing free will—and as preventing directed creativity.

The conclusion will then return to the question that motivated these theories: if the continued evolutionary trajectory of more, more and more threatens extinction, would it be possible for humans to act in concert to choose an alternate course—especially if this required sustained sacrifice in reproductive and economic potential?

The theories set forth in this book will not provide a crystal ball with which to answer this question. The more modest aims are to solve significant scientific puzzles and, in doing so, set forth a framework for understanding how and why our species has evolved as it has. The end hope is that this framework will then advance the understanding of what we are capable of becoming.

SECTION ONE
~
MINDS MOVE CULTURE:
THE THEORY OF DIRECTED CREATIVITY

CHAPTER ONE
~
DISENTANGLING CULTURAL EVOLUTION FROM NATURAL SELECTION

In the literature on cultural theory, discussions of the relationship between natural selection and cultural evolution are often muddled. Sociobiology has hovered around a not quite fully formed idea that culture must somehow co-evolve with natural selection, or is analogous to natural selection, or perhaps the two processes are identical. E.O. Wilson: "[g]ene-culture coevolution is a special extension of the more general process of evolution by natural selection." (Wilson 1998, p. 127). In the final chapter of Sociobiology, Wilson states: "Returning finally to the matter of cultural evolution, we can heuristically conjecture that the traits proven to be most labile are also the ones most likely to differ from one human society to another based on genetic differences." (Wilson 1980, p. 275). And also: "There is no reason to believe that during this final sprint [of cultural evolution over the last several thousand years] there has been a cessation in the evolution of either mental capacity or the predilection toward special social behaviors." (Id., p. 296).

Some archaeologists have argued that culture is naturally selected. (*See eg.*, O'Brien and Holland 1995, p. 181; Rindos 1986; Rindos 1989; Teltser 1995 (and other articles in the same book)). Anthropologists have used the term "cultural selection", but without distinguishing it from natural selection. (*See, eg.*, Harris 1989, pp. 126-27; Fog 1999).

But how can the idea that natural selection (or something like it) causes culture to evolve be squared with the widely accepted observation that human biology has remained more or less the same for many thousands of years, while culture has evolved immensely? Natural selection has a very specific meaning, which is the selection of *genetic* variation.

Darwin's theory is simple, logical and persuasive. The power of organisms to reproduce exceeds resources. Therefore, more organisms are reproduced than can survive. Each individual organism is genetically unique, giving rise to slight differences in traits. Those organisms that survive and reproduce tend to possess more adaptive traits than those that perish. The genetic variations that underlie the favorable traits thus spread. And so, through survival and reproduction of the fittest individuals, species evolve in small, adaptive increments. Over eons, evolution occurs on a grand scale.

Thus, if Darwinian natural selection is a cause of cultural evolution, we would see cultural diversity connected to genetic differences between societies. We would see

cultural evolution over time accompanied by the biological evolution of humans. This is exactly what we do *not* see.

In ascertaining whether there is a connection between natural selection and cultural evolution, eventually I found it useful to ask three separate questions:

> i) Does natural selection account for the evolution of the biological capacities for culture, such as the human brain, speech and hearing?
>
> ii) Does natural selection continue to operate on the human species?
>
> iii) Is the evolution of culture in some way dependent on, or tied to, ongoing natural selection?

The answers to these questions do not need to be the same. In fact, they are not, as mentioned in the Introduction and as further outlined in this chapter. Natural selection of genetic variation continues to occur in humans, but cultural evolution is a parallel and independent process.

Do Humans Continue to Evolve through Natural Selection?

Physical anthropologists have pieced together some of the steps of the biological evolution of our hominid ancestors. These include incremental increase in height, more upright posture, bi-pedal locomotion, manipulative hands with opposable thumbs, and the rise of the larger brain. On scientific grounds, no one doubts that these features evolved through natural selection of genetic variation. The modern human body is underwritten by DNA.

Have humans in the "modern" era—say, over the last ten to forty thousand years—continued to evolve through natural selection? How could it cease? In *The Territorial Imperative*, Robert Ardrey put the question as follows:

> [T]here is the matter of how we came to be. Every living creature, man or mosquito, has an unbroken ancestry going back at least two billion years to the first chemical stirrings of life. No responsible authority would dare to maintain that longer ago than at the most ten thousand years, when man first secured control of his food supply through domestication of grains and animals, our human ancestors were exempt from the natural processes that I have described. Are we seriously to believe that in ten thousand years, without divine intervention, we have repealed those natural laws that prevailed for the previous ten billion, nine hundred and ninety-nine million, nine hundred and ninety thousand years, and that brought us into being?

(Ardrey 1966, p. 35).

Ardrey, of course, is not really asking a question. He is making an argument. His argument is that it is not credible to believe that the process of natural selection that brought modern humans into existence could have ceased.

Moreover, the elements necessary for natural selection to operate continue to be present in humans. Individual humans are genetically unique. If some of these genetic differences influence who survives and reproduces, then humans should continue to evolve through natural selection.

Some biological differences between racial and ethnic groups suggest that natural selection has occurred. Skin and hair color, the shape of eyes, and to some extent body build, do vary geographically. Anthropologists point out that traits such as lactose tolerance correlate with the dependence of ancestors on dairy products for subsistence. (Poirier, et. al. 1994, pp. 81-83). Likewise, resistance to particular diseases such as malaria varies according to geography. (Poirier et. al. 1994, pp. 582-86). These differences necessarily imply genetic variation. If this variation is adaptive—as is usually argued or assumed—it implies that Darwinian natural selection has occurred in our species at some time in the past, perhaps even since the advent of culture.

Periodically, plagues have depleted human populations. The "Black Death" scourged 14th century Europe, killing an estimated 30% to 60% of its population. Smallpox carried by Europeans and Africans decimated the indigenous population of the Americas. If those who survived did so because they were biologically more resistant to these diseases, then the survivors would pass their disease-resistant genetic variations down to future generations.

Even attributes that we normally associate with culture may affect genetic selection. Researchers have presented evidence that propensities towards smoking, alcoholism, poor diet, and other potentially harmful habits that affect survival rates may be influenced by genetic propensities. Some people are more or less likely to succumb to heart attacks, strokes, and other ailments. If these affect the ability to reproduce (or to successfully raise children) in the slightest degree, and if they are due to bio-genetic propensities, then natural selection may be operating to cull some variations and favor others.

Ardrey himself gives as an example a cultural tradition of some African tribes to kill twins as soon as they are born. (Ardrey 1966, pp. 33). This should affect the genetic potential for twins. Therefore, "[v]ariations between cultural traditions of human populations must, if pursued for a sufficient number of generations, have a selective effect on the quality of a population's gene pool." (Ardrey 1966, p. 33).

There are other ways in which the cultural environment potentially influences

genetic selection. The evolution of cities with dense human populations will affect the kinds of human diseases and their spread, which will affect who survives and who does not based to some extent on bio-genetic propensities. Perhaps the evolution of a cultural tradition that encourages alcohol use, or discourages it, will play out in differential survival and reproduction due to genetic propensities.

There has been no clean break from natural selection. Humans are not immune from it. Natural selection of genetic variation continues to operate.

Does Natural Selection Account for the Evolution of Culture?

But whether natural selection continues to operate on the human species is not the issue—at least it is not the critical question for purposes of cultural theory. The question is whether ongoing selection has caused the evolution of humans from stone to iron and bronze, of the evolution of tap water and hybrid corn, and other aspects of cultural evolution. The consensus is that it has not. How do we know?

It is inferred from the historical and archaeological record. History records that there is little biological difference between ancient and modern humans. The same would appear to be true of the comparison between modern humans and the pre-historical humans unearthed by archaeologists. Meanwhile, the human way of life has evolved dramatically.

In the early 1800's, Thomas Malthus observed in his famous *Essay on the Principle of Population*,

> It is by no means one of the wisest sayings of Solomon, that 'there is no new thing under the sun.' On the contrary, it is probable that were the present system to continue for millions of years, continual additions would be making to the mass of human knowledge; and yet, perhaps, it may be a matter of doubt whether what may be called the capacity of the mind be in any marked and decided manner increasing. A Socrates, a Plato, or an Aristotle, however confessedly inferior in knowledge to the philosophers of the present day, do not appear to be much below them in intellectual capacity.

(Malthus 1993, p. 153). Malthus apparently hedged his bets as to whether modern philosophers might be slightly above Socrates, Plato and Aristotle in intellectual capacity. It is doubtful that anyone today would hedge their bets, even if instead of noteworthies, the comparison were made between the average ancient Greek and the average present-day human.

One way to put the issue is this: if they were alive today, would the ancients be capable of adopting the modern way of life? Would they be capable of designing, building and flying planes, worshipping modern gods, and otherwise living among us? Few would doubt that Cleopatra, her retinue or her slaves could do so. Few would also doubt that the same conclusion would hold for Jefferson or his slaves, Caesar or his legionnaires, Mohammed or his disciples, or any other sample of humans from the past few thousands of years. Stephen Jay Gould even suggested "that the average Cro-Magnon, properly trained, could have handled computers with the best of us…." (Gould 1980, p. 83). If so, the differences between the way we and the ancients live cannot be due to the selection of genetic variation.

Since we cannot transport people through time, these propositions are not demonstrable. But more demonstrable, and to much the same effect, humans transported from societies that never in their ancestral history have encountered planes, microwaves, or Christianity can learn to operate, manufacture, and design microwaves and planes, and convert to Christianity. Likewise, if a Scandinavian was raised in a tribe of remote Amazon hunter/gatherers, presumably he or she could learn to make a bow and arrow and find suitable plant foods with proper instruction. This would not be so if the cultural differences were dependent on evolved biological differences.

History records abundant human cultural evolution without any significant change in human biology, including the capacities for culture. But even assuming for the sake of argument that there are some biological differences between the ancients and present humans, these differences are too trivial to account for the differences in our ways of life. The same holds true for comparisons between societies. People are constantly immigrating and adopting the culture of their new societies. Biological variations such as lactose intolerance might account for some interesting differences in diet and distaste for cheese, but these kinds of variations have not led to different abilities to evolve from stone to bronze to iron, or to the major differences from one present-day culture to another.

We can see the disconnection between natural selection and culture because we observe culture evolve without the presence of the elements of natural selection. As a cultural trait, the internet spread in less than a decade. This did not depend on biological reproduction of the creators and users of the internet. The spread of the internet did not depend on whether the creators and users of the internet had many children or none at all. The spread of Fulton's steam engine did not depend on Fulton's reproductive success. No alternative to Fulton had to die in order for his steam engine to spread. In somewhat the same vein, Darwin observed: "Great lawgivers, the founders of beneficent religions, great philosophers and discoverers in science, aid the progress of mankind in a far higher degree by their works than by leaving a numerous progeny." (Darwin 1952b, p. 325).

In sum, natural selection gave rise to the capacities to evolve through culture, but

cultural evolution became decoupled from natural selection, at least in all significant respects. Humans are still subject to natural selection; and there may be some amount of gene-culture co-evolution; but natural selection has not caused culture to evolve. We know this because culture has evolved independent of significant genetic variation.

For these reasons, for purposes of determining the means of human evolution over the last few thousand years, anthropologists have been correct: human biology must be held constant, over time and across societies. (White 1949, p. 124).

The question is how the evolution of culture became decoupled from natural selection.

CHAPTER TWO
~
WHY CULTURE IS DECOUPLED FROM NATURAL SELECTION

What enabled culture to become decoupled from natural selection? One piece to the puzzle is the contrast in where biological adaptations and culture are "stored" and how they are transmitted.

Biological adaptations are stored in DNA. They are transmitted from generation to generation through biological reproduction, which is the pathway of inheritance. Consequently, to evolve biologically, DNA must change. And the changes in DNA must in some way aid the survival and reproductive success of the organisms that are responsible for transmitting them.

All else in Darwinian theory follows from the central principle that biological inheritance necessarily follows the pathway of biological reproduction. Evolution therefore follows that pathway—biological lines of descent. That is why, from the origins of life to present day, the pathway of evolution can be depicted as a genealogical family tree.

In contrast, the transmission of culture is separate from biological reproduction. Tylor's pioneering definition of culture included the fact that culture "is acquired by man as a member of society." (Tylor 1871). Culture is *learned*. Language is the medium of transmission. (Haviland 1990, p. 6). Anthropologist Leslie White described the means of transmitting culture as non-biological. (White 1988, p. 337). But of course, the tools for learning are biological: speech and hearing, along with a big brain. More precisely, White might have said that culture is transmitted separate from biological reproduction. Transmission is nongenetic.

This is possible because culture is stored separate from DNA; it is stored in human minds. When we say that culture is transmitted via language, we are saying that it is transmitted from human minds to human minds. The transmission of culture, and thus learning, has been greatly aided by cultural inventions: art, writing, electronics and other media.

But the primary device for storing culture, which kick-started cultural evolution, is the human brain. It is an evolved device for storing adaptive information. At the advent of cultural evolution, brains were the only device for storing culture. Each mind held in its memory some portion of accumulated cultural adaptations. Each mind communicated portions of it to others. Bit by bit, increment by increment, minds accumulated additions to their specific cultures, thereby adding to the "library" of culture that exists across the

entire human species.

I referred to the “library” of culture because it is an apt way to think of the body of culture. In fact, much human culture *is* stored in libraries. Re-inventing the wheel seems wasteful to us. We write books, build libraries, and erect schools to make sure that knowledge is preserved. The written word is especially useful for this, but the preservation of knowledge can also be accomplished in nonliterate cultures through verbal instruction, story-telling and art. It is, however, difficult to imagine building the level of cultural complexity of large civilizations without writing to supplement verbal communication and the memory of human brains. It is for good reason that elementary history instruction spotlights the invention of paper, the printing press and other contrivances for conserving and conveying knowledge. It is for this reason that excavations of the first large-scale civilizations—in Egypt, in Mesopotamia, in Minoa, in China and elsewhere—commonly reveal some means of recording events, laws and culture. Through media, the accumulated wisdom of our forebears is transmitted to future generations.

In the grand “library” of human culture, the Navajo, Hopi, Japanese, Amish American, and other cultures each has its own separate library wings, so to speak. People mostly browse and absorb the “books” in their own cultural wings. But cultures are not locked away separately. Trade, war and peace bring them into contact. Information, knowledge and ideas are exchanged, borrowed and pilfered from other wings of the cultural library.

Culture is thus not the property of individual humans. It was (and is) a collective enterprise. Culture exists above and beyond individual humans. When a child is born, there is a pre-existing library of culture that has been accumulated by his or her cultural ancestors: how to knap a flint, which herbs heal, the proper way to raise a child, what gods to call upon. A child receives instruction in all of these cultural attributes.

Culture may be said to be *shared intelligence*. We have evolved to share our thoughts, information and beliefs with others. When we have a great idea, we can hardly wait to tell someone else. We spread the word. Language is the evolved tool for doing so. Without communication, all ideas would die with their creators and all information would perish with its discoverers. Because of the evolved ability to communicate, they do not. Adaptations are passed on. The benefits spread far beyond their creators and discoverers. It outlasts them. It is potentially available to anyone. All potentially benefit from Fulton’s steam engine, Freud’s psychoanalysis, Darwin’s theory, Arabic numerals and Adam Smith’s economic theory of the *Wealth of Nations*.

Because culture is above individual humans, White referred to culture as “extra-somatic”, meaning that it is apart from the body. (White 1988, p. 337). Our primary device for storing culture, the brain, is of course very much a part of the human body.

More properly, White might have said that culture is "extra-genomic": it is stored separate from our DNA and is transmitted separate from biological reproduction.

The term "cultural inheritance" is sometimes used as an analogue to biological inheritance. In some respects the analogy is apt. But we must also be mindful of the distinctions, where the analogy doesn't hold. Biological inheritance is one-way, from parent to offspring, down lines of descent. Cultural information may be acquired from parents. It may also be acquired by parents from their children and by elders from the young. It may be acquired from peers. It may also be acquired from complete strangers, living in completely foreign parts of the world, through newspapers, books, the internet, and other media. It may be acquired from people long since dead. A copy of Polybius' *On Roman Imperialism* sits on my shelf.

Because the transmission of culture is nongenetic, definitions of culture have emphasized social learning as a distinguishing aspect of culture. (*See, eg.*, Haviland 1990, p. 6). Anthropologists, however, have debated whether social learning is sufficient to conceptually distinguish human culture. (McGrew 1998). Social learning is not unique to humans. Other species also are capable of learning, of acquiring adaptive information separate from reproduction. Japanese macacques have been observed to cleverly separate wheat from sand by floating the grains in water, then teach others to do the same. (Toshida 1987, p. 468). A primate may learn of a source of fruit and inform the group. A wolf will lead its pack to a kill. (Mech 1995, p. 140). Even insects are capable of social learning. A worker bee will inform its colleagues of the whereabouts of a far off pollen source through a marvelously elaborate waggle dance. (Wilson 1971, p. 262).

All these examples entail nongenetic transmission of adaptive information. All entail *social learning*. Since these are the attributes that have been embodied in the traditional concept of culture, some theorists contend that because other species also employ learning, they too possess culture. Dugatkin, for example, argues that because guppies adaptively learn through mimicry, they exhibit a rudimentary form of culture. (Dugatkin 2000).

By itself, however, the concept of social learning is not enough to understand how human culture evolves and why it is unique. We need to add a concept to culture. Learning implies only the absorption of existing culture. For culture to evolve, culture must be *built* upon. It evolves by *building* knowledge upon previous knowledge, axioms on which to build new axioms, from wheels to cars, from transistors to computers. Each hunter does not have to re-invent the bow and arrow; each gatherer does not have to rediscover which herbs heal and which kill; a mathematician need not recreate Euclidian geometry. Upon this acquired information, new possibilities can be hypothesized, tested and, if valuable, adopted. Better bows are built; other herbs are added to the repertoire; new equations are constructed. The same is true of theologies, systems of government,

business practices, and everything else humans have valued.

We evolve by building on the cultural legacies that have been handed to us by our ancestors. Rome was not built in a day. It required building upon foundations of knowledge laid, accumulated and transmitted by their cultural ancestors. We have added to the cultural inheritance they have handed down. We evolve by borrowing new ideas from other cultures, past and present. We teach children the body of existing culture, but we do so with the expectation that they will build upon it.

To build culture requires a big brain that is powerful enough to store *and accumulate* adaptations across generations, over the long haul of evolutionary time. It requires a reliable, efficient means of communicating adaptations from brain to brain—language.

This method of evolution is unique to humans. Although other species can learn, they cannot build upon learned information to increase the range and repertoire of their adaptations. At least, they cannot do so in a way that is sufficiently significant that it can replace biological evolution. It might even be supposed that they can build on information to a limited extent. The termite tools made by chimpanzees might be an example. But as far as is known, no species can use these abilities to build a body of adaptations that enables them to continue significantly altering their way of life of their species over time. Hence, to evolve, they must store, accumulate and build adaptations through changes in DNA. Their evolution thus remains tied to genetic variation.

Ours is not. We store and accumulate adaptations in human brains. We build upon them.

Perhaps cultural building is implied in anthropology's concept of learning, but it is not spelled out (at least I have not seen it spelled out). But it is necessary to spell it out, and not just in order to distinguish our species. It is necessary because this is what enables humans to evolve through culture.

And this allows us to begin to see how cultural evolution became decoupled from the selection of genetic variation. The nongenetic storage, transmission and building of culture moots the Darwinian framework—the elements of natural selection do not apply to cultural evolution. The transmission of culture is not tied to biological reproduction. Cultural adaptations therefore need not aid the reproductive success of the individual humans who invent or adopt them. Specific cultural traits are thus not tied to genetic change. And, thus, the building of culture is not tied to genetic change.

This is why the internet revolution could spread separate from the biological reproduction of computer wizards. It spread through word of mouth, writing and electronic media. This is why the internet revolution could spread whether or not it aided the reproductive success of computer wizards or those individuals who participate in the

revolution by buying computers and use the internet. The discoverer of a new medicine can die leaving no heirs, yet the discovery can be passed down to future generations.

This is what has enabled our species to evolve despite the fact that, biologically speaking, we are no more clever than the ancients. Because the library of culture is stored, transmitted and built separate from the pathway of biological reproduction and inheritance, culture can evolve without any improvement in our biological capacities for culture. This explains the fact that although Cleopatra, her retinue and slaves would be astounded at the change in the human world over the millenia, they could learn to fly, design or build planes—at least their children, unbiased by an ancient habits and worldview, could do so. Our culture has been built upon theirs. It has been built without biological evolution through natural selection.

Distinguishing Culture from Human Behaviors and Artifacts

Anthropology conceives culture as a body of knowledge, beliefs, laws, etc. This is the concept I have used, analogizing culture to a library of information. It thus exists above and beyond individual humans.

Some sociobiologists, however, have viewed culture differently, redefining it as human behaviors. According to E.O. Wilson, "culture, strictly defined, [is] complex socially learned behavior…." (Wilson 1998, p. 166). This re-definition began with ethology—the study of animal behaviors, including their application to the understanding of human behaviors. The premise is that humans are animals and evolved as such. Human behaviors can therefore be studied as animal behaviors.

Hence, ethologists attempt to trace specific human behaviors to their adaptive biological roots. For example, the incest taboo is nearly universal in human cultures. Ethology explains that the incest taboo derives from the innate predisposition of organisms to avoid the deleterious effects of inbreeding. In humans, this takes the form of cultural rules forbidding mating with close kin. (Wilson 1978, pp. 37-8). Other examples include explanations of the differences in the behavioral tendencies of males and females. The behavior of a man who, say, is aggressively striving for dominant status in some endeavor may be described as acting out a Darwinian imperative to pass on his genes, because women tend to be attracted to alpha males. A woman, coyly flirting and dressed to accent her feminine figure, may be depicted as doing so because her genes impel her to attract the most successful, dominant male, who will best provide for her children.

The ethology model of behavior can then be linked to the neo-Darwinian model of

the relationship between genes and phenotype. Genes interact with the environment to prescribe an organism's "phenotype", which is the sum of its physical characteristics and behaviors. An organism is thus genetically programmed to behaviorally respond to its environment. Ethologist Konrad Lorenz called these behaviors "fixed action patterns". (Stevenson 1974). The expansion of ethology to human behaviors was popularized by Lorenz in *On Aggression* (Lorenz 1963), Desmond Morris in *The Naked Ape* (Morris 1967), and Robert Ardrey in *The Territorial Imperative* (Ardrey 1966).

Sociobiology took this approach a step further, applying it to human *culture*. The reasoning is that culture is the sum of human behaviors. Culture is thus part of the human's behavioral phenotype. Behavioral phenotypes are programmed by genes. Culture, therefore, can be viewed as an extension of genes.

Richard Dawkins took this reasoning a step further with the concept of culture as an extended phenotype. (Dawkins 1989, p. 238). He analogized culture to a spider web. A spider makes a web that is separate from its body. Natural selection will act on a spider's web, which is to say that if a spider makes a good web, its behavioral genes for making good webs will be selected. Thus, even though the web is separate from the spider's body, it is an extension of the spider's phenotype and selected as such. The same logic applies to a bird's nest, or a beaver's house.

This logic is then applied to humans and the cultural artifacts that are made through human behaviors. Houses are cultural artifacts. So are pottery and all the other things produced through human behavior. Thus, culture, including cultural artifacts, can be conceived as an extension of human genes—an extended phenotype:

> If behavior can be subsumed under phenotype, why should the notion of phenotype not be logically extended to include the products of behavior? Biologists ... routinely include such things as spiderwebs and bird nests in their concept of phenotype, and we see no reason not to extend in similar fashion the notion of the human phenotype to include such things as projectile points and pottery, or...such artifacts as ceremonial architecture in Polynesia.

(O'Brien and Holland 1995, p. 181).

From this, the argument then follows that as culture evolves, it is selected in the same way as are animal behaviors. Culture evolves because it aids organisms in surviving and reproducing. Genes that are more fit in producing adaptive cultural phenotypes are selected. (*Id.*, p. 181).

In sum, the logic is this: genes prescribe behaviors; behaviors produce culture and cultural artifacts; genes are naturally selected; culture therefore must be naturally selected. The evolution of culture can thus be modeled as natural selection.

This is a critical mistake. It leads to the conclusion that cultural evolution must be accompanied by the selection of genetic variation. If it were true, cultural differences between societies would be due to biological differences. The evolution of culture from stone to bronze to iron would depend on biological differences. As discussed in the previous chapter, this is false.

Culture is not the behavior of making a wheel or the wheel itself; it is the *idea* of a wheel and the *knowledge* of how to make one. Culture is the collective *body* of knowledge, customs, values, laws, etc. These are not behaviors. They are ideas that influence behaviors. Culture is transmitted through nurture, teaching, and enculturation. Through this, individual humans learn how to produce cultural artifacts, such as spearpoints, pots, and wheels. Humans produce them through behaviors. But these behaviors and artifacts are not "culture." Long after the behaviors have passed, and long after the artifacts have disintegrated, the ideas of spearpoints, pots, and wheels continue to exist. The knowledge of how to make them continues to exist.

Customs, values, laws, and technical knowledge are stored in the library of culture. Techniques for flint-knapping are stored in the library of culture. Flints and the behavior of flint-knapping are not.

Distinguishing culture from behaviors and artifacts isn't just an academic exercise in definitions. Conflating culture with behaviors (and artifacts) is a mistake because it prevents seeing why culture is decoupled from natural selection. A spider's "knowledge" of how to make a web, as well as the behavioral tendency to make a web, is stored in its DNA. Improvements in webs are thus dependent on changes in DNA—on natural selection—which can be transmitted only through biological reproduction.

In contrast, the knowledge of how to flake a spearpoint is not stored in DNA. Knowledge is stored in human minds—in the cultural library. It is transmitted separately and apart from the pathway of reproduction and inheritance. This knowledge can be *built* upon, to make an even better spearpoint. A man who improves the design of a spearpoint can pass it on to his own offspring, but he is not limited to doing so. He can transmit it to other members of the tribe. Knowledge of the improved design can be diffused from tribe to tribe and spread over an entire region. The improved design is thus added to the cultural library, available to anyone who has access to that particular wing. The same is true of pottery, ceremonial architecture, fire-making, criminal laws, and military tactics.

This nongenetic storage, transmission, accumulation and building of culture has enabled culture to evolve decoupled from natural selection.

CHAPTER THREE
~
HUMAN MINDS CREATE, SELECT AND BUILD CULTURE

In neo-Darwinian theory, new genetic variation—the raw material of biological evolution—is produced through random mutations. Natural selection then culls the harmful and less fit mutations through the sieve of death. Beneficial mutations spread as they aid the survival and reproductive success of those that acquire them. New biological traits accumulate. Life evolves.

Random genetic mutation and natural selection do not apply to cultural evolution. But how then is culture built? What is the process? What substitutes for mutation and natural selection?

As set forth in this chapter, creative human minds create, select and build culture.

A man who walks into a public library to choose something to read will be confronted with an overwhelming number of books and magazines. He can't possibly read them all. He must winnow down the range of choices. Perhaps he came to the library with the notion to read something historical. Winnowing further, he was struck by the thought that he should know more about Latin America, where he is about to travel. While poring over the Latin American history section, several books about Che Guevara catch his eye. After reading the jackets of those books, he selects Guevara's *Motorcycle Diaries.* From thousands of possible books, he has selected one.

The same mental process is at work in selecting among cultural possibilities: the "knowledge, belief, art, morals, law, custom, and any other capabilities and habits acquired by man as a member of society." (Tylor 1871). There is a multitude of cultural possibilities, more than can possibly be chosen. But the possibilities are not winnowed through the actual events of death, survival, and reproduction. The method of winnowing is instead one with which we are so familiar that we hardly pause to think about it. The world around us contains a vast amount of detail, much more than anyone could possibly absorb. From all the vast detail, our mind filters what we actually perceive. It retains some perceptions. It discards others. The permutations of possible courses of action anyone could take are nearly infinite. We have time to consider only a few, and we engage in only one at a time. In the same way that the library patron selected *Motorcycle Diaries,* minds narrow the scope of possibilities, then choose. From this ongoing process, culture is continually selected.

It is not just the individual human mind that is involved in the selection process. Many minds are at work. In the selection of library books, funding for public libraries is limited. Of the millions of books available to it, a library will have a very small subset. Those that are actually on the shelf will have been chosen by the librarian. Or, more likely, they will have been chosen over time by a succession of librarians. The range of the librarians' choices will be vast, but not endless. Library boards, or some governmental entity, will have restricted the range based upon some criteria. And of course, publishers will have limited the number of choices by selecting a relative handful of books to publish from the thousands of manuscripts they receive. Authors themselves will have chosen the subjects and content.

The same process is at work in determining the theologies preached from the pulpits and taught in mosques, synagogues and churches. The same process is at work in our schools, businesses and government. The same process is at work in the homes where children are raised. Minds filter our perceptions and choose a course of action. From this continual process, culture emerges.

At all levels, and over long periods of time, human minds are at work, sifting from the vast array of possibilities, winnowing from the many to the few.

In other words, *minds are selective*. Because they are, cultural variations need not be winnowed by the actual events of death, survival, and reproduction. Cultural variations are tested and selected by the mind's *perception* that they are useful. The crew of the *Hunley*, the first submarine ever made, died when it sank. But the idea of a submarine did not sink with them. Others perceived the adaptive possibilities of the submarine. They examined that particular submarine for design flaws, refined hypotheses, adjusted, and transmitted the adjustments to others. Submarines evolved.

It is not necessary that anyone die in order to determine that a potential adaptation is faulty. Engineers can perceive that an aspect of an air traffic control system will malfunction before it causes a crash, and re-design accordingly. Unlike the Darwinian process, death is not necessary to winnow maladaptations. To paraphrase philosopher Karl Popper, our hypotheses die in our stead. (Popper 1985, p. 83)(paraphrase borrowed from Dennett 1995, p. 375).

From all the possibilities that could be stored in our memory and transferred from brain to brain, our minds sift and edit—they are selective. Hence, diffusion of metalsmithing, or a religion, or an ideology, do not require the act of reproduction. All that is needed for their diffusion is the *perception* that these ideas are useful.

In cultural evolution, selective minds substitute for natural selection.

Minds are not just selective. *They are creative*. Human minds are the source of cultural innovation. Minds generate novel thoughts and ideas that provide novel cultural

variations—new books, new paintings, new forms of architecture, new ideologies, new theologies, new technologies. They generate new riffs on old books, paintings, architecture, ideologies, and theologies. These novelties are added to the existing store of cultural possibilities. All of these are presented to other human minds—communicated by speech, by writing, by electronics. Minds filter them—discarding many, selecting a few that are perceived to be useful, interesting, or enjoyable.

Unlike mutations, cultural innovations are not random. We know that human creativity is nonrandom because we are familiar with the process. Who invented fire-making, and how was it accomplished? It is fun to speculate, as many of us do. But all we can do is speculate. Absent a time machine, we will never know. Nor will we know exactly how the many other ancient human innovations came to be. We can only wonder at the invention of the bow and arrow, the wheel, written language, metallurgy, grain cultivation, and other marvels of human creativity. Nevertheless, we have a pretty fair idea of the process involved. It was probably no different than the method used by Edison to invent the light bulb and the Wright brothers to create a machine that could fly. It was probably little different than the process we use to solve little everyday problems, as when out camping we discover we have forgotten the can opener.

We put our minds to it. We begin with a problem to be solved and a desired end result. We search our memory for solutions in our existing repertoire. If none come to mind, we search for analogues. We examine previous attempts to solve the same or similar problems, applying reason to figure out where they went right or wrong. Ideas are discarded, kept, woven together in various novel ways. A hypothesis is created, then tested. If it fails, we pick apart our failure, then repeat the process. Maybe we will ultimately hit upon a solution.

We may even wind up solving a vexing problem that was no part of our original plan. Edison did not guess that the phonograph would be used as a medium to turn singers into popular sensations. Einstein surely did not foresee that his genius would be harnessed for methods of mass destruction. Gutenberg might be aghast that the printing press, invented to print the Bible, has allowed mass production of romance novels, comic books, and Penthouse magazine. But all would appreciate, as do we, the power of human minds to discover, create, invent, then imagine new uses for the old and to cobble together old ideas for yet other purposes.

The human mind is not just a solver of existing problems. A marvel of our creativity is that we do not merely improvise solutions to problems that are presented to us; we use our imagination to create problems that never before existed, then solve them. Before the Wright brothers invented a flying machine, in what sense was the inability of humans to fly a pressing problem? The Wrights would not have perished without a plane. Neither would American society or the human race. They imagined flight as a "problem", then solved it.

Of course, we *feel* that these kinds of things are real problems. We often describe them as such. Business analysts and political pundits may opine that we *needed* the internet to exchange ideas, facilitate global commerce, and so forth. But we could have gotten by without it, just as had previous generations. In retrospect, it seems to us that our ancestors invented the wheel because they needed it for transportation. But of course they did not need it to solve an existing problem. For millenia before them, their ancestors managed without wheels

That the "problems" that many innovations solve appear to us as problems is a comment on human psychology. We are curious. We are inventive. We search, probe, and grope for new problems to challenge us. We imagine things that never before existed. Sometimes we bring them into being.

Through the creative, selective process, minds build culture.

I have so far portrayed the creative, selective process of evolving culture as completely rational. Of course it is not. Culture is replete with trivia. History abounds with folly. We experience both in our own lives, complaining about one and sometimes embracing the other. As we are aware from personal experience, a lot of silly ideas pass through our own minds, many of them apparently unconnected to anything else, useful or otherwise. Occasionally, we even act upon them.

When human life is examined narrowly and under a microscope, the world appears extremely messy. Large corporations widely believed to be profitable file for bankruptcy. People in many parts of the world have more pressing problems. Drought threatens, and starvation looms. Civil war disrupts relief efforts. AIDS is epidemic. Elsewhere, stateless people plot to plant suicide bombs. Victims diagram retaliatory measures and put them into action. As in a Greek tragedy, a cycle of revenge escalates, with neither party having a definite aim in continuing the cycle or a plan for ending it.

This is the news. These are the issues that pre-occupy daily life and engage our attention. From this perspective, the human story can seem wholly irrational, especially when our mood turns to cynicism.

History can offer a broader perspective, but often does not. When told in a sequential narrative, history reads like the daily news, except distilled and joined together over a period of time. One crisis lurches to the next, and the two are bound together by human intrigue. Greed, glory, and lust appear as history's movers and shakers. The face of Helen launched a thousand ships. Dreams of gold lured Spanish conquistadors. The world is thereby transformed. The fact that anything useful is accomplished can seem

entirely accidental.

The title of historian Barbara Tuchman's *The March of Folly* (Tuchman 1984) aptly captures the theme: history unfolds unintentionally. More, history is made by tactical and strategic mistakes. People bring about consequences contrary to their interests. Outcomes are commonly at odds with intents, expectations and hopes. Folly moves history.

Yet when we step back from the news and narratives to gain perspective, we see that although conflicts pervade, chaos does not. Patterns emerge. Extraordinary agricultural civilizations rise and leave their legacy. Horses are domesticated. Cars are invented. Highways, gas stations, and motor hotels are built to accommodate them. From cave dwellers, our species has evolved to high-rise dwellers who explore outer space.

Thematic emphasis on human folly, accidents, and apparently functionless thoughts and behaviors cloud our perspective. Human history is messy, but it is not random. To see the patterns, we need to set aside the microscope.

The cultural process *is* imperfect. To err is human. In hindsight, our perceptions are not uncommonly mistaken; many choices poorly serve us. But this is evidence only that the mind is imperfect, not that it is random. No one would suggest that birds have evolved unadaptively because eggs sometimes do not hatch. Evolution has produced imperfect organisms, not precision machines.

The human mind is no different. Some good ideas do not hatch. More than a few lousy ones do. Sometimes we can't sort the good from the bad until they play out, often in destructive ways. A plane may crash before we discover that an air traffic control system is faulty. A nation may become economically mired. But we are constantly probing, perceiving, re-evaluating, and adjusting—then probing some more. People examine the air traffic control system for flaws, then patch it. People transform their governments.

Probing, evaluating, and adjusting is a process of experimentation through trial and error. But trial and error is not random. Trials are based on hypotheses. Hypotheses are not infallible; they are merely reasoned guesses as to the solution. They may or may not be right, so we test them. If we err, we try to learn from our mistakes and refine the hypothesis. We hope eventually to achieve a solution.

This process is even slower and messier because it is a group process. Guided by the inertia of tradition, a vast majority of our cultural axioms are derived from our childhoods and are shared by nearly everyone we associate with. They are so ingrained that we seldom question them, and then only with self-conscious effort. If we question them out loud, we are likely to be opposed by others who adhere to tradition. The

Church may insist that the Earth does not move, and that is that.

Even where people are allowed to disagree, all cannot have it as they wish. Some may think that resources should be plowed into social programs, others may prefer tax reduction, others restructuring the military, and still others may not give the matter any thought. But all are nevertheless affected by the decision. Like other group decisions, the decision itself is likely to be some sort of compromise, not quite rational, and perhaps pleasing no one completely. Commenting on the cultural systems resulting from compromise, anthropologist Alfred Kroeber observed:

> Established individual habits, prestige values, change in one part of the system with lag in another, actual economic cost, mere inertia or nostalgia—all sorts of reasons, mostly rational enough in the concrete situation, have been at work; and the resulting system shows the effect of compromise and patches. Any fool could devise a more consistent system than exists, but even a despot rarely can institute one.

(Kroeber 1988, p. 118).

But as Kroeber also points out, although cultural systems do not measure up to an imaginable ideal, some degree of integration is achieved: "Cultures tend toward integration and, in the main, largely achieve some degree of it, though never total integration." (Kroeber 1988, p. 118).

Even adopting a new technology is not a straightforward process. It requires integration into an existing body of culture. Hunters and gatherers find it difficult to leap to an agricultural or industrial society, even when they desire to do so and the information is available. Most significant technologies are potentially available to just about any society. The prosperity they can bring is often desired. The know-how for building dams, factories, and weapons can be transferred relatively easily. Yet integrating these technologies into a society and maintaining their smooth function can be arduous because they become woven together with economic systems, which are tied to existing customs, laws, values, and systems of governing. A change in one cultural component affects many others.

The evolution of a culture is not a straightforward process of adding perceived improvements. It is not a simple graft; it requires coordinated integration. This process can be slow. It is messy. It does, however, happen. Culture evolves.

And culture has evolved in a direction.

The nineteenth century pioneers of cultural anthropology, Tylor and Morgan, both conceived of culture as evolving in discrete stages. In Tylor's scheme, culture evolved from savagery to barbarism to civilization, with definite cultural traits associated with each stage. (Tylor 1871). Each stage represents increased complexity. Every culture must pass through each evolutionary stage, until it reaches civilization, which he defined more or less in the mold of nineteenth century Euro-American culture. Morgan wrought an even a more elaborate sequence of evolutionary stages, with greater emphasis on the role of technology, property ownership and kinship. (Morgan 1988). Like Tylor, Morgan believed that each stage is uniform in its traits; each culture must pass from stage to stage. Both considered their evolutionary sequences and stages to be ironclad scientific "laws": all cultural features necessarily existed in a given cultural stage, and the progressive sequences must be followed. The overall direction was moral progress, again defined by the prevailing Euro-American moral sense.

Twentieth century anthropologists, with more thorough studies of a greater number of cultures, pointed out that cultural attributes often do not correspond with definite evolutionary stages. Cultures, their combination of traits, and the sequences of change, are extremely varied. They do not fit into discrete "stages." They have not advanced in definite sequences. Cultural evolution is multilineal, not unilineal.

Twentieth century anthropologists defined the evolutionary direction materially rather than morally, and abstractly rather than in distinct stages. White developed the idea that the evolutionary direction can be described as the increased capture of energy. (White 1949; White 1988, p. 339). This leads to material prosperity, which he viewed as a measure of material progress. Marshall Sahlins applied the same idea to the direction of each society. (Sahlins 1988, p. 369-70). Humans employ culture for a functional end: "it harnesses and delivers energy; it extracts energy from nature and transforms it into people, material goods, and work, into political systems and the generation of ideas, into social customs and into adherence to them." (*Id.*). Some cultures have been more adept than others at capturing energy. These cultures have tended to dominate. As a result, the overall direction of cultural evolution trends towards increased energy capture.

Increased productivity and greater wealth result in more people. Marvin Harris observed that labor-saving devices are not really used to save labor. Instead they are "used to increase energy throughput, which has been used to produce additional children." (Harris 1998, p. 395).

Even the decline in birth rates in wealthier nations has not led to lower numbers of people. Nor has it stopped population growth. A decrease in number of children per household has freed people to do many other things. It frees them to spend more resources on each child, especially education. It frees them to spend their income on things other than immediate expenses, thereby accumulating capital. These stimulate productivity, increasing techno-economic efficiency and wealth.

The economy thus expands. More resources are then available to support more people. Moreover, motivated by compassion, many people have devoted their lives to saving others, inventing medicines, machines and techniques that have decreased mortality and prolonged the average lifespan—something nearly everyone wants. Thus, population grows.

These trends led Harris to the observation that I quoted in the Introduction: "Anthropologists have long recognized that in broadest perspective cultural evolution has had three main characteristics: escalating energy budgets, increased productivity, and accelerating population growth." (Harris 1988, p. 395).

I do not think it would be accurate to say that this is the only way to characterize the direction of cultural evolution. Observers could look at human history and distill other patterns. A scholar of religions, for example, might see trends in theology. A political scientist might discern trends in systems of government.

But I believe it is accurate to say that the pattern of more productivity, people and resources is *a* cultural direction. And it is fair to say that this is a particularly prominent and persistent direction throughout the course of human history.

Human creativity has thus built culture in this direction.

Creativity is therefore directed. This proposition can be reinforced by dissecting a theory proposing that thoughts are undirected, popping out of our brains like random mutations. Donald Campbell proposed that the internal mental process that generates thoughts is essentially the same as the mechanical process of random mutation and natural selection, which he calls "blind variation and selective retention." (Campbell, D.T. 1960). This means that thought "variations" arise independently of the environmental conditions that make them useful; as they are generated, thoughts are not correlated to the solution; and subsequent thoughts do not represent corrections to previous failures. (*Id.*, p. 381).

The flaw with Campbell's model is that if thoughts were generated independent of the environmental conditions that make them useful and a solution to a problem, what then would supply content to our thoughts or narrow them down? When we plan a dinner party, how could we ever arrive at a plan if our thoughts were not initially narrowed down by a goal or "solution"—for instance, a dinner party—and if our thoughts did not continue to be correlated to that solution in the context of a particular environment? And how could we ever arrive at a solution if we did not correct our thought "errors"? If we realize that we have been planning a menu with six guests in mind, having initially

forgotten that three other couples had been added to the guest list, we would certainly not continue to generate thoughts based on a six-guest menu, or for that matter one for twenty, a hundred, or a thousand guests, as would be the case if thoughts were random.

The basic problem with the concept of "random" when applied to human thought is that it implies an infinite number of possibilities. There would be no direction to thoughts. There would be no direction to culture that human minds create, select, and build. Thoughts must be filtered so we can choose among them and, ultimately, to direct action.

The generation of nonrandom thoughts is commonplace. We experience it every day. While approaching an intersection, we may see stoplights, pedestrians, bicyclists, and other cars approaching the intersection at various speeds. Our thoughts about the range of possibilities are not random. First, we want to avoid an accident. Our thoughts are directed towards that objective. Then we form hypotheses as to the timing of the approach of all the other vehicles and pedestrians at the intersection and respond accordingly. We perform this nonrandom thought process so effortlessly that we hardly stop to think about it. Perhaps it is so routine, and results in error often enough, that we can lose sight of the fact that human thoughts, even once they have arisen in a neutral context, generally could not possibly be selected in an a neutral manner.

The thought process is messy but it is not random. We know this because if all the new thoughts that popped into our minds were random, we would soon all be dead. We would be just as likely want to create a suicide cult as fashion a better spearpoint. Nor do we communicate thoughts to others randomly; thoughts received by us are not randomly absorbed; external events and conditions that we experience do not enter our minds randomly. The mind filters our thoughts. This is the mind's function. If it did not do this, it would not have evolved.

The idea that cultural variation is not random, but instead is directed, is not new; it has been analogized to Lamarckian biological evolution because cultural variation is directed. In contrast to the neo-Darwinian concept that new variation is random, "Lamarckism is, fundamentally, a theory of *directed* variation.... Lamarckism holds that genetic variation originates *preferentially* in adaptive directions...." (Gould 1980, pp. 79-80). Thus, Lamarckian theory has become synonymous with directed variation. (Rindos 1989, p. 3). A favorite example of Lamarckian directed variation is giraffes evolving longer necks by stretching to reach leaves, then passing down their longer necks to their progeny.

Although Lamarckism is discredited in biological evolution, some scientists have

called culture a kind of Lamarckian evolution. According to Gould, "[h]uman cultural evolution, in strong opposition to our biological history, is Lamarckian in character. What we learn in one generation, we transmit directly by teaching and writing. Acquired characters are inherited in technology and culture. Lamarckian evolution is rapid and accumulative." (Gould 1980, p. 84). Similarly, according to E.O. Wilson, "[c]ultural evolution is Lamarckian and very fast…. Lamarckian evolution would proceed by the inheritance of acquired characteristics, the transmission to offspring of traits acquired during the lifetime of the parent." (Wilson 1978, p. 78).

Cultural evolution is directed. In that limited sense, the analogy to Lamarckism holds. Otherwise, however, the analogy is inadequate and misleading. One basic distinction is that in Lamarckian evolutionary theory, adaptations are transmitted from parent to offspring through reproduction and inheritance, just as in Darwinian evolution. In contrast, an essential component of cultural evolution is that culture is transmitted outside the pathway of biological reproduction and inheritance.

More fundamentally, the phrase often used to describe Lamarckism—"inheritance of acquired characteristics"—is limiting. When Gould says that "what we learn in one generation, we transmit directly by teaching and writing", he implies that we learn something new. People absorb information from the environment and pass it on. But this says nothing about the process by which culture is created and selected. The process is certainly not Lamarckian. The mindless, reactive, passive Lamarckian process is nothing like creating and selecting culture through active human minds.

In order to fully understand cultural evolution, we need to do more than acknowledge that cultural variation is directed. We need spell out the actual process. Only by spelling it out can we see how cultural evolution emerged from natural selection and has become decoupled from it. We build culture. To understand this, we need to acknowledge the role that human minds play in building culture, not just passively acquiring it.

But we must also spell out the criteria that minds use in creating and selecting culture. There must be criteria. That cultural evolution is directed necessarily implies that minds have criteria. To filter our perceptions, minds must employ criteria. What are they? And what is their source?

CHAPTER FOUR
~
ADAPTIVE MINDS

Human minds move culture. What moves minds?

According to the theory of directed creativity, the criteria that guide human minds in building culture are supplied by human biology. These criteria—which collectively I refer to as bio-psychology—co-evolved with the human brain in our hominid ancestors. This bio-psychology gives the brain something to want to do, problems to solve.

In one respect, this proposition should not be controversial. The idea that culture serves biological needs was well-developed by twentieth century social scientists. In anthropology, Malinowski listed the basic biological needs as nutrition, reproduction, comfort, safety, relaxation, movement, and growth. (Malinowski 1988, p. 227). Malinowski contended that from these basic biological needs, humans have derived additional cultural needs. A desire for safety, for example, may lead to direct human responses of protection and defense, but he also postulates that magic and religion are culturally derived from the same basic desire.

Marvin Harris referred to basic human motives as bio-psychological drives. (Harris 1988, p. 392). Reliance on biology is necessary because "without postulating the existence of selective principles operating at the bio-psychological level, one cannot explain how infrastructure mediates between culture and nature." (*Id.*, p. 391). In other words, without biology, you can't explain what motivates humans to do anything. Harris boiled these drives down to four: eating, sex, conservation of energy (efficiency in performing tasks), and love and affection. In psychology, Maslow similarly developed a hierarchy of bio-psychological needs. (Maslow, in Rathus 1990, pp. 306-07). He began with physiological needs, such as hunger, thirst and sex, as the most basic. Safety needs come next, followed by love and belongingness, esteem and self-actualization (which he regarded as uniquely human).

Although Harris, Malinowski, and other anthropologists recognized a connection between biology and culture, they did not attempt to connect human biology—and therefore culture—to the impulses, motives, desires, and psychology that have evolved through natural selection. In fact, the absence of attempts by twentieth century anthropologists to incorporate Darwin's theory into an explanation of cultural evolution, or even attempt to make a link, is striking. It seems odd. Darwin's theory and anthropology both deal with evolution. Darwin's theory achieved acclaim (and sparked controversy) at about the same time that Tyler and Morgan were developing their theories of cultural evolution. Anthropologists were not hostile to the idea that other species evolved through natural selection, including our ancestors; in fact, physical anthropology takes that as a given. So it would seem only natural that anthropology would try to link

cultural theory to our Darwinian ancestry; yet it did not.

As mentioned in the conclusion to *Dynastic Theory,* part of the reason may be that the relationship between Darwin's theory and the experience of modern humans became very muddled very quickly. Herbert Spencer, who coined "survival of the fittest" after reading Darwin's *Origin of Species*, made one of the first attempts to incorporate natural selection into human philosophy—this became known as "Social Darwinism." (Dennett 1995, p. 461). Since survival of the fittest individuals is a fact derived from nature, survival of the fittest individuals in a given society must therefore be a natural occurrence. If it is natural, then people who have sunk to starvation must be unfit. There is no reason to fund the poorhouse. Eugenics was based on Darwin's theory of natural selection. Early on, especially in the heyday of imperialism, it was common for Europeans to believe that the differences between their societies and others were racial (biological) ones. If one holds such a belief, it is a fairly simple next step to account for these differences through natural selection of genetic variation.

Perhaps because all of these muddled ideas came to be viewed not only as wrong, but odious, anthropologists became reluctant even to trace human biology to natural selection in our ancestors. In any event, this was the gap that sociobiology sought to fill. Human biology must have evolved through natural selection, just like the biology of all other species. Our basic motives, therefore, must be similar to those of all other species: to survive and reproduce. This is what E.O. Wilson implied when he said that "genes hold culture on a leash." (Wilson 1978, p. 167).

This is a thesis of sociobiology. And it re-stoked the old controversies. E.O. Wilson and other sociobiologists have been accused of racism, sexism, determinism, reductionism, and other "isms." Picket lines have been formed to prevent them from speaking at universities. (Pinker 2002, pp. 108-112). Articles and books have been written to condemn sociobiology.

One reason for the controversy was previously discussed. When they speak of cultural evolution as an extension of natural selection, and of gene-culture co-evolution, this suggests that cultural change results from genetic selection. If so, cultural diversity would be connected to genetic selection. It would then follow that dominant cultures are the product of superior genetics. The fact that sociobiologists (mistakenly) reduce culture to behaviors, while constantly speaking of selection of genes "for" behaviors, reinforces the inference. Sociobiologists deny that they mean that differences between cultures are genetic. (*See e.g.* Wilson 1998, p. 271). But they have nevertheless mistakenly entangled cultural evolution with natural selection.

The thesis of sociobiology that culture derives from human biology also comes laden with a neo-Darwinian understanding of natural selection. According to neo-Darwinism, natural selection has honed all organisms, including our ancestors, to be

entirely selfish. Neo-Darwinism also creates an expectation that natural selection hard-wires organisms to maximize reproduction. Neither utter selfishness nor a drive to maximize reproduction is consistent with human psychology. As pointed out in *Dynastic Theory* (and as will be discussed briefly in Chapter 10), these neo-Darwinian propositions are contradicted not just by human propensities, but by clear patterns in other social species. Dynastic theory, which explains these patterns and propensities, will be summarized in a subsequent chapter, with the aim of framing a more accurate understanding of Darwinian theory and its relationship to human bio-psychology.

Chapter Eight will discuss in detail one of the main criticisms of sociobiology: genetic determinism. The criticism is that if genes program the phenotypes of humans, human biology cannot account for cultural diversity, at least not without invoking genetic differences between cultures. Meanwhile, I will provide the short answer to the issue of genetic determinism, which is as follows. The bio-psychology written into human DNA doesn't "fix" a human's psychological "phenotype." Instead, our DNA contains a vast repertoire of emotions. Colloquially we refer to these as love, lust, passion, fury, hate, aggression, peace, compassion, selfishness, generosity, hunger, curiosity, fear, and many more. From this vast repertoire, humans are able to create a diverse range of social norms and moral codes. We do so by amplifying some emotions, suppressing others, rearranging them, and conditioning them to respond variously to different stimuli in varying circumstances. We are born both psychologically selfish and altruistic. These traits, too, can be shaped and conditioned.

A piano provides an apt metaphor. All humans are born with more or less the same biological keys and notes, but scores of melodies can be composed on the same piano. Psychologically, we are flexible.

The argument is that this psychological flexibility—the vast range of emotions—evolved in our pre-cultural ancestors. It remains with us. With our capability of evolving culturally, this adaptive flexibility has been greatly amplified by modern humans. The result is the remarkable diversity of human cultures. There are many wings in the cultural library.

The proposition that the criteria that guide human minds in creating, selecting and building culture are supplied by our bio-psychology, which co-evolved with the human brain in our hominid ancestors, rests on four arguments. First, there must be some criteria; minds do not function randomly. Second, culture has evolved in a general direction, which implies criteria. Third, it is logical. Human brains evolved through natural selection. They made our ancestors into highly intelligent animals. However, in order to apply their intelligence, their brains must have had motives. The bio-

psychological criteria that filter our thoughts and call the brain to action co-evolved along with the large human brain.

Fourth, there is no viable alternative to this proposition. The alternative is that human brains are born as psychological blank slates, which is not logical, which does not comport with the facts, and gets us theoretically nowhere.

Some leading twentieth-century cultural anthropologists, including Leslie White, rejected the idea that human biology had anything to do with culture. White interpreted the fact that human biology has remained constant, while culture has evolved, to mean that culture must be explained without reference to human biology. (White 1949, p. 124). He reasoned that since different cultures hold opposite values, these values cannot stem from biology. He mentions, for example, that the notion of human nature (which he equated with human biology) has provided a justification for the institution of private property. He then refutes the justification by pointing out that "[t]here are many societies in which there is no private property in the resources of nature at all; on the contrary, they are free and accessible to all members of the society." (White 1949, p. 126). Likewise, it is often said that war and aggression are part of human nature. White then points out that war and aggression are conditional. They are fought for many reasons and in many different circumstances and sometimes not at all. (White 1949, p. 132). He also uses the minutiae of cultural diversity to illustrate his point:

> Man is one but his tastes vary enormously. A food loathed by one people may be a delicacy to another. Many Chinese cannot bear the thought of eating cheese, whereas most Europeans are fond of it.... Some tribes will not eat chicken or eggs. Others will eat eggs but prefer rotten eggs to fresh ones. The choicest porterhouse steak has no charms for the Hindu, nor baked ham or pork chops for the Jew. We have an aversion for worms and insects as food but many peoples eat them as delicacies. The Navajos will not eat fish. We will not eat dogs. The eating of human flesh is regarded with extreme revulsion by some peoples; to others it is the feast supreme. It would be hard indeed to name an edible substance that is regarded everywhere as food. The aversions and loathings likewise vary. What then can be attributed to "human nature"? Virtually nothing.

(White 1949, pp. 152-53).

White concludes: "What a people likes or loathes is not determined by the innate attractions and repulsions of the human organism. On the contrary, the preferences and aversions are produced within the human organism by a culture acting upon it from the outside." (*Id.*). Hence: "To introduce the human organism into a consideration of cultural variations is therefore not only irrelevant but wrong…." (White 1949, pp. 139, 141).

In *Culture and the Evolution of Man*, the eminent anthropologist Ashley Montagu voiced the same theme as White: "Instinctual drives", which evolved through natural selection, govern behaviors of other organisms, including our primate cousins. They "arise from within the organism, they are parts of its bodily structure". (Montagu 1962, p. x). But in humans, instincts have all but disappeared:

> In the course of human evolution the power of instinctual drives has gradually withered away, until man has virtually lost all his instincts. If there are any residues of instincts in man, they are, possibly, the automatic reaction to a sudden loud noise, and, in the remaining instance, to a sudden withdrawal of support; for the rest, man has no instincts.

(*Id.*, p. ix).

According to Montagu, the "instinctual drives" of humans have been supplanted by the "intelligence" of human minds. The "mental tools" of human intelligence have allowed humans to "escape from the restricting bondage of reliance upon organically determined predispositions…." (*Id.*, p. x). These mental tools have enabled humans to invent physical tools. Both mental and physical tools "open up a world of unlimited possibilities of development…. The evolutionary result of this is the development of a man-made extra-somatic environment, namely, *culture*...." (*Id.*)(emphasis in original).

The rejection of human biology is also evident in the philosophical psychology developed by J.B. Watson and B.F. Skinner. Their school of behaviorism begins with a premise that humans are born as blank slates, entirely plastic. Humans are thus molded by their environments—by learning through psychological reinforcement. (Stevenson 1974, pp. 92-93). That is, the environment, not biological heredity, determines behavior. (*Id.*, pp. 92-93). This eliminates thinking as a cause of human behavior. Instead, what humans do is determined by behavioral conditioning. (*Id.*, pp. 92-93).

In other words, the argument is that humans are born with no inherent biological predispositions. We begin life as blank slates, completely plastic. We are then shaped by behavioral conditioning and culture, with the aid of intelligence.

The flaw in the blank slate hypothesis has been pointed out by many others. (*See, eg.*, Pinker 2002). If we exclude the human biological organism, we can't explain why humans would want to do anything. Why some people crave pork chops while others shun them might not be explained by biology alone, but without it, we couldn't explain why people would want to eat anything at all. If humans have lost all instincts, why would humans want to develop tools? This seems self-evident. *Of course* we want to eat, survive attack, protect ourselves from weather, and get from one place to another; tools can help us do these things. But why do we *want* to do these things? If we

eliminate human biology as a source of motives, it is impossible to explain even the most self-evident wants, desires, and needs. It is impossible to explain why humans put intelligence to these ends, or any other.

Early in his career, Skinner wrote a novel, *Walden Two*, describing his vision of a utopian society. In this utopia, peace, harmony, productivity, and leisure prevail. This was made possible by enlightened behavioral conditioning. But where did Skinner get his vision of a utopia? Why did he regard—and expect others to regard—peace, harmony, productivity, and leisure as desirable values that we should condition through behaviorism? If we eliminate innate psychology as a source of motives—that is, if we are born as psychological blank slates—what would cause us to want one thing rather than another? Skinner might say that these motives are supplied by the purposeful conditioning of other humans—some humans plant them in others. This, however, simply pushes the question one step further back: what causes these other humans who do the behavioral conditioning to want one thing rather than another? Why would they prefer peace over war, or war over peace, or harmony over discord?

We cannot use reason to manufacture motives from a psychological blank slate. Reason, like intelligence—or as part of intelligence—is only a tool. By itself, reason cannot create ultimate end goals. It cannot create wants, desires, or needs out of thin air. In *Reason and Human Affairs*, Nobel laureate Herbert Simon observes that "whereas reason may provide powerful help in finding means to reach our ends, it has little to say about the ends themselves." (Simon 1983, p. 7). He adds:

> [R]eason is wholly instrumental. It cannot tell us where to go; at best it can tell us how to get there. It is a gun for hire that can be employed in the service of whatever goals we have, good or bad.....

(Simon 1983, p. 8).

In saying that reason has no role in telling us where to go, Simon overstates the case. Reason is not powerless in choosing our goals. It can be a tool for making choices. It can help us choose among competing wants, desires, and needs. It can aid us in choosing peace or war, harmony or discord, productivity or leisure. Reason cannot create a basic desire to enjoy sex, nor eliminate it. But it can aid in choosing when, where, with whom, and in what circumstances. Sex is a desire, but we have a range of other possible desires that compete with it—a desire to avoid conflict with our neighbor, for example. We may desire to exact revenge on people who have insulted us, but we may also calculate that they are more powerful, and thus we may prefer our desire for self-preservation. We employ reason to choose among our competing desires.

But fundamentally, Simon is right. To begin to apply reason, there must first be goals which themselves cannot be derived by reason. A desire to have sex, a desire for revenge, a desire for self-preservation—these could be called "reasons without reasons".

They supply the rational mind with something to want to do. When we experience mixed emotions, our rational minds can choose among them, but reason cannot create these emotional wants from nothing.

We need "reasons without reasons" because without them, we would not want to do anything at all. Eating, trying to survive, building shelter, desiring sex, having children, and avoiding harmful conflict—these things are not rational. They are nonrational. Or, perhaps it would be just as appropriate to say that they seem utterly rational because they are ingrained in us. They are so ingrained in us that when people do not do these things, their behaviors are regarded as irrational. Such behaviors seem irrational because the desires to do these things are an ingrained part of our biological nature.

They are inherent—they are transmitted to us as desires through biological heredity. We understand this so intuitively that we hardly need to think about it. We are not born as blank slates. Thus, even when Skinner, Locke, Montagu, and White either ignore human biology or expressly exclude it, we nevertheless make sense of the rest of their arguments by factoring human desires back in. They are our "reasons without reasons".

One of the difficulties in addressing the relationship of reason and intelligence to emotions and instincts is the way we commonly talk about "emotional" or "instinctive" reactions. By these reactions, we usually mean that they are unthinking; reason was *not* employed. We might say that the reaction was "knee jerk." Whatever caused the reaction, it tapped into a single emotion or instinct. An especially poignant insult, for example, might cause us to "see red" and lash out.

My point is that the alternative to an emotional reaction is not a complete lack of emotion—this is impossible; instead, the alternative is using reason to sort through the repertoire of emotions, weighing the consequences of acting upon one or the other, and choosing among the possible emotional responses. Sometimes we ponder these alternatives with cool, deliberate reason; sometimes we sort through these almost automatically, without being conscious that we are doing it; sometimes we try to sort through our emotions, but fury, or lust, or compassion, just keeps its grip on us, even when we try to let go of it; and sometimes we just instinctively react with no thought at all. But in all events, we must satisfy some emotion, even if we reject others, because a psychological void is theoretically and emotionally impossible.

Today it would be hard to find any scientist who would advance an argument for the blank slate hypothesis. Nevertheless, a blank slate hypothesis slips into theories and concepts in less obvious ways. In *The Selfish Gene*, Richard Dawkins argues that humans are entirely biologically selfish, like all other species. Thus, "if you wish, as I do, to build a society in which individuals cooperate generously and unselfishly towards a

common good, you can expect little help from biological nature. "Let us try to *teach* generosity and altruism, because we are born selfish." (Dawkins 1989, p. 3)(emphasis in original).

This is a blank slate hypothesis—the idea that we can manufacture values for which we have no biological propensity. Actually, it's worse than a blank slate hypothesis. It suggests that we have to manufacture values wholly at odds with our selfish biological nature. The flaw is that if we were born utterly selfish because of our biological heritage, no one would regard unselfishness, generosity, or the common good as virtues worth teaching; those in whom we sought to instill these virtues would be psychologically incapable of responding. A sociopath would not be considered a deviant human; he or she would be the norm.

Moreover, we are not born as selfish sociopaths. As people have long noted and child psychologists have documented, infants are born possessing natural empathy, and they want to be helpful. (Tomasello 2009, pp. 6-12). We are born with propensities to form social attachments. (Rathus 1990, p. 354-58). Forming social groups seems second nature to us because it *is* our nature. Kindness, compassion and cooperation are second nature to us because they *are* in our nature. We can enculturate moral values because they resonate with innate psychological propensities.

A blank slate hypothesis is also embedded in Dawkins' selfish meme theory, which is an attempt to explain the spread of cultural traits by positing adaptively neutral psychology. Selfish meme theory corresponds with Dawkins' selfish gene theory. (Dawkins 1989, pp. 189-201). According to Dawkins, each gene is selfish, aimed at propagating itself at the expense of rival genes. Selfish genes can arise and spread despite having no use to organisms, not even the organisms they inhabit.

Dawkins applied the same concept to cultural traits, which he dubbed "selfish memes." He argued that human minds contain discrete ideas, or "memes," for specific traits, which are analogous to discrete genes for specific traits: "Examples of memes are tunes, ideas, catch-phrases, clothes fashions, ways of making pots or of building arches." (*Id.*, p. 192). These spread by imitation. Why are some memes imitated and others not? According to Dawkins, memes spread simply because they achieve their aim of propagating themselves.

What then distinguishes a meme that is good at propagating itself from one that is not? "The survival value of a meme in the meme pool results from its great psychological appeal." (*Id.*, p. 193). To have great psychological appeal, must an idea have actual adaptive use to humans? According Dawkins, it does not. Just as selfish genes can arise and spread despite having no use to organisms, so too selfish memes spread irrespective of their utility to humans. Just as selfish genes are essentially parasites of the genome, memes are essentially parasites of human minds. (*Id.*, p. 192).

They are unadaptive.

The lure of selfish meme theory seems to be that it is easy to think of ideas that spread despite having no obvious adaptive use to anyone. Why did pet rocks become a popular sensation? Why does the tune to "Auld Lang Syne" stick in the brain? Dawkins takes particular aim at the idea of God: it is an imaginary idea that has great superficial appeal because, like a doctor's placebo, it provides psychological comfort. (*Id.*, p. 193).

As mentioned, it is true that humans do create and adopt a great deal of cultural trivia. The premise that human psychology is adaptively neutral can seem persuasive when we focus on these narrow sets of traits that appear to have no adaptive function (or which arguably do not). But as with a thematic emphasis on human folly, when we step back to look at culture more broadly, the flaw in this premise becomes apparent. No one would argue that the psychology that leads humans to improve arrowheads, pots, military readiness, business plans, and such is adaptively neutral. Some would argue, like Dawkins, that gods and religion are not adaptive. This is a misjudgment. As will be discussed in Chapter 12, when viewed with a broad perspective, religion and gods have had an enormous function in human culture, including "psychological comfort."

Generally, our thoughts are directed towards ends, goals, and purposes. Stephen Pinker points out that "[m]emes such as the theory of relativity are not the cumulative product of millions of *random* (undirected) mutations of some original idea, but each brain in the chain of production has added huge dollops of value to the product in a nonrandom way." (quoted in Dennett 1995, p. 355)(emphasis in original).

Dawkins' selfish meme theory is really an attempt to extend the concept of random mutations to culture. To say that thoughts are generated and selected as adaptively neutral is the same as saying that they are generated and selected randomly. How human minds could have evolved to do this, Dawkins does not say. In the end, selfish meme theory is a nothing more than another blank slate hypothesis but with a catchy name. It adds nothing to cultural theory.

Another problem with selfish meme theory is that ideas, thoughts, and cultural attributes do not come in discrete units, like genes for white flowers and genes for red flowers. Socialism creeps into capitalism, and vice-versa. Marxism means many different things to different people, including self-described Marxists. "God" may be central to all members of a religion, but what God represents varies from person to person. Even to any one person, the idea of God blends, mixes, and changes depending on the context, the mood, or the day.

The human mind categorizes, generalizes, and pigeonholes. We are constantly trying to place thoughts and ideas in neat, tidy slots. It is virtually requisite to do so in order to make sense of the world around us. But the way the mind works is not so limited. Ideas from apparently distant realms of thought are weaved together, constantly

re-woven, and put together in new—and sometimes useful—ways.

_____

The blank slate hypothesis is empty. To make sense of humans, we need to factor in innate psychological propensities. To make sense of the direction of cultural evolution, we need to do the same.

And because human bio-psychology evolved through natural selection, it has biased culture towards adaptation in a Darwinian sense. The direction of culture can therefore be fairly characterized as Darwinian.

By this I mean that the general direction of culture has mirrored the direction of life itself. Species adapt to changing environmental conditions. Life probes new niches to occupy. It diversifies. Lineages that are most adept at surviving, reproducing, and diverging are the kind that fill the world with descendants. Despite occasional bouts of extinction, life relentlessly pushes towards more, more and more.

Human culture has done the same. Cultural anthropology has focused on understanding pre-industrial, pre-literate cultures. Archaeology has reconstructed cultures and civilizations lost to history. Both fields remind us just how successful our species has been in occupying diverse ecological niches. From the frozen north to Amazon hothouses to arid lands in between, humans have adapted. People have found ways of making a living and bequeathing it to their heirs. Humans have evolved to do so. In the process, we have immensely expanded the human population.

This Darwinian direction does not make sense if we were born as blank slates. We would have had no reason to capture energy and put it into any particular use. This direction does make sense if we take human biology into account—a biology that evolved through natural selection.

To be clear, I am not arguing that continuing in a Darwinian direction of more, more and more will be adaptive for our species in the sense that it is a good thing. Nor when I use the term “adaptive” am I suggesting that something is a good thing. I am simply saying that it is what would be expected if our bio-psychology evolved through Darwinian natural selection. Using aspects of dynastic theory, I will later make the case that our bio-psychology also includes the ability to recognize and adapt to resource limits, along with other tools that might make it possible to alter this trajectory. But for now, I will contend that we will short-circuit our understanding of our species—and our understanding of what we can become—if we do not acknowledge who we are and why we are the way we are. This means acknowledging that the trajectory of cultural evolution has been Darwinian. And that this is because our bio-psychology evolved

along with the large human brain.

Harris was right. Biologically-supplied goals are necessary. (Harris 1988, p. 391). Without them, human intelligence would be tetherless. Nothing would restrict its range. Reason would be random. It would be unadaptive. There would be no direction to human culture, as in fact there is.

Human minds thus create, select, and build culture towards adaptive Darwinian goals. When we do so, we often consciously *intend* to direct culture towards adaptation. That is, there is often a fairly direct correspondence between human intent, adaptation, and the result in the sense of Darwinian survival and reproduction. We build fortifications, improve the design of seat belts, and enhance the medical care of pregnant women and newborns. Fertility figurines are ubiquitous in archaeological sites around the world, and no one doubts why. An archaeologist analyzing an arrowhead does not hesitate to ascribe to it a use that hinges on survival. If the archaeologist observes a succession of arrowhead "types", he or she does not hesitate to ascribe a reason for the modifications that is related to changes in the chances for survival—for instance, a shift in available game, or the abundance of a particular kind of mineral. The same could be said for pottery, shelter, agriculture, and the many other attributes of human life that make up the artifacts of archaeological study.

Yet it is also often true that our conscious intents, motives, and goals seem far removed from Darwinian ones. When we get our children off to the bus in the morning, we ensure that their lunch is packed and their mittens on, remind them to look both ways while crossing the street, tell them to pay attention in class, and give them a hug good-bye. All of these things may aid our reproductive success, but it is likely that such success will form no part of our conscious intent. It seems crass to put it in Darwinian terms when the motives we do sense are love and duty. Yet joy, curiosity, love, and duty—these and other emotions are the proximate and often circuitous ways of propelling us in an adaptive direction.

A wildcatter risks his capital for the thrill of prospective financial rewards, not personal survival or reproduction. Nevertheless, the end to which the fruits of his labor eventually are put will stoke the economic engine that perpetuates the expansion of his society. The wildcatter may not intend to bring this about. He may care only for his own profit or for social recognition. But the innate psychology that prefers prosperity to poverty leads us in an adaptive Darwinian direction.

The psychological criteria that call the brain to action—what I earlier referred to as the vast repertoire of human emotions—and therefore direct human intelligence,

evolved because they assisted our ancestors in surviving, reproducing and finding ways to adapt to new niches. But this does not mean they were necessarily honed by Darwinian natural selection to make us *conscious* of the ultimate adaptive end to which our actions are put—only that they bring about the adaptive end, whatever it is that our minds tell us we intend to do.

CHAPTER FIVE
~
DIRECTED CREATIVITY DISTINGUISHED FROM OTHER CULTURAL THEORIES

The proposition that human minds cause cultural evolution is a strange one. On the one hand, the proposition seems far too obvious to require proof, much less an extended discussion of it. It is what everyone knows. If the man or woman on the street were asked what accounts for the fact that our species has evolved from cave dwellers to high rise dwellers who explore outer space, he or she probably would not hesitate to point a finger at the mind. We are smart, clever, and creative. The creative mind is the pride of our species. When it comes to distinguishing our species from others, our extraordinary intelligence, made possible by our big brains, is the first thing that comes to mind.

Yet no formal scientific theory has incorporated the proposition that creative minds cause cultural evolution. The social sciences in general have excluded creativity as a causal force. Instead, theories have placed causation in forces external to humans.

Leslie White forcefully argued that "the primary function of culture [is] to harness and control energy so that it may be put to work in man's service." (White 1988, p. 339). But he excluded humans from the process of evolving culture. "Culture must be explained in terms of culture." (*Id.*, p. 141). To explain culture in terms of culture itself, White conceived of culture more or less as made up of material elements, like physical particles. Culture evolves as cultural particles bang into one another, literally:

> We explain it in terms of culture itself. A thunderstorm or a tornado is explained in terms of antecedent and concomitant meteorological events; a clan or a constitution is likewise accounted for by citing its cultural antecedents and concomitants. Culture is ... a stream of interacting elements; one trait reacts upon others and is affected by them in return. Some elements become obsolete and are eliminated from the stream; new elements are incorporated into it.

(White 1988, p. 354).

Fellow anthropologist Julian Steward called White's idea that "culture comes from culture" a "fruitless assumption". (Steward 1988, p. 327). The idea that Hopi culture causes Hopi culture to evolve—or that human culture causes human culture to evolve—explains nothing. The reasoning is circular.

Steward devised a theory, which he called "cultural ecology," to account for some

facets of cultural diversity. (Steward 1988). His thesis is that the physical environment causes cultures to diverge. They diverge because ecological variations require different means of subsistence. Cultures therefore adapt. Eskimos do not farm because the physical environment is unsuitable. They hunt instead, and the kind of game that is available requires that they be nomadic. Eskimos build igloos while Bushmen do not. The physical environment thus directly explains divergence in terms of means of subsistence.

Steward argued that cultural ecology could explain even more. Other cultural attributes, such as economic arrangements, are tied to the means of subsistence. People who are nomadic hunters and gatherers require a different type of kinship system than a society that revolves around agriculture. This, in turn, influences other cultural attributes, including political systems. He called the constellation of cultural attributes that are affected by subsistence and economic arrangements—and therefore by the physical environment—the cultural "core". (*Id.*, p. 327). According to Steward, societies in similar ecological environments have similar cultural cores. This results in cultural "types".

Steward acknowledged that the physical environment does not account for all cultural attributes and their diversity. Some cultural attributes exhibit no apparent relationship to subsistence and economics, and therefore no relationship to the cultural core. Why is one culture typified by red and white polychrome pottery while another is typified by black on white? What does the physical environment or subsistence have to do with artistic styles? According to Steward, "secondary features...are determined to a greater extent by purely cultural historical factors—by random innovations or by diffusion...." (Steward 1988, p. 327). By giving the outward appearance of distinctiveness, differences in secondary features often disguise similarity in cultural cores that are due to adaptations to similar environments. (*Id.*, pp. 327-28).

Steward also acknowledged that his theory of environmental causation could not explain what White was concerned with, which was material progress in technologies and energy capture. "The concept of cultural ecology is less concerned with the origin and diffusion of technologies than with the fact that they may be used differently and entail different social arrangements in each environment." (*Id.*, p. 328).

White had ruled out the physical environment as a cause of the material progress. He did so for an obvious reason. Although it is true that particular cultures are "conditioned" by their local environments, over the long span of evolutionary time, these local environmental variations "average" out. (White 1949, p. 368).

White's point could be made another way. Local variations in the environment explain why Eskimos build igloos while Bushmen do not, but it does not explain the evolution of central heating, thermopane windows, and doors. The same reasoning

applies to changes in the Earth's physical environment over time, such as global temperatures. These changes do not bring airplanes, personal computers, industrialism, or democracy into existence from hunter-gatherer beginnings. Changes (or differences) in the physical environment do not cause the evolution of surface-to-air missiles from catapults, or machine guns from bows and arrows.

According to Marshall Sahlins, there was no real disagreement between White and Steward. They were simply focused on two separate categories of cultural evolution. (Sahlins 1988). Sahlins called one category "general evolution." By this he meant the overall direction of human culture. This kind of evolution is what White was describing—increased productivity and energy capture; from fire as a source of heat and cooking to central heating and gas stoves. Sahlins called this direction "progress", analogizing general cultural evolution to the progression from lower forms to higher forms in biological evolution. (Sahlins 1988, pp. 367-71).

Sahlins called the second category specific evolution. By this he meant divergence, which he analogized to speciation in biological evolution. Navajos, Utes, Eskimos, Bushmen, Germans and Chinese have evolved cultural systems distinct from one another. Each has its own separate set of customs, laws, technologies and other cultural attributes. Specific evolution is what Steward was describing.

Sahlins then argued that general and specific evolution are separate processes with distinctly different causes. Thus, White was right. In general evolution, cultural-historical factors are relevant, while the physical "environment is 'constant', or better, irrelevant". (Sahlins 1988, p. 374). And Steward was also right. In specific evolution, the environment is variable, causing cultural divergence.

But there is a logical shortcoming in separating cultural evolution into two categories with separate means of causation. Igloos did not always exist. Although the igloo is an adaptation to a specific environment, at some point in the past migrants to the icy cold north would have regarded igloos as material progress because igloos enabled them to live in that environment. Moreover, general evolution does not occur separate and apart from the evolution of specific cultures. The evolution from hunters and gatherers to agricultural civilizations, occurs in specific cultures, not to the human species in general.

The empirical patterns that specific and general evolution seek to explain appear to be different—why Eskimos build igloos while Bushmen do not, as opposed to why humans have improved housing to include central heating, windows and doors. In either case, however, culture does not stand still. It evolves. In either case, the questions really are the same: what causes culture to evolve?

A better way to think about the difference between specific and general evolution is that they focus on different aspects of the concept of "adaptation". Steward's theory

explains the kind of adaptations that are responses to specific environmental conditions. There is no way to compare these diverse adaptations in terms of relative improvement. Eskimo dog sleds are not improvements over Polynesian outrigger canoes. They are adaptations to incomparable local conditions. White, on the other hand, focused on adaptation as relative material improvement—eg., snowmobiles versus dog sleds, power boats versus outrigger canoes, trains versus horse drawn carts—improved means of transportation. The physical environment cannot account for this kind of cultural evolution.

But in all cases, they are adaptations. In all cases, these adaptations represent the evolution of culture. The process of cultural evolution ought to be the same and account for both kinds of adaptations.

According to the theory of directed creativity, creative human minds are the cause of both kinds of cultural evolution. Directed creativity takes the physical environment into account. The local environment stimulates human creativity. Minds *perceive* ice and cold; they *imagine* igloos and dog sleds; people *invent* them. Polynesians perceive an island environment surrounded by water and devise outrigger canoes. People living in colder climates may be more stimulated to invent central heating, thermopane windows, and doors. But the physical environment doesn't cause these to come into being, as though it could physically impinge on humans and result in any of these material attributes. The environment stimulates creative minds to invent them in order to aid human comfort.

In *Guns, Germs and Steel* (Diamond 1999), Jared Diamond does point out that differences in physical environments might explain one aspect of general evolution: the fact that some societies have developed more materially advanced cultural attributes than others. Some people have happened to live in environments with more favorable resources than others. If wild grains exist locally, people can develop grain agriculture. If there are wild horses, people can domesticate them. If these resources do not exist, they cannot. The development of a favorable resource sets in motion a chain of causation. A culture that has developed grain agriculture in turn develops other cultural innovations, which in turn lead to others. A single difference in the physical environment—and, hence, the resulting experiences and knowledge—can touch off a cascade of consequences that lead to larger differences in cultures, including their complex webs of social organization.

This is an important point. The physical environment in all its aspects is presented to us as a fact that constrains innovative possibilities and provides opportunities. The law of gravity constrains our ability to fly and to engineer adaptations that enable us to do so. Temperatures, rainfall, and water limit what crops can be grown and what animals can be domesticated. Geography determines what fuels are available for cooking and heating. These environmental factors enter our thoughts as perceptions, are filtered by human

minds, and condition human imagination. They thus affect cultural adaptations. The propensity of Eskimo and Polynesian minds to select, direct, and create cultural adaptations does not differ. The bias of their minds towards adaptation does not differ. But their environments, and hence their perceptions, imagination and experiences, do.

Although White's notion that culture causes culture is circular, it is true that existing culture is also an important environmental influence. It is a form of inheritance that is absorbed by human minds as a base to build upon. The particular culture that one inherits sets conditions for cultural innovation and selection. Russians, Kurds, and French Canadians begin life with different cultural bases. Culture thus shapes the universe of possibilities for cultural change. Edison could not have invented the light bulb had he lived in a remote Amazon village. The tools, materials, and knowledge base would not have been available. He probably could not even have imagined a light bulb. The universe of cultural possibilities that are available at any given time depends on the base of knowledge.

Cultural inheritance can be a conservative influence. One of the most noticeable characteristics of enculturation is inertia in cultural development. Kroeber and Kluckhohn observed:

> But with societies as with individuals any crucial 'choice' is to greater or lesser degree a determiner of later ones. Once a group starts down one road, the paths that would have opened up on another route that was 'objectively' available will not be traversed; even if they should be, the territory will be reacted to, not freshly, but in a fashion colored and shaped by the experience upon the first road.

(Kroeber and Kluckhohn 1963, pp. 216-17).

Cultural inheritance conditions peoples' perceptions, sets constraints on cultural innovations, and forms a base for new adaptations. But it is not just cultural technologies that condition perceptions, set constraints, and form the basis for new adaptations. It is also the psychology that is embodied in customs, beliefs, and values. This is why a person contemplating changes in society's political system will think differently about the role of women in society depending on whether the person was born in the Shogun era or modern Japan, in a fundamentalist Islamic society or a secular European nation. A consequence of this conditioning is cultural inertia.

Nevertheless, culture is not static. It evolves. Japanese culture in 2013 will be similar to Japanese culture in 2012, but it will not be identical. The changes in Japanese culture over longer periods of time are even more apparent. These changes may be traced in step-by-step increments, and each change will be influenced by the culture as it previously existed.

Change occurs because a current culture does not always resonate with everyone. Societies have cultural splinters and dissident sub-cultures, ensuring debate and stimulating innovation. It is especially true in most modern societies that youth and young adults tend to view their culture with a fresher perspective than do their elders, whose beliefs about the world have ossified into conventional wisdom with the passage of time. Darwin himself noted this in *The Origin of Species*, commenting that "I by no means expect to convince experienced naturalists whose minds are stocked with a multitude of facts all viewed, during a long course of years, from a point of view directly opposite to mine … but I look with confidence to the future,--to young and rising naturalists, who will be able to view both sides of the question with impartiality." (Darwin 1952a, p. 240). Evolution as well as revolution are led as much by vigor as by experience.

The competitive nature of an environment may also stimulate innovation. The competitive environment can change as people move to a new area or other groups migrate to their own. It might change because of perceived threats from neighboring groups, which might stimulate creativity. Necessity—or the perception of necessity—is the mother of at least some inventions.

To some degree, cultural innovation is stimulated simply because people are curious. We tinker and explore because human minds enjoy novel ideas and new things. We take pleasure in improving on the old. To some extent, cultural innovation is stimulated simply because humans prefer prosperity to poverty. We prefer more material comforts and devise ways to bring them into being.

The same analysis applies to history as an external cause of evolution. Marx contended that history unfolds in a predestined dialectic, with historical forces inevitably producing an antithesis, resulting in a new synthesis. Human consciousness does not determine social existence; social existence determines consciousness. People exercise no choice in the matter. History determines the future.

Marx was wrong. The future isn't predetermined by history. A preceding sequence of historical events—the historical narrative—will influence the subsequent narrative. What has gone on before constrains and conditions what humans are capable of doing at any subsequent point in human history. But history doesn't just happen to people. Humans make history. Human minds perceive the preceding narrative, absorb it, noodle it around, and seek to influence the subsequent narrative. The rallying cry with which Marx and Engels concluded the *Communist Manifesto* was aimed at stirring peoples' consciousness: "Let the ruling classes tremble at a Communistic revolution. The proletarians have nothing to lose but their chains. They have a world to win. WORKING MEN OF ALL COUNTRIES, UNITE!" (Mendel 1961, pp. 43-44). It was a call to action for people to institute social change. People, including Marx and Engels, make history.

As for genes, although they are internal to human bodies, they are external in the sense that we have no control over them. The DNA of each human is determined by the interaction of a sperm and an egg.

In directed creativity, genes influence cultural evolution, but not through natural selection of genetic variations. DNA causes cultural evolution in the sense that it builds humans. It builds the biological capacities for culture—manipulative hands, bipedal locomotion, speech, language, hearing, and the large human brain. The natural selection of these capacities has produced an emergent, unique form of evolution.

"Create." As the word suggests, we attempt to turn an imagined scenario into reality. Sometimes we are successful. Light bulbs, igloos, domesticated horses, *The Wealth of Nations*, the *Communist Manifesto*, and monotheism are not programmed reactions to environmental inputs. They are manifestations of creative human minds. Humans self-evolve by creating, selecting, and building cultural adaptations on adaptations.

CHAPTER SIX
~
CREATIVITY AND DETERMINISM

If creativity is so obviously a mover of cultural evolution, why have cultural theories failed to incorporate it?

One possibility is that creativity is just too obvious to mention; although they have not expressly included the creative human mind, cultural theories have implicitly assumed it.

This possibility can be rejected. If creativity had been taken into account, cultural theories such as White's wouldn't have gotten stuck on the circularity that culture causes culture; Steward's wouldn't haven't gotten stuck on the limiting concept of ecological causation. There have been many discussions about "cultural selection", and about the relationship of natural selection to cultural evolution. These discussions and arguments could have been cut short if someone had pointed out that creative, selective human minds substitute for Darwinian natural selection.

A second possibility is that if human minds cause culture to evolve, then you need to supply criteria for creativity and selection. The source of these criteria is not obvious. The blank slate hypothesis is a dead end. It supplies no criteria. Although sociobiologists have hinted at criteria with the thesis that genes determine human behaviors, they have not put it in terms of a psychology that supplies criteria for creative minds. If they did so, they would then run up against the same problems with neo-Darwinian theory that I encountered. Why then aren't humans entirely selfish? Why are we group oriented? Why do we share culture with complete strangers? Why don't individual humans maximize offspring? If genes determine behaviors, how does cultural diversity come about? As currently constituted, neo-Darwinian theory has been incompatible with human behavior.

These seemed like significant impediments, but none of them satisfactorily explained why some scientist had not at least seriously explored the hypothesis that minds move culture, then wrestled with the components necessary for a fully-developed theory.

The root reason, I am fairly certain, is the scientific premise of determinism.

In scientific determinism, all causation must be external to the "body". A rock does not move itself. It has no volition. It has no will. It will not move unless it is struck by another object or unless some other external force (such as gravity) causes it to move. If a force puts a rock in motion, it will continue moving in the same direction unless some other force causes it to alter its direction or stop altogether. This is reflected in Newton's

famous first law of mechanics:

> Every body perseveres in its state of rest, or of uniform motion in a right (straight) line, unless it is compelled to change that state by forces impressed thereon.

(Dixon 1984, p. 39).

In other words, a "body" of matter cannot move itself. Causation must therefore be external to the “body”.

This is mechanistic causation. It is integral to the scientific philosophy of mechanistic determinism that all events can be traced to a chain of preceding material causes. The universe unfolds like a mechanical clock. (Popper 1985, pp. 250-51).

Mechanistic determinism means that the universe is predictable, at least in principle. If all antecedent causes and the physical laws applicable to them are known, resulting states of matter are predictable—in principle. (Popper 1985, p. 256). In a Newtonian world, clouds are clocks, just complicated ones. (*Id*, p. 250). Knowing all previous states of matter, an omniscient being could perfectly predict the movements of clouds, the weather, and anything else. Since we are not omniscient, humans cannot predict all states of matter. As a practical matter, say with the weather, the phenomena may be so complicated and involve so many swiftly moving variables that it is beyond the capacity of humans to render an accurate prediction.

Nevertheless, phenomena are perfectly predictable in principle. All around us particles impinge on particles, deterministically moving the universe forward. This follows from Newtonian physics and the notion of external causation.

Even before Newton developed his laws of mechanics, some of the most revered philosophers had reached the conclusion that organisms are automata, built in principle like machines. Generally acknowledged to be the founder of modern philosophy, Descartes regarded living things as machines. (Russell 1972, p. 557; Descartes 1956, p. vii). He reasoned that the rules of mechanics are the rules of nature; organisms are part of nature and hence are mechanical. (Descartes 1956, pp. 35-36).

But Descartes made an exception for humans because, although our bodies are machine-like, we possess rational souls (in the mind). In this Cartesian dualism, the body is made of matter; the mind is not. Hobbes also regarded organisms as automata. (Russell 1972, p. 548). However, he was more tough-minded and refused to make an exception for humans.

> For Hobbes, we are made of matter, the same as everything else in the universe, and subject to the same mechanical laws as nonliving matter.

> Hobbes' view of humans as machines has prevailed over Cartesian dualism because it follows from Descartes' method. Descartes himself allowed one small exception: a human soul could, by volition, alter the direction though not the quantity of the animal spirits. This, however, was contrary to the spirit of the system, and turned out to be contrary to the laws of mechanics; it was therefore dropped. The consequence was that all the movements of matter were determined by physical laws, and owing to parallelism, mental events were equally determinate.... [I]t was not difficult to extend the theory that animals are automata: why not say the same of man, and simplify the system by making it consistent with materialism? This step was actually taken in the eighteenth century.

(Russell 1972, p. 568). Newton's formulation of his universal laws of mechanics, and their successful application to the motions of the planets, solidified the Cartesian view of organisms as mechanical. (Russell 1972, p. 537).

It is difficult to overstate the influence of Newton on Enlightenment philosophers and, hence, on modern philosophy. "What Voltaire and his readers found inspiring in these theories was not simply the mechanical view of the universe (Descartes had developed such a viewpoint half a century earlier), but the inherent rationality of Newton's scheme, the rational order of the universe, and the rational ability of human genius to understand it. The concept of an orderly universe was among the oldest of ideas, but Newton's physics established the new sense of this order that would define the Enlightenment." (Solomon 1979, p. 41). The French mathematician and philosopher Simon LaPlace famously boasted:

> We may regard the present state of the universe as the effect of its past and the cause of the future. An intellect which at any moment knew all the forces that animate nature and the mutual position of the beings that compose it, if this intellect were vast enough to submit its data to analysis, could condense into a single formula the movement of the greatest bodies of the universe and that of the lightest atom: for such an intellect nothing could be uncertain; and the future just like the past would be present before its eyes.

(Kline 1953, p. 255, quoting LaPlace).

Although derived from inanimate nature, Newtonian mechanics was presumed to apply to all forms of life, including humans. Echoing Hobbes, Voltaire put it this way: "It would be very singular that all nature, all the planets, should obey eternal laws, and that there should be a little animal, five feet high, who, in contempt of these laws, could act as he pleased, solely according to his caprice." (*Id.*).

The application of Newtonian determinism to life also follows from the principle

of reductionism, which is a goal of science. (Dennett 1995, pp. 8-82). Reductionism seeks to unify science by unifying laws of social science, biology, chemistry, and physics. Larger, more complex configurations of matter should be able to be explained at the smallest level of matter of which it is composed. Or, as Sober puts it, the objective is to understand a larger configuration of matter—the whole—in terms of its parts. (Sober 1984, pp. 166-67). Organisms are made of particles. Physical particles being governed by the laws of physics, organisms likewise must be subject to the laws of physics. The laws governing particles being mechanical, the whole that they form must also be mechanical. Since, according to the laws of physics, physical particles are predictable in principle, and biological organisms are made of physical particles, organisms must be predictable in principle.

In practice, of course, nothing of the sort has been accomplished. No one claims that the morphological development of a worm can be explained by quarks, atoms, electrons and the laws applicable to them. Nor does anyone claim that the evolution of monotheism can be understood at anything approaching that level of explanation. Reductionism is simply a scientific ideal. Nevertheless, as a unifying ideal, the principles of the laws of physics, including mechanistic determinism, percolate up to influence the angle of scientific approach.

Mechanistic determinism has become the philosophical premise of scientific causation—the "ruling faith of enlightened men." (Popper 1985, p. 250-51). Determinism is a paradigm of science. (Popper 1985, p. 250). This paradigm applies not just to the physical sciences, from which it was derived, but also to the biological sciences, the Darwinian theory of natural selection, humans, and human cultural evolution. (*See* Dennett 1995,p. 315; Lenski and Mittler 1993, p. 188; Velasquez 1994, p. 249; Mayr 1982, pp. 528-30; Popper 1985, p. 250).

And so, the universe is made of matter; matter moves according to mechanical laws, with the universe unwinding like a mechanical clock; life is made of matter and therefore is subject to mechanical laws; therefore, all forms of life are automata. Like rocks, organisms have no volition. They can't move unless an external force is impressed upon them.

In neo-Darwinism, determinism is central to the concept of the genetic program. (Mayr 1982, p. 48). Neo-Darwinian determinism is most vividly represented by its explanation of how new genetic variation arises. Organisms have no role in generating variation. Genetic variation arises through chance mutations—random errors. Variation just happens. Biologist John H. Campbell explains:

> Newtonian dynamics relies on distinguishing a mechanical system from its surroundings.... Neodarwinism extends this framework of causality to evolution. Evolution is a process of change *in* a biological system, but *due*

> to forces from without.... The triumph of a complete, objective, reductionistic, and mathematically precise explanation for evolution is in finally banishing vitalism from the process. *Neodarwinism does so by denying the behavior of the biological system any causal role in its evolution*.

(Campbell, J. 1982, p. 191)(emphasis added in part).

I don't know if scientists truly believe that humans are automata, but cultural theories are entirely deterministic. Leslie White made determinism explicit. "Culturology means determinism, too. The principle of cause and effect operates in the realm of cultural phenomena as it does everywhere else in our experience of the cosmos. Any given cultural situation has been determined by other cultural events." (White 1949, p. 413). E.O. Wilson also explicitly acknowledged determinism. (Wilson 1998, pp. 119-120). Commenting on the nature/nurture debate, philosopher of science Philip Kitcher observed that neither nature nor nurture allows any role for the individual human in how he or she turns out:

> Both genetic and cultural determinism advance the idea that our desires and intentions are imposed on us and that we are, in consequence, not free. For the cultural determinist, people are so plastic that their goals are entirely the product of the environment in which they are reared. The desires of the agent cannot be viewed as genuinely theirs, for they might have been led in quite different experiences at the crucial stages. Genetic determinists, by contrast, emphasize the rigidity of an agent's inclinations.

(Kitcher 1985, p. 410).

To include creativity into cultural theory would violate determinism. It would mean that humans do participate in cultural evolution. We would cause it. We would be self-evolving. Thus, as Popper observed, creativity is a casualty of determinism:

> I have called physical determinism a nightmare. It is a nightmare because it asserts that the whole world with everything in it is a huge automaton, and that we are nothing but little cogwheels, or at best sub-automata, within it. It thus destroys, in particular, the idea of creativity. It reduces to a complete illusion the idea that in preparing this lecture I have used my brain to create *something new*.

(Popper 1985, pp. 257-58)(emphasis in original).

A Test: Are We Automata?

But this is essential to the theory of directed creativity: humans *do* participate in our own evolution. The human biological system *does* have a causal role in cultural evolution. It participates through human minds. Minds create, select and build culture.

But does this necessarily mean that we are not automata? How could we tell? The way in which I began to think about it is this: what could an organism that is *not* an automaton do that an automaton could not?

Presumably, a non-automaton would not necessarily be a slave to its genetic program. It could in some sense determine its own course, independent of a fixed set of genetic instructions. But what would be the point of not following instructions? That is, when would determining an organism's own independent course be adaptive?

It would make sense for an organism not to follow set instructions when the organism encounters an environment for which the genetic program is not prepared, for which it has no adaptive response in the repertoire stored in its DNA. This must happen often in nature. The environment is vast. Each tiny sliver of the environment is unique in its molecular make-up. Even if it unfolds like a mechanical clock, given the complexity, the environment is never quite the same. It is also constantly changing. From the standpoint of organisms, the environment is unpredictable. Not all possibilities can be anticipated.

This is undoubtedly true in the micro-environment of each individual organism. But it would be especially evident in the macro-environment over the long haul of evolutionary time. Climate and terrain change immensely over the eons. The competitive environment constantly changes. Other organisms in the same species evolve new adaptions, as do other species. That is to say, ecosystems are highly diverse, unpredictable and evolving.

Faced with novel circumstances, how would a *non*-automaton adapt? It would not follow set instructions. Instead, it would perceive its environment, observe that the environment is novel, and know that the program is inadequate. It would devise a hypothesis as to what would be adaptive, then self-engineer a genetic change to create the adaptation. In other words, it would create its own instructions. A non-automaton would be self-determining, re-inventing itself as circumstances adaptively required.

In short, a *non*-automaton would want to evolve and know how to do so.

If an organism could do these things, it could go even further. Instead of simply adapting to novel environments, the organism could perceive adaptive opportunities that never before existed, then engineer these adaptations. It might take some experimentation, but with persistence an organism might perhaps come upon an adaptation that is useful. The adaptation would spread as descendants successfully survived and reproduced.

This, of course, is not how organisms adapt according to neo-Darwinian theory. They do none of these things. If they encounter an unanticipated environment, they must await a chance mutation that happens to be adaptive.

However, the automata model does *not* fit what we observe of humans. A *non*-automata model *does* describe human creativity and human adaptation. We see the creative process in action, in small ways, every day. We also adapt to novel circumstances in larger ways. If rainfall is insufficient to water the crops, we make a vessel that will store water that we can haul to the crops. We can go further and channel water from the river to the fields, with a gate that can open and shut the flow. Or we can pump water from the river using animals to power the pump. We can go even further and engineer a gas-powered hydraulic pump. If no river is near, we can drill into the aquifer and pump water to the fields.

Humans are constantly adapting to novel circumstances, not through error, not through chance, but by design. We seek, probe and grope for adaptations.

In fact, humans can use creativity to do more than just adapt to novel circumstances. We perceive opportunities that never before existed, then engineer these adaptations. Threats to survival did not compel the Wright brothers to invent a flying machine. They imagined human flight as an opportunity, then created a solution. It did not matter that their invention was only an incremental step in devising a practical machine to carry humans through the air. They, and others, saw the potential, inventing in increments until eventually humans produced airplanes that could take off, remain in the air, and land safely.

We are not automata—we evolve by creative adaptation.

That cultural evolution through directed creativity does not fit Newtonian mechanics can be illustrated another way. In a Newtonian system, the cause of change in culture can be determined (in principle) by an equation. For example, if $x = (ab + y)z$, then x can be solved if all constants and variables are known. Likewise, x cannot change unless either a, b, y or z change. That is, like a rock, x cannot move itself.

Thus, if x is culture, then culture is determined solely by external variables, such as the physical environment, the cultural environment, history or genes. For culture to evolve, there must be change in a, b, y or z. And if you know the change in variables, then you can predict the change in x: the evolution of culture.

In contrast, according to directed creativity, x cannot be predicted just from the external variables and constants. This is because to some extent x is self-determining. x can move itself. Through creative minds, humans *do* participate in the process of our own evolution.

An implication is that if all external variables were held constant—for example, the physical environment did not change—culture would nevertheless evolve. Even if the external environment stood completely still, human minds would not remain still. They would continue to roil with creative thoughts. Although minds perceive the environment and react to it, directed creativity is not dependent on a change in external factors. We would continue to evolve, towards goals supplied by human bio-psychology.

The same logic holds if *x*, instead of representing culture, represents the "phenotype" (sum of morphology and behaviors) of an individual human. You can't predict an individual's phenotype just from the external variables and constants—the sum of its genes and the environment. Individual humans are to some extent self-determining. We are not merely the product of nature and nurture. As individuals, too, we cause ourselves to adapt and evolve.

Humans and cultural evolution are not Newtonian mechanical systems. Unlike rocks, humans can move themselves. We self-evolve.

Creativity and Foresight

For the same reasons, human creativity also contravenes the doctrine that natural selection has no foresight. (Dennett 1995, p. 76; Mayr 1982, p. 579). Evolution through natural selection is "blind". Organisms do not "see ahead" and direct genetic variation in order to adapt and evolve. "[M]utation is random, but this only means that it can't see into the future and plan what would be good for the animal." (Dawkins 1986, p. 309).

In contrast, when humans imagine the *potential* consequences of their *potential* courses of conduct, evaluate these, and devise a course of behavior that is better than random, this *does* entail foresight.

In human affairs, foresight is often surrounded by an aura of mysticism. The future may be foretold by gazing into a crystal ball, reading tea leaves or palms, consulting oracles or stars. Prophets interpret dreams, experience visions, and receive revelations.

Yet we use foresight every day without fanfare. We look at the calendar, see that we have a school board meeting the following night, and plan accordingly. An investment group may prop up a money-losing business with infusions of cash because it has projected that eventually the business will turn profitable. Foresight is implied whenever humans strategize. A field general projects the enemy's movements, then maneuvers his own troops to potential advantage.

In one sense, foresight is conceptually separable from innovative thought. An

inventor toiling on a gadget is not necessarily "looking down the road." He or she just may be curious, tinkering in the here and now. Nor when we plan our day around an upcoming school board meeting do we think that we are doing anything innovative; we are just trying to manage life.

Yet inevitably the two concepts come together. Both foresight and creativity involve imagining things that do not yet exist. That is their common ground. Whenever the mind imagines, it is formulating a vision of how the world might be, but is not. The visions exist as scenarios in our minds, and not elsewhere. We turn these visions over in our minds. Many drift and disappear. A few are chosen and influence our conduct. A person hoping to improve an arrowhead or an airplane imagines the design, anticipates how it will work, envisions its future use—and, if ambitious, plans how to make the vision a reality.

Foresight is much more prosaic than divining the future through crystal balls, tea leaves or stars. Foresight is applied history. We project the future by extrapolating from the past.

How do we foresee that, in the United States, a presidential election will be held in November, 2012? We "know" that it will then occur probably because we know from experience that presidential elections happen every four years and the last one was in November, 2008. With a little more knowledge of history, we will know that this has been the pattern for the last two centuries, that it is written into law, and that the law has been followed. Extrapolating from this information, we project that another election will also occur in November, 2016.

To do this, we need a calendar. Calendars have been devised the same way. Astronomers have observed the course of the earth going around the sun and have calculated the number of days it takes to make a full revolution. These patterns have proved regular. Past patterns are projected into the future in order to "map" the dates and plan accordingly.

Of course, this method of extrapolating from history does not enable us to actually "know" the future ahead of time. Patterns recur, usually predictably, but not always. History does not repeat itself exactly; life unfolds in a unique narrative. Until the 2000 presidential election in the United States, most citizens were confident that they would know who the new president would be sometime on the evening of an election or when they awoke the next morning. This is what experience had taught us. But due to a statistically improbable sequence of events, the outcome was surprisingly delayed when the margin of victory was so narrow that a more precise tally of votes was required.

This kind of thing is not uncommon. As in horse races, there are good bets and bad bets, but seldom a sure thing. Surprises happen, yet we are not surprised that they do. We learn to adjust.

We expect to. Perhaps the most recurring historical pattern is uncertainty itself. We frequently encounter circumstances for which there is little precedent with which to project and predict. A military commander may find his troops facing an enemy using unfamiliar weapons and tactics. The band perhaps does not show up for the wedding reception.

Yet in the face of events, precedented or unprecedented, we are seldom helpless in figuring out some scenario with which to guide our actions. We draw on analogies, metaphors, and aphorisms. We reach deeper into history books, search out people who have experienced similar circumstances for guidance, and so forth. We weave knowledge and information together, visualize various scenarios, narrow down the likelihoods, and take our chances.

We do this so often and effortlessly that we hardly stop to think about how we do it. Foresight is not mysterious. It is the consequence of history; or, rather, with the aid of the mind, it is reason applied to history.

Foresight enables us to anticipate the future. By doing so, we can alter present conduct. By altering present conduct, we shape the future. This almost sounds as if it reverses antecedent cause and effect—that instead, the future causes the present. It does not, of course. Foresight is not like a time machine that allows us to leap into the future and jump back into the past in order to alter events. What exists in our minds is obviously not the actual future; it is only an image of a potential future.

But if foresight is the consequence of history, how can we imagine things for which there is no historical precedent? Put another way, how can antecedent cause—history—give rise to unprecedented thoughts? If our thinking were confined only to analogues, and only to straightforward projections of historical sequences, we would be capable of only precedented thoughts. We would be stuck with pre-existing analogues and metaphors. We would be locked into prevailing paradigms.

We can use the past to imagine unprecedented futures, and to imagine novel ways to adapt to the expected, because we can weave together multiple patterns. Applying reason, we can extract thoughts and principles which could not be anticipated merely from any one pattern standing alone. Lawyers and judges are called upon to do this all the time. Many cases present unique facts that do not exactly fit precedent. Opposing lawyers make their arguments from general legal principles, from legislative intent, from the spirit of the law, distinguishing some legal precedent and analogizing it to other circumstances.

Scientists do the same thing when they create hypotheses and theories. Even paradigms can occasionally be undone, as evidenced by the Copernican, Newtonian, and

Darwinian revolutions. This is seldom easy. When we perceive facts, we tend to fit them into an existing paradigm, one that comes with a ready set of analogues and metaphors that reflect its key principles. These paradigms create mental frameworks for receiving new facts. Notoriously, the Earth-centered Ptolemaic system of astronomy managed to accommodate a growing series of factual discrepancies through continual tinkering. (Kuhn 1970, p. 68). It is usually far easier to tinker with the paradigm than it is to jettison it, especially when the paradigm becomes allied with other formidable doctrines—in the case of the Earth-centered Ptolemaic system, with Western theology. Nevertheless, it happens; old paradigms are replaced by new ones. As a philosophy, science is dedicated to this process when a new one more ably, and usually more simply, explains a class of phenomena.

Law and science, however, are only formalized approaches to what everyone does constantly in small and large ways, day in and day out. The mind has evolved to anticipate the unanticipated, and in doing so, adapt to uncertainty. It has evolved to fill the gaps that prior experience fails to fill. More, it has evolved to create the unprecedented.

Creativity and Language

In developing his ground-breaking theory of language, Noam Chomsky pointed out that the use of language demonstrates creativity. (Chomsky 1972, pp. 11-12). With ease, people can generate virtually an infinite number of sentences to express our thoughts, observations and ideas. Nearly all of these expressions are unprecedented, "not a repetition of anything that we have heard before and not anything similar in pattern—in any useful sense of the terms 'similar' and 'pattern'—to sentences or discourse that we have heard in the past." (*Id.*, p. 12). Not only can people generate unprecedented expressions, other people can comprehend them.

Chomsky also observed that for an expression to be truly creative, it is insufficient that the expression be merely novel; it must also be appropriate in the context in which it is used. That is to say, expressions can't just be random. "We can distinguish normal use of language from the ravings of a maniac or the output of a computer with a random element." (*Id.*). In the terminology I have primarily used, expressions could be said to be "directed." They are purposeful, which is why other people can comprehend them.

Chomsky further observed that truly creative expressions are not simply responses to external stimuli. "But the normal use of language is not only innovative and potentially infinite in scope, but also free from the control of detectable stimuli, either external or internal. It is because of this freedom from stimulus control that language can serve as an instrument of thought and self-expression, as it does not only for the exceptionally gifted and talented, but also, in fact, for every normal human." (*Id.*).

Expressions are thus unpredictable in principal.

Before Chomsky, modern linguists, psychologists and philosophers had attempted to squeeze the human facility for language into a framework of stimulus-response, which was also assumed to be the framework for human psychology as posited by the behaviorism of Skinner and others. (*Id.*, pp. 2-4). In other words, they had supposed humans to be automata, a supposition rejected by Chomsky.[1]

Significantly, according to Chomsky, the ability of humans to generate creative expressions, and for others to comprehend them, implies that the structures for interpreting grammar are innate. (*Id.*, pp. 91, 171). That is why, even though a person has heard only a "limited set of utterances of his language", the person nevertheless can "produce an indefinite number of new utterances which are immediately acceptable to members of his speech community." (Chomsky 1975, p. 64). That is also why children can so swiftly learn the language of their culture, and use it, even though they have heard only a small fraction of its potential expresssions. Applying the same kinds of observations more broadly to human mental faculties in general, "a highly constrained genetic program determines the basic structural properties of our 'mental organs,' thus making it possible for us to attain rich and intricate systems of knowledge and belief in a uniform manner on the basis of quite limited evidence." (Chomsky 1987, p. 197).

Thus, Chomsky's theory of linguistics, as I understand it, is essentially what I have called "directed creativity" applied to one particular realm of the human capacities for culture. But it is a particularly important realm, since language is the medium for expressing, transmitting and interpreting—and thus creating, selecting and building—the thoughts, beliefs and ideas that represent human culture. And just as language expressions are unpredictable in principle, so is the evolution of culture.

Reductionism: Back to Predictability in Principle?

Wilson argues that determinism operates at the level of particles in the brain; the complexity of the process prevents us from seeing this. (Wilson 1998, p. 119-20). The reasoning is this. Human minds are made of physical particles; these are governed by mechanistic causation; in principle, particles are predictable; if so, human minds must be deterministic and thus predictable in principle. Thus, at a level of reductionism below the human organism, at the level of particles, "the mind of a particular individual is

[1] Chomsky devoted an entire book to rehabilitating Descarte's view that human thoughts and expressions are not mechanical, unlike the behaviors of other animals (as Descarte had supposed). He called this Cartesian linguistics. *See* Chomsky 1966. For a good analysis of Chomsky's view of creativity and its relationship to linguistics and historical philosophy and psychology, *see* D'Agostino 1984.

predictable, and therefore truly, fundamentally determined.…" (*Id.*).

Logically, mustn't Wilson be right?

This is an interesting question. There are a number of ways to address it. One possibility is that mechanistic matter, which is entirely predictable, can combine at the particle level to form a system—the human mind—which is not entirely predictable. If so, directed creativity is a property of matter that emerges at a higher level. In scientific parlance, it is an emergent property.

In support of this possibility, life itself is an emergent property. Rocks, clouds, planets, asteroids, comets, stars, quasars, galaxies, black holes—all of these things are complex and fascinating. The inorganic universe is creative in the sense that, over time, new kinds of configurations of matter have come into being. However, no part of the inorganic universe metabolizes and reproduces with inheritance, at least not as far as we can tell. As Ayala has pointed out, none of them have properties that exist for a purpose. (Ayala 1988, p. 188). In contrast, the properties of organisms do exist for a purpose: to enable organisms to survive and reproduce (or, according to dynastic theory, to perpetuate a lineage). Life is a self-perpetuating system. Inorganic matter is not. As a self-perpetuating system, life emerged as a unique combination of physical particles.

Likewise, humans are unique from other forms of life in the ability to evolve using creative human minds. Perhaps human minds are also unique combinations of particles that exercise a degree of self-determination and are unpredictable in principle. If this is so, LaPlace's boast is not true. An omniscient being who knew all states of all particles, including those in Einstein's brain, could not have predicted that Einstein would invent his theory of relativity. An omniscient being could not have observed Adam Smith at the age of three and predicted that he would survive through adulthood, turn his attention to economics, and write *The Wealth of Nations,* and known beforehand every punctuation mark that the book eventually contained.

Another possibility is that at a level of understanding beyond our comprehension, the physical laws governing matter are in fact not mechanical. Perhaps it is really determinism that is an illusion. Perhaps particles really are unpredictable, even creative. It is just that at the level of large aggregations of matter, the unpredictable elements average out and thus appear Newtonian and mechanical. An omniscient being could see this, where we cannot.

Yet another possibility is that Wilson is right. We just can't see the mechanical predictability of human minds because we are not omniscient.

This is the conclusion that science has presumed to be correct. However, it bears pointing out that this conclusion is a presumption, based upon the principle of reductionism. The hypothesis has not been proven. It has not even been tested. The

conclusion that mechanistic determinism flows up from particles to organic matter, including humans, is not a fact-based observation. It follows from scientific faith.

Furthermore, the mode of thinking that this presumption has engendered has ossified scientific thought. Science has taken Newton's methodology of external causation, which is applicable to inorganic matter, and applied it to human cultural evolution. This methodology has therefore caused science, at a level above particles, to deny (or overlook) even the appearance of human creativity as a causal factor in cultural evolution. As a result, science has missed the obvious and thus been stuck with incomplete, unsatisfactory theories of cultural evolution.

Whether determinism operates at the level of brain cells, all we can do is speculate. From the standpoint of an omniscient being, who knows all states of physical matter and all laws governing them, it may be that the future of everything, including human destiny, is known. It may be perfectly predictable. But we are not omniscient. That hypothesis, therefore, cannot be tested.

And while it is interesting to speculate, that speculation is not relevant to the question of how we have evolved. To address this question, it is the human vantage point that is relevant, not that of an omniscient being. After all, scientific laws are devised not for an omniscient being, who would not need our assistance anyway. They are devised for human comprehension and use. It is at this level that the question of predictability, determinism and creativity are relevant. And it is at this level that an hypothesis can be tested: are we automata?

At this level, we do not fit the automata hypothesis. At the level of life—from the vantage of humans—the future course of human evolution is not entirely predictable. We are not stuck with a pre-existing repertoire of adaptations that are stored in our DNA. We are creative.

SECTION TWO
~
CULTURE AS EPIGENETIC EVOLUTION

CHAPTER SEVEN
~
CULTURAL DIVERSITY: THE PROBLEM OF BIOLOGICAL DETERMINISM

In *The Use and Abuse of Biology,* anthropologist Marshall Sahlins laid out the central criticism of the thesis of sociobiology that all culture ultimately derives from human biology, which he called biological (genetic) determinism. By this he meant that if genes determine culture, all cultures would be exactly alike because human biology is universal and constant. They are not; cultures are diverse. "The same human motives appear in different cultural forms, and different motives appear in the same forms. A fixed correspondence being lacking between the character of a society and the human character, there can be no biological determinism." (Sahlins 1977, p. 11).

The basic assumption in Sahlins' criticism is this: the genetic make-up of organisms, including humans, rigidly determines their phenotypes—the sum of their physical, behavioral and cultural characteristics. This is why he repeatedly refers to "biologically fixed inclinations", a "one-to-one parallel" between biological propensities and phenotype, and "isomorphism" between genes and phenotype. (Sahlins 1977, pp. 3-16).

Sahlins then used this assumption to argue that this is why culture must be conceived as a force separate from human biology. In fact, according to Sahlins, culture is a force that acts on the human biological organism to determine human psychology: "Culture is not ordered by the primitive emotions of the hypothalmus; it is the emotions which are organized by culture." (Sahlins 1977, p. 13).

If the assumption that genes fix a phenotype was correct, Sahlins' criticism would necessarily be right. Culture couldn't derive from human biology. But then we would be back to a blank slate hypothesis—what causes culture?

There is also a contradiction inherent in Sahlins' argument. He assumes that the human biological organism is malleable, which is why culture can order the human emotions. But he also assumes that DNA is rigid. Both assumptions cannot be correct. If we are biologically malleable, DNA must allow us to be malleable.

In Chapter 4, I stated that DNA does not rigidly prescribe a phenotype. Our bio-psychology consists of an array of emotions that can be organized in many different ways. I used a piano as a metaphor. Scores of melodies may be composed using the same keys and notes. In Sahlins' view, the keys and notes determine a single song.

Where did Sahlins get the notion that genes rigidly determine phenotype? I suspect that he got it from the way in which neo-Darwinians speak about genes. Biologists describe an organism's DNA as a "genetic program", "hard-wiring", "blueprint" or "recipe". (*See, eg.*, Futuyma 1986, p. 43; Dawkins 1986, pp. 294-96). For every conceivable trait, biologists speak of a gene "for" it. There are genes for this and genes for that. Thus, when E.O. Wilson asserts that "genes hold culture on a leash" (Wilson 1978, p. 167), one might infer that specific genes are supposed to produce specific cultural traits.

This manner of speaking about genes is rooted in Mendelian genetics, which is at the core of neo-Darwinism. Each (diploid) organism contains two sets of chromosomes. Each chromosome consists of a string of genes at "slots" on the chromosome. Some genes are fixed in a species; the genes at those slots on the two chromosomes will be identical. Others are not. There are alternative genes (alleles) for a particular slot, like the alleles for white and red flowers in Mendel's peas. From this Mendelian model, neo-Darwinism extrapolates that life evolves as alleles displace their rivals. (Dawkins 1989, p. 36). Thus, if two organisms have different traits, like red and white flowers in Mendel's peas, the presumption is that the differences are due to different alleles.

This is a model of an organism as a string of genes that code for specific traits. As will be discussed in the next chapter, the neo-Darwinian model is somewhat more complex than a string of genes and isn't quite as rigid as the term "genetic program" suggests. But this model does discourage an understanding of organisms as adaptively flexible. In that chapter I will lay out a model of organism as an epigenetic system, which I began to develop in *Dynastic Theory*. In this model, the DNA of all organisms contains a repertoire of adaptive and developmental possibilities, so that organisms' can differentiate phenotype without genetic differences. That is, my piano metaphor is essentially correct. The epigenetic model will then be applied to humans so that we can resolve Sahlins' contradiction, end the circularity, and see how diverse cultures can derive from the same human biological "form."

Before doing so, however, it is worth sharpening the focus on the problem raised by Sahlins' criticism.

Anthropologist George Murdock listed sixty-seven kinds of traits that are found in every human culture that has been studied:

> Age-grading, athletic sports, bodily adornment, calendar, cleanliness training, community organization, cooking, cooperative labor, cosmology, courtship, dancing, decorative art, divination, division of labor, dream

> interpretation, education, eschatology, ethics, ethnobotany, etiquette, faith healing, family feasting, fire making, folklore, food taboos, funeral rites, games, gestures, gift giving, government, greetings, hair styles, hospitality, housing, hygiene, incest taboos, inheritance rules, joking, kin groups, kinship nomenclature, language, law, luck superstitions, magic, marriage, mealtimes, medicine, obstetrics, penal sanctions, personal names, population policy, postnatal care, pregnancy usages, property rights, propitiation of supernatural beings, puberty customs, religious ritual, residence rules, sexual restrictions, soul concepts, status differentiation, surgery, tool making, trade, visiting, weaving, and weather control.

(Murdock, cited in Wilson 1978, pp. 21-22). Murdock called these "cultural universals". Similarly, some of the most significant cultural innovations have occurred independently in several parts of the globe: irrigation agriculture, domestication of livestock, monumental architecture (including pyramids), writing, and numbering systems. These cultural universals and cross-cultural parallels form an intriguing pattern, which suggests that something universal does underlie all human cultures. (Kroeber and Kluckhohn 1963, p. 215).

However, these "universals" represent *kinds* of traits, not the actual traits themselves, which vary from culture to culture. The fact that there is enormous variation in the ways people have expressed cultural universals—religious rituals, kinship systems, language, housing, and everything else on Murdock's list—is an equally important factor. Cultures are extremely diverse.

The most obvious cultural differences are in the material means of subsistence. The way of life of ancient cave dwellers hunting mastodons and digging roots is hardly comparable to the lives of most people living today. There are also differences in social structures and practices. Kinship systems are highly variable. So are the gods and religious beliefs. In some cultures people bury their dead, while some burn the bodies. A list of the differences in material ways of life and social structures and practices could go on and on.

Anthropologists have also identified differences in psychological outlooks among societies. Of course, even within a society, individuals may possess different attitudes about men, women, and their respective roles, about sex and marriage, about patriotism and globalism, about war and peace, religion, and just about any subject imaginable. Among societies, differences in attitudes, customs, and morals become even more pronounced. Icons repulse a devout Muslim, yet instill belief in many Christians. Romans cheering dueling gladiators held a far different view of the sanctity of individual human life than do modern Europeans.

Psychological diversity is also reflected in broad generalizations such as the

“Oriental mind” or the “Western mind”. Historians and others speak of zeitgeists, weltenschaungs and worldviews to characterize the intellectual attitudes and cultural climates of a particular people or an era, usually using these terms thematically to describe how they have affected history. Philosophers have noted that whereas ancient Greeks regarded humankind as having degenerated, fallen from a previous golden era, modern Western thought generally regards history as a progressive improvement in the human condition. This is a vast difference in outlook, which shapes attitudes towards tradition and innovation.

Ruth Benedict founded the “culture and personality” school of anthropology, in which particular cultures are characterized like individual human personalities (Benedict 1988), as though “culture is personality writ large”, and “personality is culture writ small”. (Kroeber and Kluckhohn 1963, p. 218). Characterizing whole cultures as though they were individual human personalities has been criticized on numerous grounds. (*See eg.*, Kroeber and Kluckhohn 1963, p. 218). It is simplistic; it ignores cultural idiosyncrasies; it ignores individual humans. Today we might characterize these criticisms as objections to stereotyping.

Yet even critics observe that Benedict's theory recognizes a fundamental fact: particular cultures *do* tend to have common sets of attitudes, customs, and values that distinguish them from other cultures. These can be generalized. When imparted to subsequent generations, these common attitudes, beliefs, customs, and values are maintained as part of the descendants' psychology. People are *enculturated*. Enculturation has a marked influence on individual personalities, who then (as a generalization) reflect the “personality” of the culture as a whole.

The doctrine of psychic unity holds that people everywhere have the same basic wants, needs, and desires. (Kroeber and Kluckhohn 1963, p. 215; White 1949, p. 145). This is a basic tenet of anthropology. The doctrine of psychic unity must be roughly accurate, as evidenced by cultural universals. It also corresponds with the fact that human biology—and, thus, bio-psychology—is everywhere the same. But it can’t be entirely correct. Cultures vary in their psychologies. Thus, cross-culturally, in at least some respects, people do vary in their needs, wants, and desires.

The psychology of an individual human thus depends in part on the culture in which he or she is raised. Culture, therefore, is a determinant of human psychology. In asserting that culture organizes emotions (Sahlins 1977, p. 13), Sahlins must be at least partly correct.

Emile Durkheim, one of the twentieth century’s most influential socio-cultural theorists, made the same point as Sahlins, using slightly different terminology. For example, Durkheim argued that innate sentiments (bio-psychology) have nothing to do with kinship structures; rather, kinship structures determine the sentiments of parents

and children:

> Social facts are not simply the development of psychic [biological] facts; the latter are in large part merely the continuation of the former inside people's minds. This proposition is extremely important, for the opposite point of view inclines the sociologist at every instant to take the cause for the effect and vice-versa. For example, if, as often happens, one sees in the organization of the family the logically necessary expression of human sentiments inherent in every mind, the true order of facts is reversed. On the contrary, it is the social organization of the relationships of kinship which has determined the respective sentiments of parents and children.... Every time that a social phenomenon is directly explained by a psychological phenomenon, we may be sure that the explanation is false.

(White 1949, p. 121).

Sahlins and Durkheim must be right, at least in part. Culture *is* a determinant of human psychology. Culture *does* organize innate human emotions. Biology (genes) does not "program" cultural phenotypes.

But we can't buy their conclusion that biology has no bearing on culture, or else we would return to the circularity that culture causes culture. Or, to the same effect, we are back at a blank slate theory.

The root of the problem is the assumption of biological determinism. To resolve the circularity, we must tackle the issue of biological determinism head on.

CHAPTER EIGHT
~
ORGANISMS AS EPIGENETIC SYSTEMS

It's not true. The idea that genes rigidly fix an organism's phenotype is not even close to true. The DNA in organisms contains a repertoire of adaptive traits that are epigenetically expressed, which is to say that the traits an organism expresses depend on environmental (epigenetic) influences. This enables organisms to be adaptively flexible.

As described in *Dynastic Theory*, even simple species are adaptively flexible. *E.coli* bacteria possess a gene complex that enables them to metabolize glucose in their normal environment, but switch to lactose they are in a lactose-rich environment. (Gardner et. al. 1991, p. 392). The Mexican salamander, the axolotl, may live and reproduce in water as a tadpole for several generations, but if the pond dries, one or more offspring will pass through the tadpole stage to become a salamander. (Gould 1977, p. 178). Parasitic trematodes (flatworms) can occupy many different hosts. To do so, they alter their development so that their morphology corresponds with their host's. (Matsuda 1987, p. 39). In numerous species, sex or conjugation can skip a few or many generations. Aphids and rotifers that normally reproduce asexually for many generations turn to sexual reproduction when their food supply runs low. (Ridley 1993, p. 59). Water fleas do the same thing. (*Id.*, p. 40).

In social insects, adaptive flexibility is put to use to develop specialized behaviors and morphologies for division of labor. The behavioral and physical traits of queens and workers are entirely different. There are also differences in the traits of the several castes of workers. These differences, however, are not due to genetic differences. All females possess genes that can allow them to develop into either a queen or one of the several castes of sterile workers. The differences are due to *epigenetic* influences, such as diet or pheromones. (West-Eberhard 1987).

Thus, an organism's DNA does not fix a single phenotype. To the contrary, organisms can *differentiate their phenotype without a differentiating genotype*. They can do this because DNA contains a repertoire of developmental and adaptive possibilities. To do this, they must be able to perceive their environment—the physical environment, the social environment, or the competitive environment—and respond from their repertoire.

This, in essence, is the epigenetic model of an organism. We could say that far from fixing a phenotype, DNA contains a genetic library of potential phenotypes.

As discussed in *Dynastic Theory*, the concept of epigenesis derives from the process by which organisms develop from egg to embryo to adult. An organism begins as a single cell with a set of DNA. As the organism develops, cells multiply. As they

multiply, the cells become differentiated, ultimately developing into the distinct "parts" of the organisms—liver, legs, or leaves, whatever the case may be. Thus, within an organism, cells may be said to differentiate in "type" without having any genetic differences among them.

The epigenetic model of an organism extends this concept from differences between cells to differences between organisms. Of course, there will be genetic differences between organisms as well. Each sexually-reproduced organism is genetically unique, which will cause differences in traits. But because organisms have a repertoire of possible traits, two organisms may have very different traits, with genetic differences having nothing to do with it.

The epigenetic model can be extended further to differences between societies. The social structures of animal societies commonly change depending on the environment. In some species of ants, for example, a whole colony can epigenetically transform from monogynous, having only one queen, to a polygynous colony structure, with multiple queens. The switch is complex, involving an array of associated morphologies and behaviors. It occurs in response to ecological cues, principally the level of resource abundance (Herbers 1993, pp. 280-81), with polygynous colonies having an advantage where competition among colonies for resources has temporarily abated.

Thus, differentiation of phenotype without genetic differentiation occurs not just at the level of the cell, and not just at the level of the individual insect, but also at the level of the entire society.

The same is true in social mammals and birds. The size, composition, and behavioral differentiations among packs, clans, and colonies of mammals, as well as among cooperative breeding birds, are not fixed by genetics. These characteristics depend on environmental influences, especially territorial crowding. Where territories are saturated, the young will remain at home even after they mature, forming larger societies and helping the breeding parents, often not breeding themselves. When territories become available, they will more quickly disperse, take over vacant territories, and breed.

Epigenetic influences also play an essential role in ensuring that that an animal society acts a cohesive group. Members of a pack, or a clan, or a cooperatively breeding bird group, or a colony, behave one way towards members of their group, while being hostile to others. In the ants, foragers lay distinctive pheromone trails so that the fruits of their labors are returned to their home nests. Epigenetic influences also enable insects to identify members of their own colony so that these can be distinguished from others. While being raised, insects acquire a chemical odor that is peculiar to their own colony, and they will attack "foreigners" of the same or other species when they attempt to enter

the nest. (Wilson 1971, pp. 272-77). The distinctive colony odor is acquired epigenetically from the environment of the nest. In other words, epigenetic influences allow social insects to identify "us" (their own colony) and "them" (all others), and to discriminate accordingly.

Thus, a society is also an epigenetic system. It too is capable of responding flexibly by differentiating its "phenotype" without genetic differentiation. Moreover, through epigenetic means, a society is capable of coordinating specializations and coordinating conformity to identify "us" and all others.

Viewing an animal society as an epigenetic system allows us to look at the nature/nurture debate in humans from a different standpoint. From the standpoint of a female ant, biological heredity will not determine whether she has wings, flies from the nest, mates, founds a colony and produces offspring, or whether she will be wingless, never mate or lay an egg, and instead nurse larvae, forage for food and defend the nest. Her biological heredity does not determine which of these courses her life will follow. She is born with the biological capacity to be either. What she becomes depends upon nurture. Mature workers and/or the queen may nurture her to become a soldier, forager, nursery worker or a virgin queen. They will feed her a diet, or apply a particular chemical, depending on the colony's needs at the time. The ability to nurture is an evolved capability. So too is the ability to be nurtured.

The epigenetic influences in ants are obviously unlike the forms of nurture that we associate with humans. They are not teaching and learning as we ordinarily think of them. They are not associated with brain capacity, as is learning. They are not "deliberate" in the sense of consciousness that we associate with human enculturation. They do not conjure up love and affection, as we might associate with human mothers and fathers, teachers, and other nurturers. For the same reason, we would not expect that an ant consciously thinks of her life as rewarding or unrewarding.

Nevertheless, as forms of nurture, epigenetic influences on female ants do notare not environmental influences that just happen to the organism or its genes. They are evolved capabilities, applied according to the colony's needs. They are "deliberate." They have evolved to serve a social function. The colony depends on the coordinated division of labor into specialties, timed to coincide with the colony's needs. The colony depends upon its members recognizing one another, distinguishing between us and them.

Like human nurture, these epigenetic influences are internal to the social system. They are applied by workers and queens. In short, like human nurture, epigenetic influences foster development of females into healthy, productive "citizens" of their colony.

With humans, social scientists often debate to what degree individual humans are influenced by nurture and by nature—by DNA and external, environmental influences. If

we ask this same question about an individual female ant, we can see that this question can never be resolved. Nurture and nature are inseparable. They are both part of the evolved biological system. In a social species, both nature and nurture are necessary for social specializations and group coherence. In an epigenetic model of an organism, nature and nurture are not separate causal forces. They are parts of the same epigenetic system.

I have thus far provided examples in which an epigenetic response entails internal manipulation at the level of the cell or DNA during development. In "higher" organisms, however, physiological systems enable adaptive flexibility without directly manipulating DNA. When a javelina spots a mountain lion, its decision to fight or flee does not await internal genetic manipulation. The javelina's visual system passes the information to nerves, which may flood the system with hormones that stimulate the physiological system to action.

In humans, we would call this an emotional response. Genetic self-manipulation will subsequently be required when cells are called upon to manufacture proteins to replace those utilized in the fight or flight response. But the initial action does not. During development, DNA has pre-built a system that enables a javelina to respond flexibly and swiftly.

Although it is a step removed from developmental epigenesis, a physiological system, such as that which allows a fight or flight response, stays true to the root meaning of epigenesis. It enables an organism to vary its phenotype—fight or flight—in a way that is not based on genetic differences from other javelinas.

Another example of systems pre-built by DNA is the brain. An animal brain can be described as an epigenetic device. If a chimpanzee seeks out a particular tree based upon its memory of an earlier experience, this behavior is part of its unique phenotype. Another chimp may not do the same simply because that tree is not part of its experience and thus is not stored in its memory. The behavioral phenotypes of the two chimps will thus be slightly different. During a lifetime of cumulatively varied experiences, their phenotypes will diverge more substantially. Brains in different animals will store vastly different sorts of information and experiences. These differences will lead to different behaviors—different "phenotypes."

The concept of epigenetic flexibility can be further extended to psychological flexibility. Anyone who has owned a dog will be aware that dogs are psychologically malleable. They are susceptible to training. The same animal can become a loving pet or a fierce junk yard dog. When a freshly cooked turkey is placed unattended on a counter and within reach, we can observe a pet dog sniff the turkey, look around as if to see if anyone is watching, and hesitate as though pondering the morality of taking the turkey, or at least pondering the consequences of doing so.

If we were describing a human, we would say he or she has mixed emotions; the psychological attributes of pleasure and guilt, appetite and duty, are in conflict. They have an array of emotions that potentially conflict.

When faced with a freshly cooked turkey, not all dogs will react the same way. Genetically-based personality differences will have something to do with how they react. But which emotion prevails will also depend upon what an animal has learned through nurturing (training)—the experiences it has stored in its brain. A dog who has frequently been scolded or punished by her master for picking up stray food or begging at the table will be less likely to succumb to temptation than an untrained puppy or an adult who has been undisciplined. Nurturing is an epigenetic influence that can tap into alternate aspects of a dog's psychological repertoire.

The brain thus not only stores experience, but as an epigenetic device it also sorts through the range of emotions and consequences. When a dog is hesitating about eating a turkey within its reach, it is debating what to do. Its brain is at work sorting through the possibilities. Eventually, it makes a choice.

A javelina's fight or flight response to a lion is not entirely fixed by its genetic program as a response to a specific environmental stimulus. Mature animals might respond to threats differently than young ones. This is at least in part due to accumulated "wisdom"—experience with threats and the potential actions of the predator. Fight and flight are competing emotions. Accumulated wisdom and the reasoning power of the brain help to sort them. Even mature adults may have accumulated varied experiences that lead them to different responses in the same circumstances. Moreover, the alternatives of fight or flight may not be the only possibilities. Watch and wait might also enter as a potential course of conduct. A sow with her young may choose one course, yet choose another if she is alone.

In higher organisms, the brain enables organisms to perceive their environment. It enables them to store these perceptions. It performs the calculus for sorting through these perceptions. It sorts through mixed emotions. The brain then enables organisms to flexibly respond based upon these perceptions and, ultimately, cause the organism to self-direct its behavior.

In all of these examples of epigenesis, we *could* say that the differences in phenotypes are caused by differences in the environment (epigenetic influences). But we could just as well say that the differences are caused by the organisms themselves: they perceive the environment, and respond from the repertoire stored in their DNA or in systems that have been pre-built by their DNA.

As mentioned in the previous chapter, the basic neo-Darwinian model of an organism is a string of genes for specific traits, with alleles for alternate traits at some slots on the chromosome. Thus, if two organisms have different traits, the presumption is that the differences are due to different alleles.

But the neo-Darwinian framework is not that quite that simple. Biologists have long understood that an organism's phenotype is the product of genes interacting with the environment. For example, a plant in poor soil will wither, while an identical plant in rich soil will thrive. A plant that is carefully nourished with water and nutrients will flourish, while one that is neglected will not. A plant's genes and its environment are both determinants of an organism's development.

Johannsen coined the term "genotype" to refer to heredity and "phenotype" to refer to the organism's traits, which result from the combined influence of the genotype and the environment. (Mayr 1982, p. 782). Using the garden bean, Johannsen made a scientific study of the relative influence of biological inheritance and the environment. (*Id.*, p. 783). This study was especially important, given the still-prevalent belief in "soft" Lamarckian inheritance—that the environment directly alters biological heredity. Johannsen's research demonstrated that it does not. Although the environment affects an organism's phenotype, environmental influences are not inherited. (*Id.*, pp. 783-84). This was a critical distinction, helping spell the end of Lamarckism.

As a result of this study, biologists came to recognize that an organism's phenotype—the sum of its traits—is the result of genes interacting with the environment. (Wilson 1998, p. 137). Because of environmental influences, two organisms that are genetically identical can have a different phenotype. Darwin's cousin, Francis Galton, coined the phrase "nature versus nurture" to stress that biological heredity and environment are separate causes of an organism's phenotype. (Mayr 1982, p. 781).

This "genes interacting with the environment" model could possibly lead to an epigenetic model—that is, a model that views an organism's DNA as containing genes that complement one another and represent a range of potential *adaptive* responses to alternate environments. But it hasn't.

One reason is that the kinds of reactions of the organisms that led to the "genes interacting with the environment" model were not adaptive responses—at least not obviously. In Johannsen's experiments, for example, there is no suggestion that his bean plants were adapted for good or bad soil. Instead, the inference is that the genotype contains some "norm" for growth, which can be reduced by poor "nurture" or enhanced by good "nurture." To account for these deviations from the norm, biologists adopted the concept that genes have a "norm of reaction." (Mayr 1982, p. 783). This dull neo-Darwinian concept includes no suggestion that the genome contains adaptive flexibility—a range of adaptive possibilities that thereby cause the phenotype to vary. In discussions

of norms of reactions in human genotypes, one sees the same kinds of examples in which reactions are deviations from a presumed norm, not adaptive responses. (*See, eg.,* Sober 1984, pp. 160-61 (effects of malnutrition of a child in the womb as a norm of reaction); Wilson 1998, pp. 140-42 (effects of nurture on IQ as a norm of reaction)).

The distinction between the epigenetic model and the norm of reaction concept can be drawn this way. The epigenetic model can use the piano metaphor, in which many melodies (phenotypes) can be composed from the same biological keys and notes by playing different combinations. In contrast, the norm of reaction concept invites us to think that only one melody can be played, but that its volume can be increased or decreased by banging the keys or hitting them softly.

In practice, however, the norm of reaction concept has mostly just led to stripping away environmental influences (and organisms' reactions to them) and treating them as "noise." (West-Eberhard 2003, pp. 17-18). This point can be illustrated by Mayr's discussion of Johannsen's distinction between phenotype and genotype in his influential book, *The Growth of Biological Thought*:

> The inevitable conclusion was that differences in [plant] size due to differences in cultivation (fertilizer, light, water and so on) cannot be transmitted to the next generation. There is no inheritance of acquired characters. Since the phenotype is the result of an interaction between genotype *and* the environment, it can not be considered an accurate representation of the genotype.

(Mayr 1982, p. 783). But if the phenotype "can not be considered an accurate representation of the genotype", what *causes* the phenotype? Apparently happenstance environmental influences.

In contrast, the epigenetic model places causation in the organism. A trematode perceives its host and adaptively responds from the repertoire stored in its DNA. An organism's DNA might not anticipate every environmental influence, so we cannot say that every response is adaptive. But we can say that even with nonadaptive responses, at some level the organism's DNA causes the resulting phenotype. When a plant responds to poor soil with stunted growth, it's DNA is still directing the plant's growth.

Contrary to Mayr, environmental effects on phenotype can tell us a great deal about an organism's genotype. For example, in the case of female ants, the fact that they express very different traits (queens, several castes of workers) depending on environmental influences *does* say something very important about their genotype. It says, first, that traits for queens and workers are not alternate (rival) alleles or genes; rather, they are complements. Second, it says that the DNA of females has adapted them to respond differently to various environmental (epigenetic) stimuli.

We can go even further. The “environments” (epigenetic influences) that cause differentiation among castes are not happenstance; diet, pheromones, and other epigenetic factors are *evolved* environmental influences. The ability to apply different diets in different circumstances (does the colony need workers or queens?) and to respond accordingly are written into the DNA of female ants.

Far from being noise, these environmental effects *do* accurately provide information about the genotype. They tell us that adaptive flexibility is built into an organism's DNA.

In a book devoted to understanding neo-Darwinism’s failure to model the genome to account for adaptive flexibility, and to rectifying it, West-Eberhard observes:

> The requisite condition sensitivity [flexible response] is simply assumed, perhaps visualized as a property of a genetic program or just unconsciously lumped among the effects of a single mutant allele (Crozier, 1992), as if the same allele were responsible for both a novel behavior and its finely tuned conditional expression. Dawkins (1976), for example, thought in terms of imagining genes that have one effect in adults and another in the young, depending upon circumstances. With assumptions of this kind it is possible to pass lightly over the question of how adaptive, condition-sensitive regulation is organized and evolves.

(*Id.*, p. 17). The result is to overlook the fact that organisms can differentiate their phenotype without differentiating genotype. As a consequence, the tendency is to fall back to the presumption that differences in traits between two organisms must be due to genetic differences.

Kin selection is a prime example. The epigenetic division of queens and workers is one of the most firmly established facts of insect biology. (West-Eberhard 1988, p. 124). But kin selection models the differences as due to rival alleles. It does so because it presumes that genes for selfishness and unselfishness are rival alleles at the same slot on a chromosome, and queens are (reproductively) selfish and workers are (reproductively) unselfish. Using this model, biologists have struggled unsuccessfully with the problem of altruism for decades.

But this is the consequence of treating the environment, and organisms’ reaction to it, as noise. It leads to thinking of genes “for” this and genes “for” that. It leads to thinking of DNA as a genetic program, a recipe or a blueprint. In short, it leads to biological determinism, which led to Sahlins’ criticism of sociobiology’s attempt to connect culture to human biology.

And perhaps not coincidentally, treating the environment as a partial cause of a phenotype, like a separate force impressed upon the organism, fits nicely with the

external causation of scientific determinism. The organism itself (and its DNA) does not control the response to the environment; the environment just happens to the organism.

In contrast, in the epigenetic model, the organism perceives the environment and self-directs a response.

But I need to clarify in what sense the epigenetic model addresses the problem of biological determinism. By itself, the epigenetic model is deterministic. I am supposing, for example, that a female ant is biologically programmed to respond to various epigenetic cues in certain prescribed ways. DNA prescribes fixed responses. The responses, therefore, are predictable in principle. Placing the cause of adaptive responses in the organism rather than the environment does not necessarily imply that organisms are creative.

But the epigenetic model is not biological determinism in the sense that Sahlins described. To him, biological determinism meant that genes program a set phenotype. If the environment plays a role in determining phenotype—like culture as an environmental cause—it is a separate force, which is how it is conceived in the neo-Darwinism model. By placing the cause of alternate phenotypes in the organism, the epigenetic model avoids this kind of erroneous biological determinism. Organisms can differentiate their phenotypes without having differences in genotype. This will have a hugely important consequence when we analyze how humans can create diverse cultures—and evolve—while holding biology constant.

And although the epigenetic model does not necessarily imply creativity, it is a prerequisite to it. The environment doesn't just happen to people. Minds perceive the environment; we creatively adapt.

CHAPTER NINE
~
EPIGENETIC EVOLUTION AND CULTURAL DIVERSITY

We can now fully address Sahlins' argument that culture cannot be derived from human biology because genes fix phenotypes—and therefore can't account for cultural diversity, not while biology is held constant.

This has been partly answered through the concept of cultural building: knowledge is built upon existing knowledge, and is stored by human minds in the cultural "library." Knowledge diversifies because people in various parts of the globe are exposed to different experiences—for instance, different physical environments and different materials that can be employed for subsistence. As a result, different cultures have different "wings" in the grand human cultural library, each of which contains a different store of experience and knowledge.

The epigenetic model adds one piece to this concept. Brains can be viewed as an epigenetic device that acquires and stores adaptation information. This epigenetic device enables organisms to differentiate phenotype, while holding biology constant. Human brains are particularly powerful, allowing us to store and accumulate much more information than can other species over long periods of time. We can thus build culture over time.

This answers part of the question as to how the same biological "form" can give rise to diverse cultures—but not all of it. Diverse cultures also embody diverse psychologies. The solution to this is that our pre-cultural ancestors did not evolve biologically fixed inclinations, as Sahlins supposed. The bio-psychology of individual humans doesn't program a single psychological "phenotype." It consists of a *genetic library* of potential psychological adaptations. In Chapter 10, I described this as a vast repertoire of emotions. Diverse moral codes and social norms can be devised by amplifying, suppressing, and rearranging this repertoire. The genetic library thus enables humans to differentiate psychological "phenotypes." These "phenotypes" are embodied in the customs, values, beliefs, and laws of distinct cultures.

Sahlins was right that culture does organize the emotions of individual humans during the process of enculturation. This is because the library of culture exists above individual humans and pre-exists individual humans. Thus, when a person enters the world, he or she is enculturated in an existing set of cultural beliefs, which vary among cultures. In that sense culture *is* a causal force separate from individual humans. But Sahlins was wrong to conclude from this that culture does not derive from human biology. The pre-existing library of culture that organizes individual human emotions

was created by humans. And during the long process of building culture, what is built resonates with human bio-psychology—within the wide, flexible range.

Culture is not separate from human biology. All culture derives from human biology, and necessarily so. There is no other source.

Because members of a society are enculturated, anthropologists speak not only of culture as a distinguishing aspect of our species, but also of distinct cultures. That is why, Benedict could generalize that "culture is personality writ large", and "personality is culture writ small". (Kroeber and Kluckhohn 1963, p. 218).

Enculturation results in social cohesion. As Darwin observed, "without coherence nothing can be effected." (Darwin 1952, p. 321). According to the adage, "any form of government is better than none." (Darwin 1952, p. 321 (citing Bagehot)). For purposes of national unity, it may not matter whether the flag is blue and white or green and yellow, but it does matter that people share one recognizable symbol. One language may not be better or worse than another, but it is useful if members of a society can communicate through a common language. As Steward suggested, one kinship structure may be better than another, depending upon ecological circumstances. But whether or not it is, it is still useful if all society's members abide by the same general kinship rules.

Enculturation also serves to identify people as members of a particular society. It functions to standardize dress, ornamentation, hairstyles, and other identifying features. We have a psychological propensity to conform. In large part, popular fashion is popular simply because people find it desirable to wear the same clothing and ornamentation that they observe in others. At the same time, we can become psychologically adapted to individualize our dress and ornamentation, at least to some degree. But even those who regard themselves as a society's nonconformists tend to establish a set of norms that identify them as members of a particular nonconformist group. In Western societies, this is most often true of youth, who see themselves as rebelling, yet latch onto hairstyles, clothes, tattoos, music, and slang that identify them, as though they were wearing a badge of their own generation.

People usually do not stray far from accepted norms of dress, ornamentation, and other features of their own culture. As we can see, however, they have evolved diverse forms across societies; these forms also evolve over time. A few hundred years ago in Europe, a man dressed in puffy purple velvet would signify authority and attract women. In modern Europe today, a heterosexual male dressed in this fashion would likely be subject to endless ridicule.

But as people develop, they do more than just absorb a uniform culture. "Enculturate" is sometimes viewed as a subset of the broader term "nurture." "Nurture" itself is used in different ways. It includes the influences of parents, siblings, extended family, neighbors, teachers, peers and others. For every individual, these influences will be distinctive. "Nurture" can also be used even more broadly to signify all environmental influences that affect a person's life. Collectively, these influences are the sum of the epigenetic influences that are impressed upon and absorbed by the individual human.

These epigenetic influences will not only be unique to each individual, but they will be absorbed by biologically unique individuals. Although I have emphasized that for purposes of a theory of cultural evolution, biological differences between individuals and across societies "wash out", we should acknowledge the fact that individuals have distinct personalities that in some part are due to individual biological propensities.

And enculturation, together with all other forms of nurture in the broadest sense, is not just absorbed. Individuals process these experiences using their creative minds. Individuals will thus in part self-differentiate themselves from all others.

In human societies, one function of individual differentiation is the specialized division of labor. Among mammals, humans specialize to a degree that is so far removed from other species that it can be said to be unique in this taxonomic class. The only other animals that divide and coordinate labor in any way comparable to humans are the highly social insects. However, the method of specializing and coordinating labor is far different in humans. Brains are our primary tools, absorbing, storing and applying subsets of human knowledge.

There are countless ways in which this is accomplished. In some societies, trades are hereditary, passing from parent to offspring. In some societies, governments decree who will become butchers, bakers, priests, scholars, and administrators. In others, aptitude tests may determine the placement of individuals into particular vocations. In societies that rely on market forces, the division of labor may be accomplished largely through individual choice, with the "invisible hand" ensuring that the division is accomplished efficiently. If skills in accounting are in high demand and short supply, wages will increase to draw people into the field. In other circumstances, people may be indirectly encouraged to enter certain fields by government policies. When leaders discern that the nation is falling short in science and engineering, scholarships in those fields may be offered or grants made to institutions. School curricula may be adjusted to encourage the development of math, the arts, or basic language skills.

The division of labor requires the teaching of specialized skills and bodies of knowledge to different individuals. Economists must be trained in economics, lawyers in the law. Butchers must learn the cuts of meat, while soldiers must be taught how to use weapons.

Specialization requires more than just imparting different skills and knowledge. Different tasks also entail different psychological requirements. Some of these are not subtle. A soldier in a modern civilization must learn to be psychologically prepared to kill, something he or she has been trained since infancy not to do. A soldier must also be psychologically prepared to risk his or her own death.

Variations in psychological requirements for teachers, factory workers, butchers, bakers, lawyers, farmers, and such are less conspicuous. But variance in hours of work, patience, public speaking, pace of the job, repetition, commanding employees or taking orders—all of these demand slightly different emotional configurations. In modern civilizations, most of us become squeamish when thinking about killing, skinning, carving, and cooking an animal, something our ancestors took for granted. We are thankful that slaughterhouses and butchers perform the task. Butchers and slaughterhouse workers, however, must become accustomed to dealing with blood, guts, and gore day in and day out.

Our emotions are organized according to the task. Any given human might become a butcher, baker, or candlestick maker, a psychologist or a priest, or some other specialized worker. We are adaptively flexible. We are flexible because we are born not just with a repertoire of potential skills, but also an array of psychological possibilities.

As individuals, humans are psychologically malleable. We can differentiate our psychological phenotype. Cultural diversity results from thise same flexibility, but writ large.

We are a social species. We live in groups. Groups accumulate different sets of collective experience and knowledge. They collectively sort through the repertoire of innate emotions and arrange them in different ways.

Different physical environments demand adaptive variations in the use of materials and skills. Eskimos, Polynesians, and Bushmen must adapt their housing, materials, and tools in order to live. Psychological adaptation also is required. It is required by the climates of extreme cold, the sea, and tropical heat. Moreover, as Steward points out, adaptations in means of subsistence are accompanied by variations in social structures, including kinship and political systems. These variations require psychological flexibility.

The result is a diverse range of social norms and moral codes. This is true across societies. It is true over time. The general evolution from small, dispersed bands of nomadic hunter-gatherers to crowded, sedentary, post-industrial civilizations has required the evolution of different sorts of social norms and moral codes.

Freud wrote extensively about how humans fashion social norms by amplifying, suppressing and organizing the array of human psychological propensities. He focused in

particular on emotional suppression, arguing in *Civilization and Its Discontents* that it is a source of individual neurosis and social ills. (Freud 1961).

Freud divided the human mind into three structures. (*Id.*, pp. 11-21; Stevenson 1974, p. 66). The *id* consists of innate emotions and desires, the biological wants that the individual wishes to satisfy. The *ego* serves the *id*. It is in contact with the world external to the individual, so it can channel conduct in a way in which the *id* can be realistically satisfied. The *superego* internalizes the social norms, including morals and ethics, instilled by parents during childhood. As a person's conscience, it is a master of the *ego*, as is the *id*.

Freud's idea of the *superego* included not only norms instilled by parents but cultural norms instilled by society, which is the original source from which parents acquire most of their norms, initially through their own parents. The *superego* suppresses some desires; as a result, the cultural norms of the *superego* conflict with the *id*. A man with no money may want the television in the store window, but his conscience may inhibit him from stealing it. A woman seeing an alluring married man may want to have sex with him, but refrains from behaving suggestively because the norms instilled in her tell her that it would be wrong to do so. According to Freud, neurosis results when the *ego* can find no way to satisfy the demands of the *id* within the competing demands of the *superego*.

Why have a *superego*? Why not de-repress all desires by eliminating norms? The most obvious reason is that peoples' *ids* (desires) conflict. What would satisfy the *id* of one would repulse the *id* of another. In order to live socially, norms regulate when, where, and under what conditions *ids* may be satisfied.

Freud recognized the need for social norms. He also recognized that social living and the norms it requires are requisites for the cultural achievements of modern civilization. But he also contended that civilization results in neurosis by demanding too much emotional suppression in the satisfaction of the *id*. "[I]t assumes that a man's ego is psychologically capable of anything that is required of it, that his ego has unlimited mastery over his id. That is a mistake...." (Freud 1961, p.90).

Whether or not one agrees with Freud's assessment, what is inarguable is that no society, not even the most remote tribe, has been free of norms that regulate peoples' desires. A large portion of anthropological fieldwork has been devoted to documenting these norms—the various bodies of culture, including mores and morals. For social beings, it is never a question of whether emotional suppression exists; it is a question of what to suppress, what to emphasize, to what degree, and under what conditions.

We are conscious of cultural norms. We debate them. When they grate on us, we complain. We seek to change them. In arguing for change, we may even cite a Freudian argument that cultural norms are the cause of dysfunctional neurosis in many people,

maybe even society as a whole. The process of change typically begins with the perception that there is a problem. Alcoholism or drug use becomes rampant in a society or some segment of it. Solutions are proposed and debated; a few are adopted. They might involve a re-adjustment in attitudes about drug and alcohol use. Programs may be adopted to foster drug and alcohol education for teens. Other approaches may be so radical that the use of certain substances is banned altogether: prohibition. Use becomes immoral, then illegal. Changed attitudes may be reflected in stiffened laws and the enforcement of them.

People perceive a problem, re-organize attitudes, and through nurture attempt to instill the new attitudes as revised cultural norms. It is an imperfect process. It is experimental. If one thing does not alleviate the problem, another is tried. A remedy for one ill may inflict another, which must then be cured. People don't agree.

Arguments for momentous changes in cultural norms are usually put in terms of superordinate moral ideals, such as justice, equality, or liberty—combined with an argument that as the society is currently constituted, they are lacking. To influence cultural norms, moral ideals must appeal to human emotions. They must resonate psychologically. As an ideology, the Marxist vision of a classless society of perfect equality possessed a powerful emotional appeal. As a moral imperative, the principle "from each according to his ability, to each according to his need" found a psychological resonance with many people. Nations and empires have been founded on this moral imperative, which has served as both inspiration and aspiration.

Societies that have been regarded as ideological opposites of Marxism nevertheless share some of the same moral ideals with the same emotional appeal. The Declaration of Independence that led to the creation of the United States contains these famous words: "We hold these truths to be self-evident, that all men are created equal...." The ideal of equality has been deployed time and again as a rallying cry to effect moral, social, and political change in the United States. This ideal, however, has never stood alone. The Declaration of Independence states other "self-evident truths", including the rights to "Life, Liberty and the pursuit of Happiness." These, too, have proved to be emotionally powerful words, resonating with people and deployed similarly.

We often speak of these ideals as though they were pure and absolute. But they almost never are. They can't be. They clash. The pursuit of happiness clashes with all kinds of other norms. Individual liberty can clash with equality. Societies that emphasize individual reward systems nevertheless re-distribute wealth and income. Societies that declare equality as the highest ideal nevertheless provide individual rewards. Individual liberty resonates, yet so does collective well-being and security. "Love thy neighbor as thyself" collides with individualism. In times of war or civil disruption, people who place great value on personal liberty are nevertheless willing to give up some measure of it if necessary to ensure safety and social order.

In the former Soviet Union, the appeal of "from each according to his ability, from each according to his needs" has declined. One reason is that ideal failed to produce prosperity. As a moral ideal, equality resonates psychologically, but so too does the desire for prosperity.

Opposing ideals co-exist. But how can this be? How can conflicting ideals resonate psychologically at the same time in the same person, or at different times in the same people, or in different people at the same time?

It is possible because the psychological resonance of moral imperatives is not fixed. The repertoire of emotions did not evolve so that all could be expressed equally and at the same time. We are flexible. That is why, even individually, we experience mixed emotions. We constantly struggle with moral uncertainty and moral dilemmas. Sometimes this is because it is not clear what we should do. Circumstances are ambiguous, and we do not know which rule to apply. Sometimes we know the rule, but other emotions compete with guilt, duty, and fear of punishment.

A dog faced with a freshly-cooked turkey must choose to satisfy either her appetite or her desire to avoid guilt and punishment. Humans too are constantly faced with similar choices. Not all emotions can be satisfied. One or another must be suppressed. Lust and fidelity, bravery and safety, passion and peace, revenge and compassion—literature is rich in the ways with which these run into one another. It is adaptively useful to have such a vast array of emotions, even if they potentially conflict, because it expands the range of our psychological flexibility. It means, however, that we must choose among emotions.

In socio-political systems, a consequence of this is that we experience mixed ideals. Social equality, personal liberty, obedience, security, order, privacy—all these ideals are based on psychological premises. These and many others potentially clash and often do.

An ideology typically takes one propensity, magnifies its virtues, and renders it absolute or at least supreme in the hierarchy of ideals. An ideal anarchist holds liberty as a supreme virtue; an ideal totalitarian places social order above all else; an ideal egalitarian envisions a uniform utopia. Conservatives treasure tradition and look back to a more golden age. Progressives embrace change and look forward to a more perfect society. Significant cultural evolution is often moved by grand ideological visions, especially when prevailing social conditions have neutered an ideal and created a psychological void. Sometimes these visions become exaggerated, like pathologies. Usually, however, pragmatists sort ideals, balance competing demands, then shape them into a socially workable forms.

The ways in which ideals are balanced and mixed, and conflicts among them resolved, vary over time and among societies. There are thus many ways of ordering the

range of potential psychological norms.

Recall that Leslie White pointed out that various cultures hold opposing values, which he used to refute the claim that culture could derive from biology. Private property is an institution in some societies, while in others, resources are accessible to all. (White 1949, p. 126). Aggression cannot be innate because although people sometimes fight wars, sometimes they prefer peace. (White 1949, p. 132).

White was right, in part. The propensity to own private property is not fixed by the human organism. But he was wrong to say that the propensity does not exist. Humans do have a psychological tendency for possessiveness, which provides a basis for the idea of private property. His error was in the assumption that if this tendency is biological, it must be fixed as the only possibility. It is not. We also possess a propensity for unselfishness, for sharing. We are born with multiple psychological propensities.

Recall also that, unlike White, some social scientists have postulated human biology as the basic source of human behaviors and culture, boiling down basic biological needs and drives to a handful, such as feeding, flight, fighting, and reproduction. Boiling them down is a useful tool, but in using the tool, we should be mindful that these needs and drives do not fix human psychology.

The flexibility of human bio-psychology is what enables individuals within a society to specialize. It is also what enables cultural diversity. We can thus evolve cultural systems built around the concept of private property, emphasizing all the psychological attributes necessary to sustain the concept. We can also evolve cultural systems built around the concept of shared resources. We can in turn evolve cultural systems that blend these concepts and psychological attributes.

Epigenesis is a unifying concept. Reconceiving organisms as epigenetic systems helps to eliminate false divides between humans and other species. All organisms possess genetic libraries. All are adaptively flexible. All perceive their environment and respond. All can differentiate phenotype. All social species have evolved to nurture and be nurtured.

Eliminating false divides allows us to see what actually *does* divide our species from all others—what makes our species unique. Culture is an epigenetic influence. Humans can differentiate phenotype by reaching into the repertoire stored collectively in human minds, as well as in writing, art, electronics, and other media devised as aids to those minds. We evolve these epigenetic influences.

In other words, humans *evolve epigenetically*. *Cultural evolution is a system of epigenetic evolution.*

The theory of epigenetic evolution and the theory of directed creativity account for the same pattern: how humans have evolved while biology has remained constant. The methodology of directed creativity is to focus on the discontinuity between humans and other species—the fact that cultural evolution is decoupled from natural selection. It identifies the elements of natural selection, then determines what substitutes for those elements in cultural evolution. The theory of epigenetic evolution begins by identifying the continuities, then seeing how we differ.

I was introduced to the concept of epigenesis through two articles by Mary Jane West-Eberhard (1987, 1988), which explained the epigenetic division of castes in social insects. Epigenesis became a key element in solving the problem of altruism, as set forth in *Dynastic Theory* and which will be summarized in the next chapter. I began to see the connection of epigenesis to culture when puzzling about the lackluster response sociobiologists had made to Sahlins' assumption of biological determinism.

I had also come across a reference to epigenesis in E.O. Wilson's book *Consilience*. (Wilson 1998, p. 157-166). Wilson argues that genes prescribe "epigenetic rules", which can be defined as "prepared learning"—the capacity to absorb elements of culture. These rules derive from human genes, which allow for a norm of reaction. The process of natural selection follows: "Culture helps to determine which of the prescribing genes survive and multiply from one generation to the next. Successful new genes alter the epigenetic rules of populations. The altered genetic rules change the direction and effectiveness of the channels of cultural acquisition." (Wilson 1998, p. 127). Then, just as in natural selection:

> Some individuals inherit epigenetic rules enabling them to survive and reproduce better in the surrounding environment and culture than individuals who lack those rules…. By this means, over many generations, the more successful epigenetic rules spread through the population along with genes that prescribe the rules. As a consequence the human species has evolved genetically by natural selection in behavior, just as it has in the anatomy and physiology of the brain.

(Wilson 1998, p. 127).

This explanation of the role of epigenesis feeds into accusations like Sahlins' that sociobiology ties cultural evolution to genetic selection. It is poles apart from my use of the concept.

My use of epigenesis places the cause of adaptive flexibility in the organism itself, which is a condition precedent to the concept of creativity. Together, the concept of

creative self-evolution and psychological flexibility cracked open a door in a way I hadn't thought possible. The human evolutionary trajectory has been towards more people and goods. A question that motivated the search for a theory of cultural evolution was whether this trajectory is inevitable. The theory of directed creativity holds that the trajectory has been guided in the past by human bio-psychology, but that this bio-psychology is not fixed. The question then becomes "what is the range of possibilities allowed by the bio-psychology that has evolved through natural selection?" In other words, what is the potential range of human nature?

But to trace human nature to the bio-psychology that evolved in our ancestors, it was first necessary to fill a gap left by neo-Darwinism. Humans are not entirely selfish. We have inherent psychological propensities for unselfishness and group adaptations—attachment to a society. Neo-Darwinian theory cannot account for these. This was the purpose for developing dynastic theory, which is summarized and applied to humans in the following chapter.

SECTION THREE
~
AN EVOLUTIONARY THEORY OF HUMAN NATURE

CHAPTER TEN
~
GROUPS, MORALITY AND DYNASTIC THEORY

In the concluding chapter of *Dynastic Theory,* I made the case that humans are psychologically disposed towards loyalty to groups. Making this point seems like it should be a waste of paper and ink. Everyone knows this. As a glance at a world map reminds us, cooperative groups are of colossal importance in human life. The social sciences are premised on the existence of human societies. Morality is tied to group living. There would be no need for morals if we did not live in groups, but we do. Culture itself is a kind of group altruism. Culture is shared values, shared knowledge, shared communication, and the sharing is mostly done within a society. Our propensity for an emotional attachment to a society ought to have evolved in our ancestors through natural selection. Darwin understood this: "In order that primeval men…should have become social, they must have acquired the same instinctive feelings, which impel other animals to live in a body.... [T]hey would have felt some degree of love; they would have warned each other of danger; and have given mutual aid in attack or defence. All this implies some degree of sympathy, fidelity, and courage." (Darwin 1952, p. 320).

It was necessary to state the obvious because neo-Darwinian theory and, hence, sociobiology, have insisted that all organisms, including humans, are biologically selfish. Even genes exhibit "ruthless selfishness." (Dawkins 1989, p.2). Hence, the "light which guides the human sociobiologist" instructs that even when we see what looks like cooperation among humans, it's an illusion: "[U]ltimately the benefits have to return to the individual." (Ruse 1989, p. 163). "Scratch an 'altruist', and watch a 'hypocrite' bleed." (De Waal 2006, p. 10, quoting Ghiselin). "[T]he pretense of selflessness is about as much part of human nature as its frequent absence. We dress ourselves up in tony moral language, denying base motives and stressing our least minimal consideration for the public good; and we fiercely and self-righteously decry selfishness in others." (*Id.,* quoting Wright).

The human world *is* often ruthless. We are predators. Survival is a first principle of human existence. We *are* selfish. But selfish individualism is not the whole story. As the long rows of headstones in war memorials attest, people are often willing to commit self-sacrifice for perfect strangers if they share the same social boundaries—as members of a nation, a tribe, an ethnic group, a religion, or a shared culture. Bravery in battle is particularly dramatic evidence of group loyalty, but the same thing occurs every day in numerous less dramatic ways.

Each human necessarily views the world through his or her own mind, motivations, and senses. "I think; therefore I am", Descartes' *cogito,* was his famous

philosophical premise. This magnifies our sense of our self. It also magnifies our sense of selfishness. When an individual experiences psychological pleasure and satisfaction, the experience can seem selfish, but it isn't, not necessarily. A person who sees a fellow human suffering may be motivated to relieve the suffering and offer to help. When praised for the charitable deed, the person might respond "I did it for myself." A friend of mine who volunteers for hospice care says that volunteering makes *her* feel good. In ministering to the needs of the destitute, Mother Theresa undoubtedly fulfilled her own psychological needs. A soldier motivated to perform heroic deeds in pursuit of glory may seem selfish to himself, and perhaps to others as well. He wants to be admired.

But if selfishness is framed as the pursuit of psychological satisfaction, even the most noble deeds can be made to seem selfish. Even compassion, mercy, and valor become susceptible to an explanation that they are really motivated by selfishness.

Minimizing human altruism by ascribing it to psychologically selfish motives is a persistent theme in the literature of sociobiology. In *On Human Nature,* Wilson writes that "[t]he evolutionary theory of human altruism is greatly complicated by the ultimately self-serving quality of most forms of that altruism. No sustained form of human altruism is explicitly and totally self-annihilating. Lives of the most towering heroism are paid out in the expectation of great reward, not the least of which is a belief in personal immortality." (Wilson 1978, p. 154).

In order to magnify selfishness, Wilson has equated psychological selfishness with reproductive selfishness. In Darwinian theory, true altruism is *reproductive* sacrifice; true selfishness seeks *reproductive* gain. Cowards are selfish. Heroes are not, because they risk their lives and thus risk reproductive failure.

But psychological selfishness is not the same thing as reproductive selfishness. A "belief in personal immortality" or a psychologically similar reward is not biologically selfish. In fact, it is exactly the kind of bio-psychology we would expect to evolve as an altruistic group adaptation. It is adaptive to the group that individuals perceive that patriotic valor will satisfy their psychological self-interest. We want people to be highly motivated to defend us. We want people to seek admiration for doing so. We want them to feel psychologically gratified when they receive admiration from members of their society.

Likewise, if altruism has evolved biologically, it would be expected that people should feel psychological satisfaction by relieving the suffering of others. In *Descent of Man,* Darwin made the point that these kinds of feelings are not species adaptations, but rather group adaptations. Adam Smith (and others) had argued that social sympathies stem from an individual's memory of his or her own pain, which is recalled when the stimulus to the pain is observed in others. The individual is then motivated to relieve the pain in others. Darwin did not disagree, but he observed that it is an insufficient

explanation because humans are not equally motivated by the suffering of everyone:

> But I cannot see how this view explains the fact that sympathy is excited, in an immeasurably stronger degree, by a beloved, than by an indifferent person.... The explanation may lie in the fact that, with all animals, sympathy is directed towards the members of the same community, and therefore towards known, and more or less beloved members, but not to all members of the same species.

(Darwin 1952b, p. 309).

The social tendencies, including altruism, are directed not towards random members of the human species; they are preferentially directed towards members of one's society. Humans *do* have "instinctive feelings" for "love…sympathy, fidelity and courage." (Darwin 1952b, p. 320). We do have an instinctive desire to live in groups. These instinctive feelings must have been acquired by "primeval men", our ancestors. Neo-Darwinism has no theory to explain these emotions.

Not all sociobiologists subscribe to the belief that humans are entirely selfish. Jared Diamond suggests that humans are uniquely unselfish, somehow overcoming our biological selfishness:

> While sociobiology is thus useful for understanding the evolutionary context of human social behavior, this approach still shouldn't be pushed too far.... [W]e evolved, like other animals, to win at the contest of leaving as many descendants as possible. Much of the legacy of that game strategy is still with us. But we have also chosen to pursue ethical goals, which can conflict with the goals and methods of our reproductive contest.

(Diamond 1992, p. 98). As pointed out earlier, this requires a blank slate hypothesis. We can't manufacture values for which we have no biological propensity. Nurture can shape our nature, but it can't overcome it.

And a blank slate hypothesis is not necessary. As documented in *Dynastic Theory*, humans didn't invent societies, group adaptations and altruism. Ants, bees, wasps, termites, the cooperatively-breeding birds, packs of wolves, prides of lions, troops of macacques, and the other social mammals—all have evolved group-adaptive altruism. If this can evolve in other species, it would have evolved in our pre-cultural ancestors.

Dynastic theory explains how these traits evolved. According to traditional Darwinian theory, the problem of altruism is this: although self-sacrificing traits are good for the success of the group, self-sacrifice diminishes the reproductive success of the individual. Thus, within the social group, selfish individuals would have more offspring than self-sacrificing members. "[F]allen heroes do not have children. If self-sacrifice

results in fewer descendants, the genes that allow heroes to be created can be expected to disappear from the population." (Wilson 1978, pp. 152-53).

Dynastic theory solves this problem. It does so by recognizing a key pattern in animal societies. They are formed through natal philopatry. Societies are formed (and replenished) when offspring remain with their parent(s) even after they mature; in some species this may extend for several generations. For example, a queen ant will form a colony by bearing daughters who are sterile workers, daughters who are virgin queens, and males. Outsiders are excluded. Depending on the species, eventually the colony might consist of several generations, but all descended from the founding queen. The same holds true in other social insects, the social mammals and birds—even after they mature, the young remain living in their natal nest or territory. An animal society thus will look like a family tree. If an animal society "buds" off a new society, it will be structured the same way. I call this dynastic structure.

Dynastic structure is the key to the solution: it ensures that altruism falls on fellow altruists. Members of an animal society do not bestow altruism indiscriminately. They limit it to members of their own society. Thus, when an altruist "begets" a society it will consist of altruists who help one another. Likewise, selfishness begets selfishness. Within a group, a selfish individual might benefit temporarily, but it will pay the price when it begets its own group. Offspring won't help their selfish parent or one another. So long as altruism is slightly advantageous, altruists will outcompete selfish individuals.

Because animal societies are dynastically structured, altruistic traits spread in the same way as any other kind of trait—down biological lines of descent.

We can project that our ancestors likewise evolved group adaptations, including sacrifice for the good of the group. We can also project that their groups were formed through natal philopatry and, thus, were structured as family dynasties. That is, they were tribal. These propensities form part of human bio-psychology. This is the foundation of human morality. This is why we are not entirely selfish. It is why altruism and cooperative bonds extend to the boundaries of society.

However, as humans began to evolve culturally, a significant shift occurred. Like other animal societies, those of our ancestors would have been bounded by biological structure; they would have formed dynastic groups. But with the advent of culture, human societies expanded and became bounded by common culture. Culture binds societies.

The nonliterate societies studied by anthropologists and archaeologists typically

retain a form of dynastic structure, at least nominally. Group governance is often determined by biological descent (kinship), which is maintained by rules of inheritance, marriage, and dispersal.

Anthropologists have found it difficult to place kinship structures into a few convenient categories. There is an enormous variety. (Haviland 1990, pp. 269-287; Schneider 1973). Some societies follow a geographic, matrilocal rule, while others are patrilocal. There are societies in which personal goods and status are passed through matrilineal descent, while others are patrilineal. There are societies in which descent is matrilineal and patrilineal for different purposes. There are societies that are ambilineal, with individuals opting for one or the other. Even a description of a society as "matrilineal" or "patrilineal" does not necessarily have a clear meaning. Several societies may all be described as "matrilineal", yet vary widely in descent rules. (Schneider 1973). Adding to the classification problem, descent rules often follow nominal genealogical relationships rather than genealogy in an actual biological sense: "real biological relationships are distinct from and need not necessarily correlate with the social designation of a kinship relationship." (Schneider 1973, p. ix).

As for dispersal patterns, marriage between groups—exogamy—is common, often accompanied by general rules as to whether males or females must disperse upon marriage. However, exogamy does not necessarily imply intermarriage between tribes or bands. It also can refer to marriage within a community, but outside of a clan, immediate family lineage, or some other designation of a group within a group. (Haviland 1990, pp. 223-34). Even in the narrow sense of marriage outside close family, exogamy is not universal. Besides brother-sister preferences in royal families in some societies, cousin marriages are also favored by some cultures. (Haviland 1990, pp. 234-5).

What seems to be the "rule" is that as a species, humans have been extraordinarily flexible in kinship social structure. Anthropologists suggest that these flexible variations are adaptations to different means of subsistence, which follows from ecology. (Steward 1988; Aberle 1973). For example, "These latter groups consisting of patrilineal bands are similar…not because their total environments are similar—the Bushmen, Australians, and southern Californians live in deserts, the Negritoes in rain forests, and the Fuegians in a cold, rainy area—but because the nature of the game and therefore of their subsistence problem is the same in each case." (Steward 1988, p. 329).

A striking feature that is common to all of these human societies is that males as well as females cooperate. This is significant. In most social mammals, societies are matrilineal, matrilocal, and matriarchal, with adult males cooperating very little or not at all. This is true of most Old World primates. However, our closest relatives, chimpanzees and bonobos, are notable exceptions. Males are philopatric. These patrilocal societies are relatively large, loosely structured "communities" of twenty to a hundred members in chimpanzees and of a greater size in the bonobos. (Nishida and

Hiraiwa-Hasegawa 1987). As predicted by dynastic theory, cooperative bonds in these societies are among males, who defend the territory, patrolling the perimeter and occasionally fighting with males of neighboring communities. (*Id.*, pp. 170, 176). Chimpanzee female bonds are mostly between mothers and their offspring. (*Id.*, p. 168). Each adult female chimpanzee and her young typically travel and forage alone, showing very little bonding or even interaction with other females.

For mammal societies in which both males and females cooperate, we need to look to some of the social carnivores—*eg.*, wolves, coyotes, African wild dogs, and mongooses. These species also have a mixed pattern of male and female philopatry, like human societies that are structured by kinship. But these social carnivores typically confine breeding to an alpha pair, whereas breeding in human societies is more or less egalitarian, which is somewhat similar to what occurs with Old World primates, including chimpanzees. But unlike in humans, chimpanzee mating relationships are impermanent. During estrus, females are promiscuous, sometimes mating with several males in succession. There is no obvious dominance hierarchy in bonobos, and mating is also impermanent and promiscuous. (Nishida and Haraiwa-Hasegawa 1987, pp. 172-72; Kano 1992).

Thus, although elements of human kinship structure can be found in other social species, none of them provides a precise analogue. And although human societies that are based on kinship structure are extraordinarily varied, we can project from them that, like all other social species, our pre-cultural human ancestors formed and maintained societies based on natal philopatry—they were dynastically structured.

But modern humans are unique. Although kinship still plays a central role in structuring some human societies, social bonds in large modern societies extend far beyond dynastic structure. It is true that nuclear and even extended families continue to be the basic building blocks of any society, large or small. Kinship also often governs aspects of property inheritance. Humans are capable of constructing extensive genealogical charts, pinpointing biological relationships to people whom we have never met and who are long since deceased. These can be a source of pride. Some cultures practice ancestor worship. Many cultural expressions use kinship metaphors. Territories are sometimes referred to as the “motherland” or “fatherland.” We pray to God the Father and the Holy Mother. Chiefs, kings, and queens are referred to as “fathers” or “mothers” of their people. “Blood brothers” invokes the close affinities of a nation’s defenders.

Family is extremely important, both symbolically and in reality. But it no longer defines our broadest social bonds. The United States illustrates this dramatically. On any given day, school children whose ancestors came from every part of the globe, who are about as far apart on a genealogical family tree as can be imagined, will turn to face a common flag and pledge allegiance to “one nation.” Even in a society that is ethnically

homogeneous, bonds are far broader than kinship. We cooperate with, and sacrifice for, people we've never met and never will. Soldiers defending their country risk their lives for perfect strangers. Tax revenues are pooled and spent by government on broad public purposes that benefit people with no family connection to the taxpayer.

China, India, Russia, Brazil, the United States, Pakistan, and other mega-states—these are just the extremes. The same principle holds true of even the smallest nations, cities, towns, and school districts. Expansion beyond kinship is not a recent invention. One can also look back to Rome, Persia, the Mayans, Babylon, Egypt, and other ancient civilizations.

We can see the departure from dynastic structure by contrasting the ways in which expansion occurs. Other social species expand through natal philopatry. When opportunities arise, a society reproduces itself through fission or budding; through natal philopatry, the "offspring" society is structured dynastically. Human societies also expand and, occasionally, spin off new colonies. However, whether expansion is internal or through colonization, it does not follow dynastic structure. The British colonies that eventually became Canada, the United States, and Australia are well-known examples. The internal expansion of a society can occur through increased birth rates and decreased mortality. It often also occurs through immigration. Where immigration is permitted, it is not tied to a biological relationship with the destination society.

The expansion of human societies beyond dynastic structure has likely occurred for two general, adaptive reasons. The first is sheer numbers. Societies compete. People stave off territorial intruders. They compete to expand territories and acquire new ones. Numbers can confer an advantage, both for defensive and offensive purposes.

A second adaptive reason that human societies expand is in order to increase productivity through specialization. Adam Smith was right to emphasize the specialized division of labor as a source of the wealth of nations. It has proved remarkably potent.

This distinctive (among mammals) ability to specialize is due to the same biological capacities that have enabled humans to evolve culturally—the intellectual capacities of the human brain, combined with speech and hearing. These have enabled cooperative endeavors, such as hunting, gathering, housing, and child care, to become increasingly well-organized. As culture evolved, it became increasingly useful, and possible, for tasks within a group to be specialized, with the utilization of improved tools and technologies. This would have been especially salient in societies developing agriculture as a mode of subsistence, or in any society dependent on endeavors that entail cooperation on a large scale.

Specialized division of labor has led to economic productivity. Productivity has led to expansion of societies' populations by supplying them with greater resources. Together, increased productivity and population growth have enabled societies to gain an

edge in an ongoing competition for power and perpetuation. Expansion has necessarily entailed extending group bonds far beyond dynastic structure.

The expansion of a group's numbers is not a simple thing. It requires far more than reproducing more offspring, reducing mortality, taking in immigrants, or acquiring new territory. It requires more resources to exploit or greater productivity from the same resources. It requires economic techniques to supply larger numbers of people. It requires political and organizational techniques to govern larger numbers. Perhaps above all, it requires techniques to ensure that group members identify most strongly with the outer bounds of the expanded society and do not splinter along internal cultural fault lines.

On this last point, an individual does not have just a single cultural identification with a single society. Each individual possesses many cultural identifications. We may identify with a tribe that exists as one of several within a nation, with its own customs, mores, and language. We may have ethnic or religious allegiances. We may have allegiances to a rural farm culture, pitted against urban culture. We may have allegiances to particular economic sectors, such as labor or management. We may identify with a political ideology, such as Marxism, that purports to transcend nation-state allegiances, or nativism, that seek to rid society of foreign cultural influences.

The synthesis of varied cultural allegiances, and coherence at a larger social level, cannot be taken for granted. It often fails. Tribes fragment. Nations fracture. Empires fall. The history of Yugoslavia, which ultimately split along ethnic/religious lines—Serbs, Croats, Bosnians, Albanians; Orthodox, Catholic, Muslim—provides a recent example of disintegration. Sudan and many other African nations that were created by lines drawn around several distinct (and often hostile) tribes have consistently found it difficult to maintain a cultural identity stronger than tribal allegiances.

But throughout history, synthesis and coherence have been accomplished. The trend has been towards larger, more complex societies—beyond dynastic structure.

Expanding beyond kinship structure requires the evolution of cultural techniques, but it does not require any new bio-psychology. The instinct for group loyalty evolved in our ancestors, the same as it did in all other social species. Animal societies distinguish between "us" and "them". The ability to "recognize" members of a dynastic group, and distinguish them from all others, is epigenetic. It is based on proximate cues—special proximity, visual identification, or odors, acquired by sharing a nest or territory. Humans are very visual, so it is likely that our ancestors relied primarily on their visual abilities for group identification.

Modern humans also use epigenetic cues to discriminate between members of our own society and all others. However, as societies became larger, epigenetic identification could no longer depend on personal familiarity. We use other means: clothing,

ornamentation, hairstyles, flags, songs, language, rituals, passports, and many other cultural signs to identify with individuals far beyond our own personal world. As a result, like other social animals, the broadest attachment of humans is to society, but the society to which humans attach is not bounded by dynastic structure. It is bounded by a common culture.

That human societies are not dynastic is irrelevant to cultural evolution. Dynastic structure is required for the biological evolution of group-adaptive traits because it ensures that these traits follow the pathway of reproduction and inheritance. But cultural evolution is decoupled from natural selection. Thus, it does not matter that humans have ceased to identify with a biological lineage and instead identify with a cultural lineage.

The same result can be reached using dynastic theory's concept of society as an organism. In this concept, a society is an organism, and what we usually think of an organism can be viewed as a society of cells. In a nutshell, just as the reproductive cells of a baboon reproduce not just individual cells, but a whole organism, so too a queen ant reproduces not just individual ants, but a whole colony. A wolf reproduces a pack, not just individual wolves. The same holds true for all animal societies. This also holds true for a colony of cells in invertebrates or a colony of bacteria. The common threads in all of these societies—all organisms—are that each society is an adaptive unit of function and each is dynastically structured.

Besides famously coining the phrase "survival of the fittest", Herbert Spencer was also well known for his description of human society as (or analogous to) a biological organism. (Spencer 1988). He believed human societies evolved in the same way that a biological organism develops, in stages from egg to embryo to adult. Human society began at some point in time as a general, undifferentiated mass (like an egg), with no specialization among its members (individual humans are analogous to cells of an organism), then evolved to greater complexity as society's members (and institutions) became more numerous and specialized. Just as all the parts of a biological organism had functions that worked together as a unified whole, the functions of human social institutions, in Spencer's view, also worked together as a coordinated whole. Spencer believed that this evolution of human society from simple to complex was accompanied by a direction towards human perfection.

Shorn of its metaphysical idealism, Spencer's concept of human society as an organism is apt. According to dynastic theory, every animal society can be viewed as an organism. Each is an adaptive unit of function. Social animals have evolved adaptations that have served group function, including loyalty, fidelity, courage, compassion, and other traits necessary for a society to cohere—and, thus, to perpetuate the biological lineage of the group.

The societies of our pre-cultural ancestors would have been organisms; the

individuals within them would have evolved such adaptations. They would have discriminated between “us” and “them”, most likely based on visual identification. As humans began to evolve culturally, and as societies expanded, group identification became more dependent on cultural bonds. Human societies are still organisms. But they are now cultural organisms.

CHAPTER ELEVEN
~
HUMAN REPRODUCTIVE PATTERNS: THE EVOLUTIONARY ROOTS

Neo-Darwinian definitions of natural selection, fitness and adaptation create the expectation that organisms have evolved to maximize reproductive success. (*See, eg.*, Wilson 1980, pp. 305, 312, 316; Alcock 1993, p. 578). Darwin also described natural selection as having honed every individual organism to maximize reproduction. "[E]very single organic being may be said to be striving to the utmost to increase in numbers...." (Darwin 1952a, p. 34).

If so, natural selection should have honed our ancestors to do the same. That drive ought to remain with us. Individual humans should be conniving to outreproduce everyone else. Human reproductive patterns, however, show nothing of the kind. Although human population has soared, it is not because individual humans have as many children as possible. It is virtually certain that the readers of these pages are not churning out as many offspring as they could.

Another reproductive pattern that isn't explained by neo-Darwinian theory involves social dominance. According to the selfish individualism of sociobiology, social dominance correlates with reproductive success. "In the language of sociobiology, to dominate is to possess priority of access to the necessities of life and reproduction…. With rare exceptions, the aggressively superior animal displaces the subordinate from food, from mates and from nest sites. It only remains to be established that this power actually raises the genetic fitness of the animals possessing it. On this point the evidence is completely clear." (Wilson 1980, p. 141).

Thus, socially dominant individuals should have the most offspring. If this tendency evolved in our ancestors, it should remain with us. Yet there is no demonstrable pattern indicating this is so.

Every human society has a merit system of some sort. It is customary for a society's movers and shakers to be rewarded in some manner, with, for instance, wealth or status. However, there appears to be no positive correlation between wealth or status and reproductive success. There is no obvious pattern that societies' movers and shakers have more children, while others are reproductively penalized. According to Wilson, there is a connection between social status and sex: "[t]he data show that high male status is correlated with greater longevity and copulation with more women...." (Wilson 1998, p. 170). However, this does not translate into "the fathering of more children." (*Id.*).

It is tempting to treat this as a contemporary anomaly, a recent interruption in the otherwise historical fit between social status and reproductive success. One could cite past examples of Arab pashas, Oriental potentates, and tribal chiefs accumulating wives, concubines and children to illustrate the historical fit between social dominance and number of offspring. But one could just as easily cite to past examples such as the Roman Empire, where the powerful elite practiced family limitation, while denominating the poorer classes as the "proletariat" because of their prolific fertility. (Durant 1944, pp. 665-66). Paging through the leaves of history, we can remark upon how many people who bequeathed great cultural legacies left no biological heirs. Roman Emperors were constantly stressed to find suitable successors because their own descendants were in short supply. Alexander the Great, who spread Hellenism throughout the vast dominions he conquered, had a drive for dominance in great supply. But he left only a cultural legacy, not biological descendants. This pattern was sufficiently suggestive in Victorian England that defenders of Darwin's theory felt it necessary to disprove the connection between social eminence and infertility. Darwin quotes Frances Galton: "I regret I am unable to solve the simple question whether, and how far, men and women who are prodigies of genius are infertile. I have, however, shewn that men of eminence are by no means so." (Darwin 1952, p. 325).

Even wars of conquest, which seem so utterly Darwinian, usually have comparatively little to do with spreading the DNA of culturally dominant conquerors but a lot to do with spreading the conquerors' culture. When Rome conquered England and Wales, making them a part of its empire, what the conquering Romans mostly spread was Roman culture, not Roman genes. (Moreover, by that point, a great many Roman soldiers weren't from Rome). Roman power was put towards cultural hegemony, not biological hegemony. Where conquest has led to colonial expansion, the conqueror has not always sent its most socially successful people as colonizers; often they have sent soldier conscripts, misfits, and outcasts. Some of the Macedonians and Greeks who accompanied Alexander on his conquests left biological lineages in foreign lands, but these lineages did not displace those of the conquered natives. More indelibly, they did leave Greek culture.

This is not conclusive proof that there has been no historical connection between dominance and individual reproductive success. Nor is it proof that there has been no connection since the advent of cultural evolution. It is an anecdotal analysis, not a systematic one. In Darwinian theory, for a trait to evolve and spread does not require that it enhance the reproductive success of every individual that has it; all that is required is a patterned tendency over time. It is possible that there is a pattern but that it is just too faint to be noticeable. Empirically, all that can be said for certain is that there appears to be no obvious correlation between social dominance and reproductive success.

There is also no obvious connection between the biological capacities for culture—including intelligence—and reproductive success. "Intelligence", of course, is

notoriously hard to measure. It is also notoriously hard to define. There are all kinds of intelligence—from sheer candle power to several kinds of social intelligence. But however you chose to define and measure it, you'd be hard-pressed to find a pattern indicating that, within a society, more intelligent people have more children.

A conventional way to account for the disconnection between the predictions of neo-Darwinism and human reproductive patterns is to suppose that individual reproductive restraint is uniquely human. In his book *Our Kind*, in a chapter entitled "The Myth of the Reproductive Imperative," anthropologist Marvin Harris argues that natural selection did not endow our species with a "procreative drive or appetite." "It merely endowed us with a powerful sexual drive and an internal hiding place where the fetus could grow." (Harris 1989, at 210). Harris asserts that in other species, this sexual drive hard-wires individuals to reproduce, but in our species, it does not, because humans can use contraception. Humans can also abort fetuses and commit infanticide. As a result, "we have been decisively liberated from the reproductive imperative that reigns throughout the rest of the animal kingdom". (*Id*., p. 210).

Harris' argument erroneously assumes that other species are hard-wired to reproduce. They are not. Reproductive restraint is not unique to humans. As documented in *Dynastic Theory,* one of the most prevalent group adaptations is reproductive suppression, as evidenced by the castes of sterile workers in the social insects. Reproductive suppression is also ubiquitous in cooperatively-breeding birds. In most social birds, there is usually only one breeding pair. Reproductive suppression is not ubiquitous in social mammals, but it is widespread. Wolf packs have only a single breeding pair, as do other canids, mole rats, and dwarf mongooses. In societies of marmots and other rodents, reproductive suppression of some adult females is typical. Female marmots skip a year of reproduction. Reproductive suppression of adult females is commonplace in New World primates, but usually does not occur in the matriarchies of Old World primates. But even in these societies, the larger the group, the lower the rate of reproduction, a fact that indicates reproduction is somehow discouraged if not suppressed.

Reproductive suppression through dominance in animal societies is completely different than it is in nonsocial contexts. In nonsocial contexts, such as tournaments among bull elk, rams, bucks, stallions, roosters, and elephant seals, the displays of dominance are spectacular. The males are physically adapted to fight. They are strikingly large and have racks, horns, hooves, claws, or teeth. They have evolved to win through physical domination.

We see none of these adaptations for dominance in social species. We see precisely the opposite. Female European Badgers, mongooses, marmots, New World monkeys, and other group-living species in which there is female reproductive suppression, have no such physical adaptations for fighting and dominance. Neither do

females in Old World primates. Wolves and African wild dogs have no exaggerated morphologies adapted for tournaments. Nor do cooperatively-breeding birds.

In social species, dominance is seldom violent. It is highly ritualized and characterized by swift submission. In wolves, "[r]ank begins to be established early in life, when puppies play-fight. It is reinforced in maturity by repeated exchanges of hostile and submissive displays. Fights usually end quickly by the submission of one of the contenders." (Wilson 1980, p. 247). African wild dogs are even less aggressive. Alpha status must often be inferred not from aggression, but from submission. (*See, eg.*, Malcom and Marten 1982, p. 2). In many social species reproductive suppression occurs without dominance at all.

It is a striking pattern that most cooperatively-breeding birds are territorial. They defend defined patches. This is the root cause of cooperative breeding. (Smith 1990, pp. 595-605 (tables)); Skutch 1987, p. 253). Territories are saturated. Neighboring societies are hostile to intrusion. It is therefore difficult for young birds to disperse and breed, so they remain at their natal nests while scouting out opportunities. Meanwhile, they help at the nest. But because resources in the territory are limited, it would be maladaptive for every member of the group to reproduce. Thus, reproductive suppression evolved. It is a group adaptation.

The same pattern holds true in social mammals. Territoriality leads to delayed dispersal and thus natal philopatry. But territorial resources are limited. Hence, reproduction becomes bottle-necked. Members of a society can't afford to reproduce as many offspring as they are capable of. Reproductive suppression therefore becomes adaptive.

Reproductive suppression in birds and mammals is necessarily epigenetic, just as it is in social insects. In all cases, the reproductive member of the group must transmit to descendants not only the trait that caused it to be the reproductive, but also the trait of acquiescence—of swift submission to nonreproductive status. If the division were based on a genetic tendency to greater aggression or fighting ability, these tendencies would ratchet up. And they would be dysfunctional to the group. As is evident from studies of ritualized aggression and submission in social animals, it has ratcheted down. The division between reproductive and subordinate status, even if temporary, must therefore be epigenetic.

Other species are not hard-wired to maximize reproduction. They are adaptively flexible.

As also documented in *Dynastic Theory*, and contrary to sociobiology, social dominance in the animal world doesn't always correlate with reproductive success. Some species of social mammals have dominance hierarchies, but dominance has no bearing on breeding "rights" or numbers of offspring. Reproduction is egalitarian. This is especially

prevalent in Old World primates. (Silk 1987, p. 322). A study of Japanese macacque females with matrilineal societies found that high rank correlated with accelerated maturity and shorter breeding intervals (and therefore more offspring), but also found that the offspring of these females were more likely to die in their first year. Other studies of the same and similar species found no correlation. (*Id.*, pp. 320-21). Strum observed that females in troops of olive baboons formed stable hierarchies, but the number of infants and their survival correlated with age, not rank. (Strum 1987, pp. 139-140). In his study of zoo-kept Hamadryas baboons, Kummer found that females in harems establish rank. However, rank did not correlate with reproductive success. In fact, males preferred lower-ranking females as sex partners. (Kummer 1995, p. 32). In an experiment to test for female preferences, the dominance rank order established by Hamadryas males among themselves was irrelevant to the desires of the females. (*Id.*, p. 190). As between males, they never tried to steal females from males in the same band (but would steal from males of a different troop). (*Id.*, pp. 182-87). Kummer verified this with another experiment. So long as males had previously observed a female bonded with another male, they honored the bond. The size, strength, and fighting ability of males did not matter.

Societies of our closest relatives, chimpanzees, which are patrilocal, are often cited for their human-like male "politics." Jane Goodall documented the competition among male chimpanzees for alpha status in their societies, as well as the constant shifts in male dominance hierarchies. (Goodall 1990). According to Desmond Morris, "[t]heir life is full of takeovers, dominance networks, power struggles, alliances, divide-and-rule strategies, coalitions, arbitration, collective leadership, privileges and bargaining. There is hardly anything that occurs in the corridors of power of the human world that cannot be found in embryo in the social life of a chimpanzee colony." (Gadagkar 1997, pp. 152-53, quoting Desmond Morris in his Introduction to *Chimpanzee Politics*).

But male dominance does not translate into greater mating success. (Nishida and Hiraiwa-Hasegawa 1987, p. 171; Wilson 1980, p. 270). It doesn't even lead to greater sexual access to females. Mating relationships are impermanent, promiscuous, and apparently without male jealousy. "Once Jane Goodall saw seven males mount the same female, one after the other, with less than two minutes separating each of the first five copulations…. An estrous female in Sugiyama's Budongo troop stopped grooming a dominant male, approached a young adult male on a nearby branch, copulated with him, and then resumed her ministrations to the first male." (Wilson 1980, p. 270).

Alpha status does not even necessarily correspond to breeding status. According to Mech, an alpha male in a wolf pack may refrain from mating and allow a subordinate to do so, yet the alpha male "remains dominant and directs the activities of the entire pack." (Mech 1995, p. 69). Alpha status can serve other functions. A pack preparing to hunt cooperatively cannot head in six different directions; it must choose one. This requires leadership.

Dynastic theory explains how reproductive restraint and flexibility evolved. In would be expected that this same flexibility evolved in our ancestors. They would have lived in societies and have been territorial. Resource limitation—or just the perception of it—would have induced reproductive restraint in individuals. When resources allowed, a society could increase reproduction. Expansion could have been accomplished by extending an existing territory or carving out a new one. It could have occurred by seizing a territory vacated by a failed group, or pushing out a failing or less powerful group. It could also have been accomplished by splitting the society, with the splinter group re-locating to an unoccupied ecological niche and figuring out how to adapt to it.

As for the apparent lack of correlation between socially dominant individuals and reproduction in human societies, the reason is that quite likely there was no such link in our ancestors. Social hierarchies evolved not to increase the reproductive success of dominant individuals, but as a group adaptation such as leadership. The insistence that there is such a link is a myth perpetuated by sociobiology because it conforms to the notion of reproductive selfishness.

But this does not necessarily lead to the conclusion, asserted by Harris, that "we have been decisively liberated from the reproductive imperative…." (Harris 1989, p. 210). A flaw in this argument is that most people genuinely like children. Most want to have children of their own. Most people do have children, even when birth control is easily accessible. It would be an overstatement to characterize a desire for children as a "procreative drive or appetite", but to say that this desire is a part of human bio-psychology would be accurate. Given the amount of care and attention that children require, we would expect that a propensity to enjoy child-raising evolved in our ancestors.

However, as with other aspects of our bio-psychology, the desire to have children is epigenetic and is therefore subject to enculturation. The intensity of the desire to have children, along with decisions about their number and whether to delay having them in order to pursue education or to first secure a financial footing—these and many other considerations, and their relative degrees of influence, vary widely among individuals. Some individuals have desires for social fulfillment that compete with the desire to raise (more) children. The results of these "aid the progress of mankind in a far higher degree by their works than by leaving a numerous progeny." (Darwin 1952b, p. 325). The degree of enculturation of the desire for children also varies widely among cultures. In some, begetting many children is a mark of virility, fertility, and status. In others it is not. In early Communist China, Chairman Mao encouraged reproduction with the maxim that "every stomach comes with two hands." Policy later changed, such that the government came to encourage and sometimes mandate one child per family.

No bio-psychological propensity stands alone. We have many emotions. We have many desires. A desire to have and raise children competes with others.

The same is true of the desire for sex. Although humans have a "powerful sexual drive," it is not so powerful that it escapes enculturation. When we have sex, under what circumstances and with whom are subject to varying social mores. Polygamy has been customary in many societies at most times in history. In modern Western cultures, it is outlawed. When isolated cases are discovered, it evokes disgust. The partnering of teenage girls with older men has been common in some cultures; in modern Western cultures, it seems creepy and can be prosecuted as statutory rape. Mores about premarital, marital, and extramarital sex vary widely.

Still, the desires to have sex and children, and to nourish and raise them, are unquestionably among the repertoire of human emotions that evolved through natural selection.

I stated that in modern humans there is no apparent connection between the biological capacities for culture—including intelligence—and reproduction, and that this disconnection likely existed in our pre-cultural ancestors. This raises a question: if there was no such connection, how could the big brain have evolved? It must have been naturally selected. Those with better brains must have left more descendants. How could this selection occur if better brains were not rewarded with reproductive success?

The answer is that they *were* rewarded with reproductive success, but this does not mean that *within* a society the more intelligent individuals left more offspring than others. According to dynastic theory, this is unnecessary.

A crude hypothetical scenario can illustrate how the biological capacities for culture (including the big brain) could have evolved without a link to individual reproductive success within the group. Assume a species in which hominids lived in small bands of eight to fifteen individuals. Assume that breeding among group members was entirely egalitarian; that is, there was no sole breeder or overt reproductive suppression. Suppose that one member of a band was born with a genetic variation for a better brain. This better brain would have been slightly advantageous in figuring out how to make a fire, hunt, test herbs, raise children, or whatever. This ability would be put to use for the good of the group, the entire band. (Perhaps the knowledge gained could have been shared with other members of the band—shared intelligence). As a result, the band as a whole would be slightly more prosperous than it would be otherwise. Offspring would be more likely to survive and grow to maturity. The band would increase its reproductive success, with benefits spread throughout the group, not just to the individual with the better brain.

Because of this, the band can be assumed to eventually reach a size where it can

"fission" into two bands. Meanwhile, within the group, the member with the better brain will have had an average number of surviving offspring. (We have assumed that he or she has no reproductive advantage). Because like begets like, some of these descendants will also have the better brain. After fission, if all of these remain in the original band, this band will be more prosperous compared to the other band. As this repeats over time, because of the increased success of bands that have members with better brains, the trait for the better brain will spread, and the alternative lesser brain will decline.

This will work with other assumptions. For example, instead of supposing that all the offspring of the individual with the better brain remain in the original group, suppose that the more intelligent individual has but two offspring, with one remaining in the original band and one joining the splinter band. Keeping everything else equal, these two bands will be equally successful. But both of these bands will still be more prosperous than other bands, and so will fission more swiftly, and in this way, the better brain will spread more swiftly than will the alternative. Or we could suppose that bands intermarry, with male or female dispersal. Any band that an individual with a better brain marries into will become slightly more prosperous. In any case, over the long haul of evolutionary time, the better brain will spread and, eventually, replace the lesser brain alternative.

In short, what would have enabled the big brain to evolve was that groups (societies) were adaptive units of function. Groups composed of individuals with more effective capacities were more successful—and thus begat more groups (and thus more individuals) with these greater capacities. Hence, for individuals with better brain capacities to have evolved, it was not necessary that these individuals were accorded dominant breeding status or greater reproductive success within the group.

This works so long as societies are dynastically structured, as presumably bands of human ancestors were. That is why we don't see any obvious connection between the capacities for culture and reproductive success in modern human societies. Our ancestors evolved as egalitarian breeders *within* a society.

There is, of course, something quite different about modern human societies: they are no longer dynastically structured. Hence, according to dynastic theory, this kind of evolution of better brains and other biological capacities for culture will no longer occur. In terms of biological "flow", human societies are more like populations. Hence, the biological capacities for culture—including our social propensities—should be "drifting." That is, they should not be declining or improving, or evolving in any particular direction. Natural selection is continuing to operate on the human species, but in fairly small ways that have no significant effect on the human ability to evolve culturally.

This matters very little. Humans now evolve by creating, selecting, and building culture outside the pathway of biological reproduction. As evidenced by the dramatic

human cultural evolution over the last several millennia, our biological capacities for culture remain in fine shape.

CHAPTER TWELVE
~
THE EVOLUTIONARY ROOTS OF RELIGION

Some have argued that religion serves no useful function. (*See, eg.,* Dawkins 1989, p. 192). This is wrong. Religion serves as an enormously important cultural binding agent. Religion, spirituality, and gods are present in human cultures everywhere and in all eras. Murdock's list of cultural universals includes divination, eschatology, ethics, faith healing, funeral rites, superstitions, magic, supernatural beings, religious ritual, and soul concepts. (Murdock, cited in Wilson 1978, pp. 21-22). All of these are typically tied to religion. Many other cultural universals in Murdock's list are also often tied to religion: art, dream interpretation, education, food taboos, law, marriage, population policy, sexual restrictions, and weather control.

In fact, nearly every one of Murdock's cultural universals could be linked in some way to religious beliefs, at least in some cultures. Or, to put it another way, each culture itself is usually entwined with the culture's religion. In many societies, governmental, legal, and educational institutions are not separable from religion. Even in modern secular societies, where there is a conscious effort to distinguish religion from other institutions, it is commonly understood that these other institutions derive at least in part from religious traditions. Western societies, for example, trace particular cultural institutions to their Judeo-Christian heritage.

Culture itself is surely functional. To function, a society must cohere. Common culture provides shared rules that enable coherence. Religion is a common source of these shared rules. Religion is also a means of restraining society's members from subverting rules. It is one thing to call into question a secular rule made by mere mortals, but it is another thing to deviate from a rule decreed by a supernatural deity at the beginning of the time. One way to ensure orthodoxy is through divine decree accompanied by the threat of divine punishment for deviation.

The concept of life after death is a recurrent theme in the multitude of theologies devised by humans. It surely has some adaptive value for a species whose members are aware of the eventual deaths of themselves and their loved ones. It provides comfort. Life is full of grief and injustice. The belief that grief in this world will be assuaged in the next can alleviate devitalizing sorrow. The possibility that injustice in this world will be rectified in the next can alleviate debilitating bitterness.

It is true that many religious disputes have seemed trivial and destructive, especially to outsiders. One branch of a religion claims that drinking the wine and eating the bread are symbolic, while another claims that the wine and bread are transformed by ritual into the actual body and blood of Christ. One branch claims that the Father, the Son, and the Holy Spirit are one God, while another claims that they are separate

divinities. One branch claims that the caliphate follows one hereditary line of succession; another branch claims that it follows a different line. People spill blood and fight wars over these rival claims. Far from leading to coherence, religion leads to wars—so goes the argument.

It is beyond the scope of this work to attempt to ascertain the extent to which these kinds of disputes are proxies and rallying cries for more material reasons for violence. In either case, just as a thematic emphasis on human folly masks the fact that there is an overall direction to human history, so too a thematic emphasis on this particular subset of human folly can mask the function of religion in human culture. And in the broadest perspective, theology, as an aspect of religion, is not trivial. For most of human history (and continuing still), theology has provided people with an understanding of the universe, and their role in it, in a consistent way, through its explanations of the origins of the world; the origins of a people; thunderstorms; the existence and movement of heavenly bodies; the reasons for drought, famine and abundance, among many other things.

This drive to account for our universe in a consistent way—to connect all the dots—is a product of human minds. It is the same drive that underlies secular disciplines, including science. Examining, exploring, and debating the cracks in our understanding of the universe moves human knowledge forward. This creative process is not always *straight*forward. Yet through lurches, lapses, and more lurches, human understanding does evolve.

Or perhaps the argument is not so much that religion in general is not functional, but rather that it is difficult to believe that faith in deities, the afterlife, and such could possibly be derived from human biology that evolved through natural selection. Can there really be a gene for God? This, in fact, has been proposed. Dean Hamer has actually written an entire book with this hypothesis in its title: *The God Gene: How Faith Is Hardwired in Our Genes.* (Hamer 2005). The notion of a "god gene" is premised on a Mendelian model of organisms—i.e., the notion that organisms are the sum of a string of genes, each of which codes for this trait or that. For the reasons previously described, I believe this to be an inaccurate model.

Moreover, a hypothesis that a belief in higher powers derives from evolved bio-psychology can be derived in a much more simple way. In all social animals there are dominance hierarchies. In some, this hierarchy is weak. In others it is strong. Group leaders are respected, even revered. They are followed. An alpha wolf leads the pack. Others accede to dominance and submit. Humans are social animals. We can infer that our ancestors likewise lived in social groups, with a social hierarchy and leaders—alpha males and females.

We certainly see this in modern humans. We also see respect, even reverence, for

social leaders. We see it in reverence for royalty, for Popes and Imams. We even observe reverence for leaders of exotic cults.

As our species evolved consciousness, we developed cosmology—an understanding of the universe and our place in it. We connect the dots. In so doing, we anthropocentrically project alpha status to the creators of the universe, higher powers who prescribe rules for how life ought to unfold. They are the ultimate lawgivers. They reward obedience and punish disobedience. This is not just a religious phenomenon. From Plato to the present, philosophers have posited "ideal forms" of humans—what we ought to be, if we were perfect, in accordance with universal law—and admonish fellow humans to strive towards these ideals.

In this hypothesis, the bio-psychological propensities that have led to gods, religion, and spirituality did not evolve through natural selection for these purposes. Rather, they evolved in our ancestors for other functions, such as leadership; from these, humans have extrapolated to employ them for additional functions. This kind of evolution is not unique to human culture, nor is it unusual. In fact, this hypothesis is similar to the concepts of preadaptation, exaptation, and contextual shifts in Darwinian theory: "parts" and behaviors evolved for particular functions are employed for other functions, perhaps in slightly modified forms, in different environments.

I do not know how this hypothesis can be tested. It is, however, a logical extension of the bio-psychology that has evolved in social animals, joined together with the particular attributes of curious, creative, and logical human minds. Beliefs in supernatural alpha males and females—and in idealized human forms—have proved functional across cultures and over time. To these alphas, we project ultimate sources for morality, obedience, and justice; these gods give us comfort when the world seems unjust. We look to them for leadership and direction, just as we often do with political leaders in this world.

As for the widespread belief in salvation and life after death, these can be easily linked to the basic desire to survive. From this powerful desire, it takes only a bit of imagination, combined with a bit of hope, to project eternal life.

And if innate human bio-psychology is not the source of such beliefs, we must ask what other source would supply them. Believers, of course, will say that their beliefs are supplied by the deities themselves. But if we hold the question to science, no plausible alternative has been proposed.

In any event, what is beyond debate, or should be, is that religion has been an integral part of human cultures. In fact, religion often serves as a means of cultural identification well above political boundary lines, as Huntington observes in *The Clash of Civilizations and the Remaking of World Order.* (Huntington 1996). The concepts of culture and civilization are related. In line with most scholars, Huntington argues that the

two concepts are intertwined, with "civilization" referring to a broader cultural identification: "Civilization and culture both refer to the overall way of life of a people, and a civilization is a culture writ large. They both involve 'values, norms, institutions and modes of thinking to which successive generations in a given society have attached primary importance.'" (Huntington 1996, p. 41, quoting in part Bozeman, "Civilizations Under Stress"). As Huntington defines it, "[a] civilization is the highest cultural grouping of people and the broadest level of cultural identity people have short of that which distinguishes humans from other species." (*Id.* at 43).

As such, a civilization transcends political boundaries. Huntington divides the current human world into six or seven civilizations: Sinic (also referred to as Chinese or Confucian, encompassing China and most of Southeast Asia); Japanese; Hindu; Islamic; Western; Latin American; and African (possibly). Significantly, he notes that four of the five world religions (Buddhism being the exception) are identified with a civilization.

Nations, states and subcultures that share a civilization are often at odds with one another. But when they perceive a threat to their civilization, they tend to unite in opposition. Huntington cites the example of Spartans and Athenians, often at odds on the Greek mainland, uniting to oppose the Persian invasion. For religious-cultural reasons, the Athenians assured the Spartans that they would not betray them:

> For there are many and powerful considerations that forbid us to do so, even if we were inclined. First and chief, the images and dwellings of the gods, burnt and laid in ruins: this we must needs avenge to the utmost of our power, rather than make terms with the man who has perpetrated such deeds. Secondly, the Grecian race being of the same blood and the same language, and the temples of the gods and sacrifices in common; and our similar customs; for the Athenians to become betrayers of these would not be well.

(Huntington 1996, p. 42 (quoting Herodotus)).

There is no shortage of functional rationales, for gods, spirituality and religion.

CHAPTER THIRTEEN
~
HUMAN NATURE:
AN EVOLUTIONARY APPROACH

As a species, who are we? Why are we like that? In the opening lines of *On Human Nature*, E.O. Wilson paraphrases the essential questions concerning human nature as formulated by philosopher David Hume:

> How does the mind work, and beyond that why does it work in such a way and not another, and from these two considerations together, what is man's ultimate nature?

(Wilson 1978, p. 1).

Philosophy, including science, seeks universals. Sifting through the details, we discern patterns that are linked with other patterns and assign reasons and causes that explain and weave together the several patterns. A broad perspective is required. This is not an easy task, no matter the subject. It is even more difficult when the subject is our own species. We are immersed in the details. We live them.

Our experience makes us keenly aware that humans are very different from one another. We are different from close members of our own family, even more so from other members of the community and distant citizens of our country. We differ in our attitudes, behaviors, hopes, and outlooks on life. During the course of our lives, we meet sinners and saints, pillars of the community and felons. Ascetic monks and poverty-vowed nuns do not desire the same things as most of us, at least not for themselves. Vengeance, spite, tolerance, peacefulness, habits of dress, theology—all these characteristics and attitudes vary from person to person. Humans do not fit into a mold.

As access to distant lands has eased, we have become even more aware of the enormous diversity of human life across time and space. A Muslim may be repulsed by aspects of Western society perceived as decadent, such as the tolerance of alcohol and pornography. A Westerner may be bewildered by the imposed modesty of Muslim women and the enforced uniformity of cultural rules and taboos. Both may view as barbarous the ritualized custom of removing female genitalia as practiced in still other societies.

Even greater differences exist across time. The ways of life of ancient cave dwellers hunting mastodons and digging roots can hardly be comparable to the lives of most living today. Who now can fathom the delight Roman citizens took in attending the Coliseum to watch fellow humans being torn apart by animals?

This broadened scope has caused something of a crisis in the traditional philosophical aim of prescribing universal moral imperatives. How to speak of what humans universally *ought* to do, at least not without condemning most humans who have ever lived as being in the wrong? Accepted rules of behavior may be necessary for social functioning, but knowing that they are relative to a specific cultural context can dampen the ardor with which they are preached and the fidelity with which they are observed.

Even putting aside the question of what humans ought to do, the broadened scope has multiplied the difficulties of describing what human nature *is*. If it is to be discerned from morals, customs, beliefs, technologies, and overall ways of life, then human nature must be judged to be remarkably diverse. It would seem to render insuperable the task of describing a theory of human nature in a way that applies universally, to all humans across space and over time.

This problem has plagued traditional philosophy. Plato conceived of the various aspects of the universe, including humans, as having ideal forms. (Velasquez 1994, pp. 113-120). He believed that the human mind could perceive the ideal human form and attempt to achieve it by using reason to rule the "appetites" and emotions. The multitude of human personalities must therefore be explained on grounds that humans are imperfect, deviating from the ideal.

As our knowledge of the diversity of humankind has broadened, so too has the range of deviations, making a theory based on ideal forms ever more difficult to support. Recall that because of the wide variability of human customs, norms, and beliefs, Leslie White dismissed the very idea of human nature: "What then can be attributed to 'human nature'? Virtually nothing." (White 1949, pp. 152-53).

In a book entitled *Ten Theories of Human Nature* (Stevenson and Haberman 2008), the editors describe ten of the most prominent approaches to human nature: Plato, Kant, Marx, Freud, Sartre, Skinner, Lorenz, Confucianism, Upanishadic Hinduism, and the Bible. A well-versed reader might be familiar with some or all of these approaches and might be able to concisely state the definitions of human nature that follow. But none of them satisfactorily account for the broad trajectories of history, including the patterns that most interested me: the trajectory towards more productivity, goods and people. And none of them lay out a theory of universal human nature while at the same time accounting for the diverse ways of human life.

While working through dynastic theory, it dawned on me that Darwin had described a theory that unified *non*-human nature despite the gross dissimilarities of species as diverse as snails, bacteria, baboons, orchids, and now-extinct trilobites. As a unifying feature, all organisms are "designed" to survive and reproduce to the maximum extent possible. They are so designed because all have evolved through the same process: natural selection. This unifies nature by seeing diversity not as a complication,

not as something to be ignored, but as central to the solution. It is the nature of life that it evolves. In doing so, it diverges. Diverse features evolve because they are adaptive in surviving and reproducing. But at all times, organisms must evolve according to the unifying principle of "design"—to survive and reproduce to the maximum extent possible.

It is an *evolutionary* theory of *non*-human nature. It also occurred to me that, with dynastic theory, I was essentially revising this theory of non-human nature by accounting for organisms such as sterile workers that do not reproduce, by accounting for group-adaptations including altruism, and by accounting for reproductive restraint when resources were limited and increasing reproduction when resources were available. And a theory of non-human nature should also account for solitary species. The formulation I arrived at was this: natural selection has honed organisms to perpetuate a line of descent, following the principle of continuity of the lineage first, with expansion being secondary and opportunistic.

I also thought that this formulation, if correct, should generally describe the bio-psychology that evolved in our pre-cultural ancestors—the motives that give our big brains something to want to do. This bio-psychology remains in modern humans.

However, the shift to cultural evolution altered our psychology in one significant respect. Unlike all other species, humans are not "designed" to perpetuate a *biological* line of descent. With the shift to cultural evolution, we perpetuate a *cultural* line of descent. Thus, we perpetuate a cultural "lineage"—the cultural heritage of one's society—following the principle of continuity of the cultural lineage first, with expansion being secondary and opportunistic. We create, select and build culture to that end.

The accuracy of this generalization could be illustrated using any culture, but China perhaps illustrates it better than most due to its sheer size, its resilience over a long period of time, and the consistency with which its history has been recorded.

After 268 years of imperial monarchy, the Great Qing Dynasty fell in 1912. (Wakeman 1975). It was the last of the 15 (more or less, depending on how they are counted) great Chinese dynasties stretching back to the Xia Dynasty in the twenty-first century B.C. The final Qing dynasty was founded by Manchurian conquerors, with the royal line following from Nurhaci, who had unified Manchurian tribes before invading northern China. Like the Mongol conquerors who established the Yuan Dynasty in 1271 A.D., the Manchurians, though they were the conquerors, eventually absorbed Chinese culture.

Confucianism was central to Chinese culture. As in most societies, families in China could maintain and expand economic advantages over time through hereditary perquisites, including property. But there also existed a path of upward mobility that consisted of passing rigorous national civil service exams that were based upon literary and philosophical subjects. These centered on Confucian classics. Degree-holders acquired status for themselves and their families. They sometimes obtained positions in the vast, centralized Chinese bureaucracy. Degree-holders also perpetuated the ancient Confucian culture that prescribed morality, family relations, and social and political relations among rulers and subjects. In so doing, they bonded the ethnically, linguistically, geographically, and economically diverse Chinese empire.

The original Xia dynasty was formed in what is now northern China around the Yellow River. By the height of the Qing dynasty in the eighteenth century, the empire's borders had expanded to include most of what consists of the modern Chinese nation, along with numerous vassal states including Korea and Vietnam. As peace and prosperity reigned during the Qianlong Emperor's rule in the 1800's, population climbed to nearly 400 million. (Wakeman 1975, p. 105).

Rampant corruption, factionalism, natural disasters, and European power all combined to cause the Qing Dynasty's eventual downfall. The second White Lotus rebellion in the late 1700s, led by rural peasants preaching the coming of the Maitreya Buddha, rallying against taxes, and seeking the end of Manchu rule and restoration of the Ming Dynasty, was eventually quashed. Sixteen million people died. The Taiping rebellion in the mid-1800s began as a vision by a failed civil service candidate to establish a heavenly kingdom. His vision fused elements of Christianity, Chinese culture, and himself as a quasi-messiah, but his movement eventually became an anti-Manchu military force. It was defeated after twenty to thirty million were killed. China's attempts to control or crack down on European trade, especially in opium, were resisted by militarily superior Europeans, culminating in the Opium Wars. In 1860, the English-led Europeans routed Chinese defenses, entered Peking, punished the Emperor by destroying his magnificent summer palace, and required the humiliated Chinese to sign the Convention of Peking guaranteeing European trade and influence.

The Qing Dynasty nevertheless survived, and it attempted to placate European hegemony while assuaging the anti-foreign sentiments of the Chinese people and reforming the government and military. But as European influence spread, so did anti-European sentiment, which eventually culminated in the peasant-led Boxer Uprising. Boxers began targeting Christian missionaries and priests. The Empress Dowager Cixi, with de facto control of the imperial government, at first attempted to suppress the Boxers, but as they grew in power, she reversed course and supported them in their efforts to expel the "foreign devils." The European allies prevailed once again. In 1895, the Japanese defeated China in a brief war for control of Korea, with China also losing territorial control of Taiwan. Under pressure, China acceded to demands to allow Russia

to build the trans-Siberian railway through Manchuria.

In 1912, the Qing Dynasty collapsed, the child Emperor abdicated, and a shaky Republic was formed. After warlords took over fragments of China, Chiang Kai-Shek temporarily unified most of China. After World War II, civil war erupted between Chiang Kai-Shek's government and Communists led by Mao Zedung, ending with the mainland being transformed into the People's Republic of China. A half-century later, despite disastrous efforts to transform Chinese culture and the economy through programs such as the Great Leap Forward and the Cultural Revolution, China has recovered to become a world power, with the third largest economy, the largest consumption of energy, the greatest number of troops, and possession of nuclear weapons. With an excess of 1.3 billion people, it is the most populous nation in the world.

Over the millennia, Chinese culture has evolved. Yet Chinese civilization persists. Ruling dynasties have come and gone. Reforms and revolutions have changed Chinese ways of life dramatically. Threads of Chinese culture, however, stretch back thousands of years, creating a unique, indelible heritage.

Until the twentieth century, Chinese eras were defined by ruling dynasties. Of course, Chinese dynasties describe imperial succession, not the structure of Chinese society. In China, as elsewhere, nuclear and extended families have always been important. Indeed, ancestor worship has been customary and to some extent remains so. But cultural attachments extend far beyond the biological family and lineage. Attachments extend to a nation in excess of 1.3 billion. Attachments extend even beyond the living to a cultural heritage stretching back thousands of years.

In perpetuating a cultural lineage, first and foremost is continuity of the cultural heritage. Culture changes, but it is woven into tradition. Even where a people adopt the cultural practices of other societies, or when these practices are imposed, they are integrated into its cultural heritage and given its unique stamp. Thus, as a culture evolves, it retains threads of continuity despite change. Just as biological lineages gain DNA, shed and modify other DNA, human cultures adopt some cultural traits, shed and blend others. Over time, a culture may be so completely morphed that an outsider might barely recognize the connection between past and present, yet an insider can trace the heritage with pride.

Culture exists separate from any given individual human. The body of knowledge, mores, beliefs, customs, traditions, and rituals is collective. It is stored in many minds and, in recent times, recorded in so many documents that no one individual can view them all or even be aware of them. But of course the actors in the evolutionary drama are individual humans. Individual humans are enculturated. Individual humans become attached to the culture in which we are born and raised.

Individuals can become attached to a culture even though their ancestors had no

connection to any of it. Those of us whose ancestors are recent immigrants to the United States nevertheless feel a connection to Pilgrims, having celebrated the tradition of Thanksgiving and re-enacted the ritual year after year. African-Americans, whose ancestors were forcibly transported to the Americas and enslaved, can claim a cultural connection to the founding fathers who themselves were slave owners. The founders' doctrines of equality, not intended to apply to slaves, nevertheless were adopted by slaves' descendants as rallying cries for their own equality. The wider view of equality has become woven into American tradition as a source of pride, psychologically reconciled with a contradictory history. In the modern view, the founding fathers sinned, but the sins are understood in context and forgiven, while morality is transformed and woven into a longer, more ancient cultural heritage. In this, we take pride.

The biological propensity, evolved through natural selection, to perpetuate a biological lineage has thus been transferred so that we seek to perpetuate a cultural lineage following the principle of continuity first. The Chinese defended themselves against Western territorial aggression. They also defended the "Chinese way" against cultural aggression. Even reformers such as K'ang Yu-wei, who saw the value of Western ideas, sought to meld them with Chinese culture. The Chinese had historically viewed Confucius a strict traditionalist, so K'ang Yu-wei first reinterpreted Confucianism in order to incorporate aspects of Western philosophy, including the very idea that change itself is positive. (Wakeman 1975, pp. 202-06).

Humans everywhere have tended to resist conquerors and other cultural aggressors. They have done so not because their own culture is objectively better than the foreign culture. We would be hard-pressed to come up with an objective definition of what we mean by a "better" culture. Any definition will be laden with values, which will be interpreted differently depending on the cultural values with which a person has been inculcated. That is the point. People resist domination because they are defending their way of life—which to them is better simply because it is *their* way of life. We are born with a psychological propensity to form attachments to a way of life and to defend it.

Historically, humans have seized opportunities to expand their cultures. This has often been accomplished through violent conquest. What is now Chinese territory was not always so. From a northern core, fragment after geographical fragment has been added, lost, added again, and consolidated. Likewise, Alexander the Great, Caesar, manifest destiny, and lebensraum fill the pages of history.

Nonviolent avenues to cultural hegemony also have been employed. Missionaries, Peace Corps volunteers, cultural exchanges, foreign aid, and commerce also effectively spread culture. Whether violent or nonviolent, some efforts succeed, some do not. Some cultural additions are temporary, forgotten soon after they are introduced. Others are grafted onto existing cultural rootstock. Some expansions have intended to be benevolent, some have not. In any event, the pages of history disclose that the rivers of

powerful cultures tend to break their levees and flood surrounding lands.

The continuity of one culture and expansion by another obviously come into conflict. Nativists resist imperialist influences and seek to restore indigenous culture, as with the Boxer uprising. But at various times in history, societies surrounding the dominant ethnic Han Chinese sought to curb its influence, too, as it sought to expand. Manchurians resisted Chinese Confucianism, then conquered it, only to absorb it when they discovered that their own cultural traditions, while useful for conquering, were not good for governing. The Chinese themselves, while resisting European domination, at the same time aimed to adopt some European technologies and ideas in the hopes that these would better enable them to resist complete domination by Europe, Russia, and Japan. History is filled with both resistance to a dominant culture and the absorption of it. And, of course, history also records failed efforts to resist and the consequent loss of cultural heritages.

Like territorial expansion in other social species, the effort to expand culture is sometimes successful and sometimes not. Also, like territorial expansion in other species, human cultural expansion is not done simply on impulse or blind instinct. It is epigenetic. Cultural expansion is opportunistic. Humans perceive their environment—including their own relative strengths and weaknesses—before undertaking risks. Although history is rife with miscalculations, calculations are usually involved.

Biological lineages are exact. Given enough information, we can trace a genealogical chart with certainty. Cultural lineages evade this kind of precision. Although we speak of a given "culture" as though it had absolute attributes, none is nearly so well-defined. Any given culture is an amalgam of knowledge, values, beliefs, customs, and rituals. It evolves, usually not in a straightforward way. Within a society, individuals may understand their culture differently, with some having attachments to particular aspects of a cultural heritage, some being attached to others. Moreover, in any society, there are multiple levels of cultural allegiances. Individuals vary not only in allegiances, but in depth of attachment.

A world map deceives us with its clearly-marked boundary lines. The human world is not nearly so well delineated. Lines on a political map correspond to political boundaries. These do not necessarily correspond to cultural allegiances. The world's thirty million Kurds live mostly in Kurdistan, which forms fragments of Turkey, Iran, Iraq, and Syria, in which the Kurds are ethnic minorities. And as mentioned in the previous chapter, humans also sometimes culturally identify with broad, roughly-defined civilizations, above the political boundaries of nation-states.

However, allegiance to those who are culturally most like us is not anything close to a hard and fast rule. Cortès was able to conquer the Aztec empire only because other native groups, who shared many cultural attributes with the Aztecs, allied themselves with the Spanish in the hopes of shaking off the yoke of Aztec domination. Even where a culture coincides with political boundaries, betrayal occurs. Humans have group-oriented psychological propensities, but we also have selfish ones that can and do conflict. Moreover, a social group is seldom culturally homogenous. Within a group, different people have different notions of what their culture is or should be. Within a group, people have varying notions as to how best to perpetuate their cultural lineage.

There is no such thing as a distinct culture or a distinct civilization in the sense that it can be defined precisely, with absolute attributes that hold true for every human who lives in a particular cultural milieu. In part, a culture evades precise definition because it is subject to interpretation by individual humans, each of whom has at least slightly different epigenetic influences—life experiences and enculturation. In part, a culture evades precise definition because it evolves. A culture evolves, in part, because humans are creative. Each individual imagines the world as it is, as it might be, and as it should be, in at least slightly different ways.

But this imprecision does not mean that there is no such thing as a culture or a civilization. Navajo, Hopi, Amish, French, Chinese, Persian, Islamic, Japanese—as bodies of culture, these are not illusions. They are real. But they are real in the sense that they are generalizations. Those who demand that all science must be as precise as physics will be disappointed that human culture does not conform.

Some of those who have been disappointed have reeled to the opposite view: there are no scientific generalizations that apply to human culture. This is a mistake. Science can proceed even with generalizations, imperfect though they may be. Commenting on the claim of some fellow anthropologists that there are no sociological laws, and that cultures are put together by a hodge podge of historical accidents, Radcliffe-Brown remarked:

> Generalisations about any sort of subject matter are of two kinds: the generalisations of common opinion, and generalisations that have been verified or demonstrated by precise observations systematically made. Generalisations of the latter kind are called scientific laws. Those who hold that there are no laws of human society cannot hold that there are no generalisations about human society because they themselves hold such generalisations and even make new ones of their own.

(Radcliffe-Brown 1988, p. 303).

The concept of a particular culture—a distinct body of knowledge, information, values, morals, customs, and beliefs—is based on a generalization, not an ironclad “law.”

But it is a valid generalization, as is the concept that humans form attachments to a particular culture and, having formed attachments, seek to perpetuate it.

Unifying Human Nature

The "cultural universals" compiled by Murdock—certain kinds of traits that exist in every culture ever studied—were listed in Chapter 10. Anthropologist Donald Brown wrote a book entitled *Human Universals*, in which he compiled an even longer list. (Brown 1991). There are cultural universals, but there are no ideal forms. Every culture has "dancing, decorative art, divination, division of labor, dream interpretation" etc., but each has its unique form.

An evolutionary approach to human nature reconciles the concept of human nature with cultural diversity. According to the theory of cultural evolution through directed creativity, diversity is possible because humans are epigenetic systems, capable of differentiating our phenotype without differences in genotype, and this is reflected in each body of culture that is created, selected, and built. We have differentiated culture due to geographical demands and possibilities; we have differentiated due to competitive differences in regard to surrounding societies; we have further differentiated because once a culture heads down a particular track, the customs, habits, and beliefs of that body of culture tend to be self-reinforcing. We have differentiated culture because humans are creative, which means there are not fixed cultural responses to similar environmental stimuli. Creative responses to varying stimuli differentiate us even more.

We evolve. As a result, the entire body of human culture, which in a sense exists in the aggregate, is not distributed uniformly across the globe. But we are not completely elastic. We are not blank slates. We are born with bio-psychology. Certain kinds of ideas resonate. Others do not. Because bio-psychology is universal and constant, humans tend to exhibit certain kinds of traits—as general abstractions—in nearly every culture.

The theory that we evolve following the principle of continuity of our cultural lineage first, with expansion being secondary and opportunistic, is a broad generalization. Although I have called this a theory of *universal* human nature, it does not predict that every single human who has ever lived has at all times acted according to this principle. But I do submit that it is a valid generalization that holds true across societies and over time. It is consistent with the behavior of people, cultures, and civilizations as recorded in history and with what can be gleaned from the archaeological record. It is also consistent with the broader arcs of human history—the evolutionary direction of our species. People in distinct cultures pursuing the continuity of their own cultural lineage, with continuity first and expanding when they perceive the opportunity, have collectively caused human culture to evolve towards larger societies, with more sophisticated

technology, lengthier formal education and increased productivity.

History records exceptions, but over time, the exceptions have tended to be subsumed by the generalization, which has relentlessly carried on. In that sense human nature is universal.

CHAPTER FOURTEEN
~
MALTHUSIAN POPULATION GROWTH

Why are there so many people? Why has the perpetuation of cultural lineages been accompanied by population growth?

As set forth in Chapter 11, like other species, humans aren't programmed to maximize the reproduction of offspring. We recognize resource constraints and can limit reproduction accordingly. But prosperity is a mighty motivator. With the take-off of cultural evolution, our species has become uncommonly adept at extracting more and more resources. Population expansion follows.

This sequence more or less fits the scenario described by Reverend Thomas Malthus in *An Essay on the Principle of Population*, first published in 1798. He observed that "[t]he power of population [growth] is indefinitely greater than the power in earth to produce subsistence of man." (Malthus 1993, p. 13). According to Malthus, whereas the rate of economic growth can increase "arithmetically", the rate of population growth can increase "geometrically".

Malthus, however, went further. He added that given human propensities to reproduce, any increase in economic productivity will be quickly absorbed by further population growth. Some portion of the human population will therefore always be on the edge of starvation. Some, inevitably, will be over the edge. War, famine, and death will follow.

Darwin borrowed Malthus' thesis and applied it to the plant and animal world as a premise of natural selection:

> [T]he Struggle for Existence amongst all organic beings throughout the world, which inevitably follows from the high geometrical ratio of their increase, will be considered. This is the doctrine of Malthus, applied to the whole animal and vegetable kingdoms. As many more individuals of each species are born than can possibly survive, and as, consequently, there is a frequently recurring struggle for existence, it follows that any being, if it vary however slightly in any manner profitable to itself…will have a better chance of surviving, and thus be *naturally selected.*

(Darwin 1952a, p. 7). However, the application of Malthus' doctrine to humans is different from its application to other species. In Darwin's theory, in every species, in every generation, organisms collectively reproduce more than can possibly survive. This means certain death for some. The result is natural selection: less adaptive genetic variations are culled, while more adaptive ones are preserved. But in humans, while it is

true that starvation, famine, and war occur, and while these might stimulate cultural evolution, they are not essential to cultural evolution. Cultural variations are not culled by the actual events of death of individual humans. They are selected and culled based on the perception that they are adaptive.

Malthus' basic thesis nevertheless does hold true. Collectively, the power of human reproduction does exceed resources; population expands to the limit. Famine does occur. So do wars over resources. These have been persistent themes in human history. One need only scan a newspaper to be reminded that these themes still persist.

One aspect of Malthus' doctrine has been controversial: the pessimistic implication that excess population, with consequent starvation, is endemic to the human condition. As proof that it is not endemic, some economists point to modern developed nations. Starvation, if not eliminated, does not occur cyclically or en masse. Economic growth is possible, leading to a general rise in affluence. (Gill 1972, p. 252). As living standards have risen, birth rates have fallen. Although famine continues to occur elsewhere, the fact that the condition can be eliminated in some parts of the globe is taken as proof that it is not inevitable anywhere.

Moreover, the claims of social theorists who have most dramatically espoused a modern brand of Malthusian pessimism have proved untrue. Paul Erlich's *The Population Bomb* predicted death on a massive scale in the 1970's due to overpopulation, even in Western nations. (Erhlich 1971). It didn't happen. Although some resources are fixed, others have grown tremendously, such as yields from crop hybrids produced by the "green revolution". (Shelley and Clarke 1994, pp. 196-98). *The Limits to Growth*, published in 1972, predicted that the world would run out of oil in 1992. (Meadows et. al. 1972). We did not. Humans dug deeper, more efficiently, and in places with reserves that had not been known. Historically, economic growth has also been driven by exploiting materials that were previously not considered to be resources. Fossil fuel buried beneath the Earth's surface is just one example. Solar energy captured through photovoltaics is another.

Yet Malthus' basic observation is correct. The power of reproduction always exceeds resources. Humans put their creativity towards expanding resources. When successful, humans as a species have not kept population intact and distributed economic gains to increase per capita economic prosperity. Instead, expanded resources have allowed population to expand. People like having children. Hardly anyone would doubt that if, figuratively speaking, manna rained from heaven, it would quickly be consumed through increased personal consumption accompanied by a rapid expansion of human population. Resources would quickly be saturated. Blue ribbon commissions would be appointed to search for other sources of manna and substitutes for it.

This is essentially what happened with the green revolution. As crop yields rise,

they are consumed. There is no great hoard of grain or land untilled. Consumption expands to meet supply. As evidenced by the several billions of people added to the human population in the last few decades, a substantial part of expanded consumption is due to expanded population.

Even the decline in birth rates in prosperous nations has failed to prevent population growth. Fewer children per family has resulted in greater investment per child, resulting in decreased mortality, increased productivity, economic expansion, and, thus, population growth.

In wealthier nations, population grows not just through internal expansion; it also grows through immigration. The press for immigration is propelled as populations in other countries increase dramatically, past sustainable limits. People in these countries are eager to live in places where jobs, food, and shelter are more plentiful. More prosperous nations are eager to absorb immigrants as a source of highly motivated and cheap labor. Emigration to wealthier parts of the globe relieves poorer ones of population stress, but only temporarily. The cycle has continued.

We have evolved following the principle of continuity of a cultural lineage first, expanding when possible. Population growth has been the sidekick cultural evolution.

Is this inevitable? Previous chapters have put pieces in place that might enable us to evaluate whether it is in our biological nature to control growth. But before doing so, we must first answer a very basic question: are we free to choose? That is, do we possess free will?

CHAPTER FIFTEEN
~
DO WE HAVE A CHOICE?
(A THEORY OF GUIDED FREE WILL)

I asked this question: why has the evolutionary trajectory of the human species been the relentless growth in productivity, people and resources consumed? I also asked a follow-up question: as a species, can we choose the evolutionary trajectory?

Initially, this seemed like a simple question with a common sense answer. We go about our daily lives with a presumption that we freely choose among alternative thoughts, beliefs and conduct. As individuals, we choose occupations, we choose mates, we choose whether to have children; it seems like we are constantly making choices about everything. At some level, acting collectively, we choose the kind of society we live in. We choose our leaders and we do so based in part on the future that they project and promise. It follows that, in some way, as a species we do choose the human trajectory.

But when I thought more deeply about this question, the possibility of a definite answer seemed hopelessly elusive—it involves the issue of free will. To answer whether we can control the destiny of our species necessarily presumes that the free will question can be answered, and not just at the level of individuals, where it is usually asked, or even at the level of sovereign nations, but at the level of the entire human species—as a species, do we have the ability to foresee a range of possible destinies and choose among them?

Through the millennia, the issue of free will has knotted theologians, philosophers and scientists. In Western theology the free will dilemma stems from the premise that an omnipotent, omniscient Deity has a plan for the Universe, including each individual human. (*See, eg.*, St. Augustine 1958, p. 106). If humans cannot deviate from His Plan, then they have no choice. But if humans exercise choice, they could deviate from His Plan, in which case Deity is not omniscient and omnipotent.

In science, the dilemma stems from determinism: all states of matter are determined by preceding states of matter through laws of cause and effect. "Determinism applied to man mercilessly declares: There is no free will. The human will is determined by external physical and physiological causes." (Kline 1953, p. 255). Thus, socio-cultural theories have typically rejected the possibility of free will. "[C]ulturology repudiates and rejects ... the ancient and still respectable philosophy of anthropocentrism and Free Will.... The principle of cause and effect operates in the realm of cultural phenomena as it does everywhere else in our experience of the cosmos." (White 1949, p. 413). According to Wilson: "The hidden preparation of mental activity gives the illusion

of free will....” (Wilson 1998, p. 119-20). Wilson concludes by noting that the fact that our deterministic predictability is hidden from us is adaptive. The illusory confidence that we exercise free will prevents us from the debilitating effects of fatalism. (*Id.*). Cicero similarly pointed out that absent free will, there would be no ground to hold people responsible for their conduct: “all human life becomes topsy-turvy; laws are made in vain; there is no point in reproaches or in praise, in scolding or in exhortation; there is no ground in justice for rewarding the good or punishing the wicked.” (St. Augustine 1958, p. 105).

But free will is illusory nonetheless. This view is compelled by determinism. In a book bearing the title *Free Will*, Sam Harris, speaking of two brutal murderers, argues: “As sickening as a find their behavior, I have to admit that if I were to trade places with one of these men, atom for atom, I would *be* him.” (Harris, S. 2012, p. 4).

Not wanting to get bogged down in the esoteric issue of free will, I set aside the question as to whether humans can control our evolutionary trajectory. Ultimately, however, I came back to it via a circuitous route. The scientific rationale for rejecting free will is precisely the same as for rejecting creativity. But humans are not automata. We are creative. Humans and cultural evolution are not deterministic. We adapt to novel environments. We also create novel environments. We have unprecedented thoughts. We imagine things that never before existed. Humans are self-evolving.

The theory of directed creativity seemed to crack open the door to considering the seemingly imponderable problem of free will. But just because directed creativity breaches determinism, does it necessarily follow that we have free will? What exactly do we mean by free will?

Obviously, humans are not free to do and create anything we want. We are well aware of the enormous constraints on our lives imposed by factors external to us. We are not free to murder and maim other people—or, we may be free to do so, but if we are caught we will be placed in a cell so that we cannot do so again. We are not free to determine who our parents are, in which society we are born and raised, or in what period in history we live. A citizen can cast a vote for President, but who is elected is not the individual citizen’s decision to make. If laws are passed that we do not like, we must learn to live with them, circumvent them, or accept the possibility of being punished for disobeying them. Eskimos were not free to invent grain agriculture because neither grain nor the requisite climate was available. Neither am I, since it has already been invented. We can invent wings for flying, but we are not free to fly like a bird because our anatomy is unsuitable.

Literally, free will is a misnomer. External factors set parameters of what is possible for us to do.

Moreover, the range of what we want to do is subject to internal constraints. The

goals of human minds are supplied by our bio-psychology. We cannot choose our emotional repertoire. To some extent we are also constrained by our cultural inheritance. People are enculturated in the body of knowledge, beliefs, norms and morals of their own society, which can constrain the imagination and, thus, the range of innovation and cultural selection.

Because there are external constraints and limits to the range of possible goals, human behavior, culture and evolutionary direction exhibit patterns. Patterns imply regularity in causation. That is, they imply determinism. There is in fact a strong element of determinism in human behavior and cultural evolution. This is not an illusion.

But humans do evolve. *X* can move itself. Humans have at least a measure of self-determination.

But self-determination co-exists with determinism. To say that they co-exist sounds strange. It sounds strange because as scientific philosophy has developed, determinism and self-determination have been viewed as mutually exclusive possibilities. It sounds strange because, with a premise of determinism, scientific philosophy has precluded the possibility of any measure of creativity or self-determination.

But it is not strange. Deterministic patterns with a measure of creative self-determination are what we observe.

There is a direction to human creativity—it is purposeful. Universal bio-pyschology provides the direction with an element of predictability. But human minds creatively move cultural evolution in that direction. Creativity provides an element of unpredictability. Thus, even where the direction is specified, the route is not deterministically fated. Metaphorically speaking, even when the universal destination is Cincinnati, there are multiple routes to the destination. We can choose among them. We can also devise new routes that have never before been traveled.

This is where creativity comes into play. There is room to roam, to improvise and experiment with many varied possibilities. If we wish to call this free will, it is guided free will. Just as aptly, it is directed creativity.

Moreover, our goals are not fixed. Although human bio-psychology is universal, human psychology is not. It is widely diverse, as reflected in the variety of individual human psychology and by the vast amount of cultural diversity. Even though we cannot choose our bio-psychology, we do have the ability to choose what among the repertoire of psychological possibilities to emphasize, what to amplify, what to repress, and how they are rearranged and combined. In other words, we can be creative in our choice of psychology, including moral beliefs and norms. We can do this individually. Through the messy group process, we can do so at the level of societies.

Kant argued that humans are free from Newtonian causation; humans are free to obey moral laws. (Solomon 1979, pp. 131-33). The theory of directed creativity, however, goes further: we are not only free to conform to existing morality, we are free to devise morality.

But again, there are limits; there are outer boundaries to human self-determination in choosing goals. According to the evolutionary theory of universal human nature, our bio-psychology guides us to perpetuate a cultural lineage, following the principle of continuity of the cultural lineage first, with expansion being secondary and opportunistic.

Human nature thus places parameters around potential goals. Still, guided free will leaves a great deal of choice.

Consciousness and Free Will

I have thus far treated free will as equivalent to creativity. This is not precisely correct. Like free will, directed creativity means that humans have a measure of self-determination. But when we think of free will, we usually imply another element: that we not only choose among options, but do so consciously, aware of the consequences. That is, we tie the issue of free will to our concept of morality. We not only choose, we are aware that we do so and are aware of the consequences, to ourselves and to others.

I came to draw this distinction in part because conscious choice is how we ordinarily think of and debate free will. But I also have drawn the distinction because I don't believe humans are the only species that evolves by directing variation.

As set forth in a separate book, *Genetic Experimentation: The Adaptive Function of Sex and Conjugation*, I do not believe that the genetic variations that make natural selection possible are random mutations. Instead, genetic variations are generated by sex (meiosis) and conjugation. They generate nonrandom genetic variation.

If this is correct, it means that sex and conjugation are adaptations for evolving. This would also mean that organisms in other species *are* adapted to evolve. They *do* participate in the evolutionary process. Unlike rocks, organisms are capable of moving themselves. They are not automata. This kind of directed variation would be a kind of directed creativity.

There are many distinctions between this and human directed creativity. First is foresight. Nothing like foresight occurs in sex and conjugation. Second, because directed creativity in sex and conjugation is genetic, transmission is limited to biological lines of descent.

A third distinction, and most important for the issue of free will, is our concept of morality. Morality does not just entail conduct towards others. We also associate morality with consciousness. In that sense, we may say that the human ability for self-determination is unique. We possess free will.

Recent arguments that attempt to refute free will claim that we do not consciously make decisions. Harris, for example, cites Libet's laboratory experiments on simple motor activities (eg., selecting buttons to push) that purport to document that decisions are made before we become aware of them. (Harris 2012, pp. 8-9). Likewise, brain scans can sometimes predict choices before the subjects became conscious of those choices. Based on this, Harris asserts: "One fact now seems indisputable: Some moments before you are aware of what you will do next—a time in which you subjectively appear to have complete freedom to behave however you please—your brain has already determined what you will do. You then become conscious of this 'decision' and believe that you are in the process of making it." (*Id.*).

This is paltry evidence to substantiate the claim. If we focus on simple motor activities or habitual decisions, the claim can be made to seem plausible. But many choices are weighed, re-weighed, and re-weighed again. Many choices are reversed when we become newly aware of other consequences that we did not first anticipate. That is the point: most often, before we choose, we *anticipate*, conscious of the consequences. We plan for the future. We discuss our plans. We debate them. We choose.

Later on in his book, Harris briefly addresses this kind of planning. (*Id.*, pp. 42-43). Without acknowledging that Libet's experiments do not apply to longer-term decision making, he switches to a different argument, saying he does not know why he makes certain decisions. As an example, he says that he once again took up martial arts, in part because of the influence of a particular book, but he doesn't know why he decided to read that book.

Harris is cherry-picking his examples, then extrapolating from these to make the sweeping claim that people never, ever consciously know the reason for doing what they do. I know why I chose to read Harris' book. I wrote this chapter without reading any books or articles on free will (other than St. Augustine's passages on free will in *City of God*), largely because discussions of this topic I had previously come across all seemed to get lost in narrow metaphysics. But I decided that I ought to do some research to see if there were arguments for or against free will that hadn't occurred to me. I went to Amazon, typed in "free will", and Harris' book *Free Will* popped up first. I ordered it from the library. I read it and saw his reference to Libet's experiments. These past few paragraphs followed.

I will not extrapolate from my conscious choice to read Harris' book to make the

sweeping claim that all of my decisions are made consciously and with a purpose that I fully understand. Nor will I make the sweeping claim that everyone's decisions always are made consciously and with a purpose that they understand. Some choices are impulsive or whimsical. Some choices are made before we have a chance to think, such as when driving and a car swerves into our lane. But this does not defeat the fact that we do make some choices consciously and with a purpose we understand. We observe this again and again.

Moreover, even assuming that Harris truly did not know why he chose that particular book, this does not mean that the choice was without a purpose, formed by him. During our lives, we evaluate, criticize, mull over, and form opinions on many things. On some subjects, these opinions become habits of thinking, so that we do not pull them up into our consciousness when making choices. This is true of our choices in literature. Some of us like comic books, while others won't consider reading them. Some like bodice buster romance novels, others do not. Some prefer nonfiction over fiction, and vice-versa. Etc. When browsing at a bookstore, the thought "I don't like romance novels" may not enter a person's consciousness, but the past evaluations and opinion that she reached nonetheless fully informs her choice to head to a different section of the store. Whatever section to which she heads, the choice will be influenced by opinions previously reached; she might be conscious of them, or they might be habits of which she is no longer aware—unless something pricks her mind to cause her to think of that particular habit. Harris, no doubt, has developed habits of thinking that influenced his choice of books.

Harris' refutation of free will calls to mind the arguments that culture results from a series of random patches, that history unfolds unintentionally, and that cultural variations are adopted as psychologically random memes, with no function. If one focuses on little bits of culture like the tune of *Auld Lang Syne* or pet rocks, the notion of memes can seem like it has some theoretical significance. If one focuses on history's follies, history can appear to unfold in no discernible direction. But this is losing sight of the forest for the trees. When we step back and look at history and culture overall, we see that they are not random. They have unfolded in a direction.

Likewise, citing a few small examples of (apparently) thoughtless choices, and extrapolating from these to a grand generalization that we do not exercise free will, is not good science.

Note too, that Harris' premise—that if we are not conscious of the purpose in making a choice, we are not exercising free will—does nothing to demonstrate that we are automata, which was his original point: that we are slaves to our genes and the environment. He does not appear to recognize that consciousness is a separate element of free will. We can be creative; we can exercise a measure of self-determination; even if we are not conscious of our psychological goals and purposes. We add the element of

consciousness to free will because that is how we *think.* And often enough, we are conscious of our choices, the purposes for which we made them, and the consequences, to ourselves and to others.

We make conscious choices not just in our individual lives, but in our public lives. Groups of intellectuals, politicians, activists, philosophers, scientists, and others get together and consciously attempt to change their nations, societies, communities—to get groups of individuals to choose one course or another.

We do not control who are parents are, the DNA we are born with, in which nation or town we are born, the period of history in which we live, or most other aspects of our environment. In that respect, we are not free to choose. But within this framework, humans exercise a degree of self-determination. We direct our creativity. We often do so consciously.

Individually, and as societies, we exercise a measure of self-determination. But does this mean that we are self-determining as a species, sufficient to control our evolutionary destiny?

CHAPTER SIXTEEN
~
CAN WE CHOOSE THE TRAJECTORY OF OUR SPECIES?

We direct our creativity, often consciously. Collectively, these choices have shaped the direction of human cultural evolution.

These choices have shaped the direction, but this is not the same thing as saying that any one, or any group of people, has looked ahead and chosen the human evolutionary trajectory.

We use foresight mostly to solve problems of the moment. The kids must be gotten to the bus on time. What to do for dinner? Birthdays are coming up, and the holidays will be upon us before we know it. These things all must be foreseen and planned for. People also use foresight and planning to solve immediate problems that are weightier. Outbreaks of disease must be stanched, starvation relieved, and hurricane-caused calamities cleaned up. These are the issues that pre-occupy daily life and engage our gifts for planning.

Yet we also look at our lives further down the road. We prepare for retirement. Economists stress building infrastructure to maintain a healthy economy for the long-term. Disaster agencies imagine "what if" scenarios so that they may be prepared. While the Joint Chiefs of Staff submit their military budget for the year, they are also keeping an eye on future war needs.

People occasionally even look beyond their own lifetimes in order to leave legacies. Much monumental architecture, such as the European cathedrals, the Great Wall of China and Egyptian pyramids, were not only were designed to last beyond the living, but took generations to build.

Cultural evolution is directed with at least fitful glances to the future. By and large, however, history stumbles from moment to moment, period to period, era to era. Cultural evolution has not been the unfolding of a master plan for the human race. From stone to bronze to iron; from small kin-based tribes to vast civilizations; from a few million people scattered in pockets of the globe to seven billion—in hindsight we see these patterns. But no one envisioned these patterns as human evolutionary destiny and sought to bring them about. We foresee, plan, strategize and create who and what we are, making history, and thus directing cultural evolution, but this is not the same thing as choosing the evolutionary trajectory.

This is a crucial distinction. Our bio-psychology supplies purpose to human creativity and thus direction to culture. The psychological criteria that call the brain to

action necessarily evolved to enable our ancestors to take care of life's day to day details. They evolved to enable us to eat, drink and be merry often enough, to marry, to raise children; to accommodate other members of society and work in concert, to raise living standards. And thus, these are the things we think about, intend to do, and set out to accomplish. In ordinary life, we don't feel as if we are doing anything so weighty as directing human evolution. It does not look that way in the news. The things that matter most in life are more immediate. We don't intend to influence human destiny. We are just trying to manage life as best we can.

In the aggregate, these short-term goals supply purpose and direction to human culture. By fulfilling them, humans direct the short-term evolution of our species. Added together, they form a longer, broader pattern of human cultural evolution—whether or not we intend the consequences, and even if they lead to results that no one wants, as they sometimes do.

It is easy to think of circumstances that humans have brought about but that the species as a whole has not chosen, and would not choose. Most people would probably rank nuclear proliferation as the gravest potential threat to human extinction. No one views the threat of extinction as a positive thing. Yet examined in isolation, the motives for creating each nuclear arsenal are not grossly irrational. Each was a response to competition. If one nation is developing such weaponry, another does so in order to avoid nuclear blackmail. Scientists who participate in the endeavor, such as Andrei Sakharov—who later achieved fame as a human rights activist—lend their talents for patriotic reasons. Patriotism and defense of a nation against external threats are motives that we understand. It is a fact that there exist people who wish to harm others, and would do so if afforded the opportunity. The result has been a perpetual race towards bigger, better, more powerful arms, now with the capability of obliterating our species.

Historians can narrate the sequences of events that led to their development and proliferation. They can list the key individual participants and decision-makers. And thus, nuclear weapons can be said to be the result of directed creativity, using foresight as a tool. Yet in the aggregate, the end result is an outcome no one regards as desirable. No one chose that nuclear weapons should circle the globe, with nations pointing them at one another and threatening the entire species. People wish that this man-made threat would vanish, yet it has not. The expansion of human population illustrates a similar point. Who chose to almost triple the population in half a century?

We direct our creativity towards goals. Sometimes we fail to achieve them. Sometimes we achieve them, and wish that we had not. Sometimes individual decisions are foiled by group decision-making. Sometimes a group decision is foiled by decisions of individuals or other groups. The result is history, a messy narrative in which it is difficult to see a direction, much less an adaptive one. Yet step by step, increment by increment, a larger narrative unfolds.

Through most of our existence, humans have not even been able to perceive that there is an unfolding evolutionary trajectory. But the breadth and depth of our knowledge of the human narrative have been stretched nearly as swiftly as human population. Perceptions of these larger narratives are now within human grasp.

This has been an enormous step. Foresight is applied history. We can plot past patterns. We can thus project the trajectory. We can extrapolate to project scenarios of the future. We can envision whether particular scenarios might threaten the extinction of our species.

Even the perception that humans are not exempt from extinction is a recent addition to intellectual thought. Plato and the ancients had no cause to contemplate that possibility. The perceived world was much smaller then. That we are a remarkable species with remarkable gifts has been known for a long time. The idea that we might be too remarkable for our own good entered consciousness with Hiroshima. Rachel Carson's *Silent Spring* made us aware that we are capable of ecological destruction on a large scale. Scientists have since discovered human-caused holes in the ozone layer and the role of greenhouse gas emissions in global warming. Applying history, at current rates of population growth we can project a world with twenty-five billion people in just a few decades, then attempt to visualize what that might be like.

And, of course, Darwin's theory stretches our concept of time and helps us view the human species in the larger scheme of life. The geological record discloses that numerous species, success stories in their own epochs, have ceased to exist. Ascendancy in the present does not assure against a future fall. At this point the human species is a mere blip in the long haul of evolutionary time. Should we think about how long we want our species to exist and plan for it? *Can* we?

This is all very new. It is uncomfortable to contemplate. We can apply history to visualize the future and imagine the consequences of alternate scenarios; but can we *feel* them? Can the consequences of future scenarios possibly resonate deeply enough with human bio-psychology that it overrides the traditional, time-worn hope of humans to prosper in the present and sacrifice only when disaster strikes? While we think about these things, the world keeps rushing along.

What is also fairly new is that these things are species-wide problems that require species-wide solutions. Is cooperation at the species level within the range of human bio-psychology?

Humans have traditionally divided the world into "us" and "them"—our culture versus all others. This follows from dynastic theory, together with the theory of directed creativity. Adaptive sacrifice and cooperation evolve at the level of the group. At the level of societies, animals are selfish. This is part of human bio-psychology. That is why humans have historically evolved to perpetuate a cultural lineage. Competition among

cultures, societies, nations and civilizations has long been the norm. Competition has been one of the drivers of cultural evolution.

As pointed out in *Dynastic Theory*, a theory of group adaptations, and the elimination of utter individual selfishness, do not lead to a utopian vision of humankind. We draw boundaries around our societies. History attests that groups of humans can be utterly brutal in their treatment of others. The objective is not to paint a more utopian vision of our species, but rather a more accurate one.

But to solve problems that affect the entire species would necessarily require adaptive sacrifice and cooperation at the level of the entire species. Humans would need to develop a cultural attachment to the human species that would, at least in some measure, override traditional cultural attachments. Is this theoretically possible?

Darwinian theory holds that traits do not evolve for the good of the species. In fact, neo-Darwinian theory has hardened the view that traits evolve only if they are good for the individual. Dynastic theory alters this view, but it does not disturb the principle that biological traits do not evolve for the good of an entire species.

But humans do not evolve biologically—or, more precisely, natural selection is not the dominant form of human evolution. Although intraspecies competition has been a driver of cultural evolution, cultural evolution does not depend on it. Cultural evolution does not require the existence of alternative cultures or societies. It is not necessary for humans to be divided into "us" and "them." Culture can evolve if the entire human species were amalgamated into one society with one overriding culture and one overriding goal—the perpetuation of the entire human species. It could also evolve if many separate societies treated human civilization as one for the purposes necessary to avert calamity.

This is not a prediction that this will occur. We possess competitive spirits, which are part of our biological nature. Historically, humans have in fact been divided into "us" and many "thems." Even within a society there is a myriad of subcultures, cultural allegiances, and cultural competition. Huntington defined "[a] civilization [as] the highest cultural grouping of people and the broadest level of cultural identity people have short of that which distinguishes humans from other species." (Huntington 1996, p. 43). This definition would need to be revised so that the broadest cultural identity would be synonymous with the entire human species.

At this point it is not easy to imagine. Cultures are not only competitive, many are hostile to others. Nearly everywhere, nations have weapons pointed at others, with more in the pipeline. Some efforts at large-scale international cooperation aimed at solving species-wide problems—such as depletion of the ozone layer, nuclear proliferation and infectious diseases—have been modestly successful. Others, such as reduction of greenhouse gases that cause global climate change, have not.

To put aside cultural differences so that humans could generally identify the entire human species as their civilization would entail a cultural sea-change across the globe. But if this result cannot be predicted, at least it can be said that the process of evolution and our biological nature—and therefore human nature—does not preclude it. Over time, humans have consciously expanded their cultural attachments from kin groups to ever larger groups and, if perceived to be necessary for the survival of the human lineage, could consciously create a cultural identification with the entire species.

The theory of directed creativity and epigenetic evolution; dynastic theory; an epigenetic model of an organism; an evolutionary theory of human nature—these do not provide a crystal ball for projecting our future. But they do supply a broad framework for analyzing whether our species can control our evolutionary trajectory. If we can't answer the question of why humans have evolved in the direction of more productivity, goods and people, we can't hope to answer whether this trajectory is ingrained and must continue. If we *can* answer this question, we at least have a foundation for projecting further.

We can say that yes, our species possesses crucial tools to control growth. We aren't programmed by natural selection to reproduce to the maximum extent possible. Reproductive restraint is in the repertoire of human bio-psychology, especially when we perceive resource limitations. We aren't entirely selfish. We do care about the welfare of others. Altruism is in our nature. And we evolve using foresight. We can visualize how the future might unfold if we continue the trajectory. We are creative. We can devise culture to adapt to perceived future conditions. We have a choice. We are conscious of the consequences of our choices. Within the range of our bio-psychological repertoire, we are free to devise social norms and moral codes accordingly.

And theoretically, it is possible—we could evolve a cultural attachment to the entire human species that overrides internecine struggles for existence. There are limits to the range of human possibilities. Yet there is a range. We are free to choose our evolutionary trajectory.

And, as a final thought, it is important to remind ourselves that the very nature of creativity means that the future cannot be predicted in its entirety from past patterns. That is what it means to evolve.

BIBLIOGRAPHY

Abbott, D.H., Barett, J. and George, L.M. (1993). "Comparative aspects of the social suppression of reproduction in female marmosets and tamarins", pp. 152-63, in Marmosets and Tamarins: Systematics, Behviour and Ecology. (A.B. Rylands ed.) Oxford U. Press

Abegglen, J. (1984). On Socialization in Hamadryas Baboons: A Field Study. Bucknell U. Press

Aberle, D.F. (1974). "Matrilineal Descent in Cross-cultural Perspective", pp. 655-727, in Matrilineal Kinship (eds. Schneider, DM. and Gough, K.). University of California Press

Alcock, J. (1993). Animal Behavior (5th ed.). Sunderland, Massachusetts: Sinauer Associates

Ardrey, R. (1966). The Territorial Imperative. Dell Publishing

Armitage, K. (1986). "Marmot polygyny re-visited", pp. 303-331, in Ecological Aspects of Social Evolution (ed. D.I. Rubenstein and R.W. Wrangham). Princeton U. Press

Ayala, F.J. (1998). "Teleological Explanations", pp. 187-195, in Philosophy of Biology (ed. M. Ruse). Prometheus Books.

Bertram, B.C.R. (1975). "Social Factors Influencing Reproduction in Wild Lions", Journal of Zoology 177:463-82.

Bohannan, P. and Glazer, M. (1988a), "Introduction", pp. xii to xxii, in High Points in Anthropology (2nd ed.)(eds. Bohannan and Glazer). McGraw-Hill, Inc.

Bohannan, P. and Glazer, M. (1988b), High Points in Anthropology (2nd ed.)(eds. Bohannan and Glazer). McGraw-Hill, Inc.

Boomsma, J.J., Frouwer, A.H., and Van Loon, A.J. (1990). "A new polygynous *Lasius* species (Hymenoptera; Formicidae) from Central Europe. II. Allozymatic confirmation of species status and social structure". Insectes Sociaux 37:363-75

Bourke, A. and Franks, N. (1995). Social Evolution in Ants. Princeton, New Jersey: Princeton U. Press

Campbell, D.T. (1960). "Blind Variation and Selective Retention in Creative Thought as in Other Knowledge Processes", in Psychological Review 67:380-400

Campbell, J. (1982). "Autonomy in Evolution", pp. 190-201, in Perspectives on

Evolution (ed. Milkman, R.). Sinauer Associates

Chomsky, N. (1987). The Chomsky Reader. Pantheon Books

Chomsky, N. (1972). Language and Mind. Harcourt Brace Jovanovich

Chomsky, N. (1966). Cartesian Linguistics. Harper & Row

D'Agostino, F. (1984). "Chomsky on Creativity", in Synthese 58(1):85-117.

Darwin, C. (1952a). The Origin of Species by Means of Natural Selection (Great Books Series). Encyclopedia Britannica

Darwin, C. (1952b). The Descent of Man (Great Books Series). Encyclopedia Britannica

Dawkins, R. (1989). The Selfish Gene (2nd ed.). Oxford U. Press

Dawkins, R. (1986). The Blind Watchmaker. Longmans

Dennett, D. (1995). Darwin's Dangerous Idea. Simon and Schuster

Descartes, R. (1956). Discourse on Method (Lafleur, L., ed. and trans.). Bobbs Merrill

Desmond, A. and Moore, J. (1991). Darwin: The Life of a Tormented Evolutionist. Warner Books

De Waal, F. (2006). Primates and Philosphers: How Morality Evolved. (Eds. Macedo, S. and Ober, J.). Princeton U. Press

Diamond, Jared (1999). Guns, Germs and Steel: The Fates of Human Societies. W.W. Norton & Co.

Diamond, Jared (1992). The Third Chimpanzee: The Evolution and Future of the Human Animal. Harper Collins

Dixon, R.T. (1984). Dynamic Astronomy. Prentice-Hall, Inc.

Dugatkin, L. (2000). The Imitation Factor: Evolution Beyond the Human Gene. Simon and Schuster

Durant, Will (1944). Ceasar and Christ. Simon and Schuster

Durkheim, E. (1988). "Rules for the Explanation of Social Facts", pp. 231-53, in High Points in Anthropology (2nd ed.)(eds. Bohannan and Glazer). McGraw-Hill, Inc.

Ehrlich, P. (1971). The Population Bomb. Ballantine Books

Fog, Agner (1999). Cultural Selection. Dordecht: Klewer

Freeman, S. (2011). Biological Science (4th ed). Pearson Benjamin Cummings

Freud, S. (1961). Civilization and Its Discontents (ed. and trans., J. Strachey). W.W. Norton & Co.

Futuyma, D. (1986). Evolutionary Biology (2nd ed.). Sinauer Associates

Gadagkar, R. (1997). Survival Strategies: Cooperation and Conflict in Animal Societies. Harvard U. Press

Gamboa, G.J. (1996), "Kin Recognition in Social Wasps, p. 161-177, in Natural History and Evolution of Paper-Wasps, (eds. Stefano Turillazzi and M.J. West-Eberhard). Oxford U. Press

Gardner, E., Simmons, M., Snustad, D. (1991). Principles of Genetics (8th ed.). John Wiley and Sons

Gill, R.T. (1972). Economics and the Public Interest. Goodyear Publishing Co.

Goodall, J. (1990). Through a Window: My Thirty Years with the Chimpanzees of Gombe. George Weidenfeld and Nicolson

Gotwald, Jr., W.H. (1995). Army Ants: The Biology of Social Predation. Cornell U. Press

Gould, S.J. (1989). Wonderful Life: The Burgess Shale and the Nature of History. W.W. Norton & Co.

Gould, S.J. (1980) The Panda's Thumb (1982 paperback ed.). W.W. Norton and Co.

Hamer, D. (2005). The God Gene: How Faith Is Hardwired in Our Genes. Anchor Books

Hamilton, W.D. (1964). "The Genetical Evolution of Social Behavior" (I and II). Journal of Theoretical Biology 7: 1-52

Harris, M. (1989). Our Kind: The Evolution of Human Life and Culture. Harper and Row

Harris, M. (1988). *Theoretical Principles of Cultural Materialism*, pp. 377-403, in High Points in Anthropology (2nd ed.)(eds. Bohannan and Glazer). McGraw-Hill

Harris, M. (1980). Cultural Materialism: The Struggle for a Science of Culture. AltaMira Press

Harris, S. (2012). Free Will. Free Press

Haviland, W.A. (1990). Cultural Anthropology (Sixth ed.). Holt Rinehart Winston

Herbers, J. (1993). "Ecological determinants of queen number in ants" in Queen Number and Sociality in Insects (ed. Keller). Oxford U. Press

Holldobler, B. and Wilson, E.O. (1994). Journey to the Ants. Cambridge, Massachusetts: Harvard U. Press

Holldobler, B. and Wilson, E.O. (1990). Ants. Cambridge, Massachusetts: Harvard U. Press

Hospers, J. (1971). Libertarianism: A Philosophy Whose Time Has Come. Reason Press

Hull, D.L. (1998). "The Ontological Status of Species as Evolutionary Units", pp. 146-155, in Philosophy of Biology (ed. Ruse, M.). Prometheus Books

Huntington, S.P. (1996). The Clash of Civilizations and the Remaking of World Order. Simon and Schuster

Kano, T. (1992). The Last Ape: Pygmy Chimpanzee Behavior and Ecology. Stanford U. Press

Kitcher, P. (1985). Vaulting Ambition: Sociobiology and the Quest for Human Nature. MIT Press

Kline, M. (1953). Mathematics in Western Culture. Oxford U. Press

Kroeber, A.L. (1988). "The Concept of Culture in Science", pp. 101-123, in High Points in Anthropology (2nd ed.)(eds. Bohannan and Glazer). McGraw-Hill

Kroeber, A.L. and Kluckhohn, C. (1963). Culture: A Critical Review of Concepts and Definitions, Papers of the Peabody Museum of American Archaeology and ethnology, 47. Harvard U. Press

Kruuk, H. (1989). The Social Badger. Oxford U. Press

Kummer, H. (1995). In Quest of the Sacred Baboon. Princeton U. Press

Kuhn, T.S. (1970). The Structure of Scientific Revolutions (2nd ed.). University of Chicago Press

Leighton, D.R. (1986). "Hornbill Dispersion: Variations on a Monogamous Theme", pp. 108-130, in Ecological Aspects of Social Evolution (eds. Rubenstein and Wrangham). Princeton U. Press

Lenski, R.E. and Mittler, J.E. (1993). "The Directed Mutation Controversy and Neo-Darwinism". Science 259: 188-194

Ligon, J.D. and Ligon, S.H. (1990). "Green Woodhoopoes: life history traits and sociality", pp. 33-65, in Cooperative Breeding in Birds (eds. P.B. Stacey and W.D. Koenig). Cambridge U. Press

Lorenz, K. (1963). On Aggression. University Paperbacks

Machiavelli, N. (1952). The Prince. (ed. C. Gauss). Mentor Books

Malcom, J. and Marten, K. (1982). "Natural Selection and the Communal Rearing of Pups in African Wild Dogs (*Lycaon pictus)*", Behav. Ecol. Sociobiol 10: 1-13

Malinowski, B. (1988). "The Group and the Individual in Functional Analysis", pp. 272-93, in High Points in Anthropology (2nd ed.)(eds. Bohannan and Glazer). McGraw-Hill

Malthus, Thomas R. (1993). An Essay on the Principle of Population. Oxford U. Press

Marzluff, J.M., and Balda, R.P. (1990). "Pinyon Jays: Making the Best of a Bad Situation by Helping", pp. 199-237, in Cooperative Breeding in Birds (eds. P.B. Stacey and W.D. Koenig). Cambridge U. Press

Matsuda (1987). Animal Evolution in Changing Environments (with Special Reference to Abnormal Metamorphosis). Wiley Press

Mayr, E. (1982). The Growth of Biological Thought. Harvard U. Press

McGrew, W.C. (1998). "Culture in Nonhuman Primates?" Annual Review of Anthropology 27: 323

Meadows, D., et. al. (1972). The Limits to Growth. Signet

Mech, L. (1995). The Wolf: The Ecology and Behavior of an Endangered Species. University of Minnesota Press

Mendel, A.P. (1961). The Essential Works of Marxism. Bantam Books

Montagu, M.F.A. (1962). "Introduction", pp. vii to xii, in Culture and the Evolution of Man. Oxford U. Press

Morgan, Lewis H. (1988). "Ancient Society", pp. 29-60, in High Points in Anthropology (2nd ed.)(eds. Bohannan and Glazer). McGraw-Hill

Moritz, R., and Southwick, E. (1992). Bees as Superorganisms: An Evolutionary Reality,

Springer-Verlag

Morris, D. (1967). The Naked Ape: A Zoologist's Study of the Human Animal. McGraw-Hill

Nishida, T. (1987). "Local Traditions and Cultural Transmission", pp. 462-74, in Primate Societies (eds. Smuts, et. al.). University of Chicago Press

Nishida, T. and Hiraiwa-Hasegawa, M. (1987). "Chimpanzees and Bonobos: Cooperative Relationships among Males", pp. 165-177, in Primate Societies (eds. Smuts, et. al.). University of Chicago Press

Nowak, M.A., Tarnita, C.E. and Wilson, E.O. (2010). "The Evolution of Sociality." Nature 466: 1057-1062

O'Brien, M.J. and Holland, T.D. (1995). "The Nature and Premise of a Selection-Based Archaeology", pp. 175-200, in Evolutionary Archaeology: Evolutionary Issues (ed. Teltser, P.A.). University of Arizona Press

Ornstein, R.E. (1992). The Evolution of Consciousness: of Darwin, Freud and Cranial Fire: the Origins of the Way We Think. Simon and Schuster

Park, J.H. (2007). "Persistent Misunderstandings of Inclusive Fitness and Kin Selection: Their Ubiquitous Appearance in Social Psychology Textbooks", Evolutionary Psychology 2007. 5(4): 860-873

Pinker, S. (2002). The Blank Slate: The Modern Denial of Human Nature. Viking

Poirier, F.E., Stini, W.A., Wreden, K.B. (1994). In Search of Ourselves: An Introduction to Physical Anthropology. (5th ed.). Prentice Hall

Popper, Karl R. (1985). Selections. (ed. D. Miller). Princeton U. Press

Queller, D. and Strassman, J. (1998). "Kin selection and social insects", Bioscience 48: pp. 165-75

Rabenold, K.N. (1990). "*Campylorhynchus wrens*: the ecology of delayed dispersal and cooperation in the Venezualan savanna", pp. 159-196, in Cooperative Breeding in Birds (eds.: Stacey, P.B., and Koenig, W.D.). Cambridge U. Press

Radcliffe-Brown, A.R. (1988). "On the Concept of Function in Social Science", pp. 294-304, in High Points in Anthropology (2nd ed.)(eds. Bohannan and Glazer). McGraw-Hill

Rand, A. (2005). Atlas Shrugged. Dutton

Rathus, S.A. (1990). Psychology (4th ed.). Holt Rinehart Winston

Ridley, Matt (1993). The Red Queen: Sex and the Evolution of Human Nature. Macmillan

Rindos, D. (1989). "Undirected Variation and the Darwinian Explanation of Cultural Change", in Archaeological Method and Theory, Vol. 1, pp. 1-45 (ed. M.B. Schiffer). University of Arizona Press

Rindos, D. (1986). "The Evolution of the Capacity for Culture: Sociobiology, Structuralism, and Cultural Selection", Current Anthropology 27:315-332.

Ruse, M. (1989). The Darwinian Paradigm. Routledge

Russell, B. (1972). A History of Western Philosophy. Simon & Schuster, Inc.

Sahlins, M. (1988). "Evolution: Specific and General", pp. 356-76, in High Points in Anthropology (2nd ed.)(eds. Bohannan and Glazer). McGraw-Hill

Sahlins, M. (1977). The Use and Abuse of Biology. University of Michigan Press

Saint Augustine (1958). City of God. Image Books, Doubleday

Schaller, G.B. (1972). The Serengeti Lion. University of Chicago Press

Schneider, D.M. (1973). "Preface", pp. vi to xvii, in Matrilineal Kinship (eds. Schneider, DM. and Gough, K.). University of California Press

Shelley, F. and Clarke, A. (1994). Human and Cultural Geography. Wm. C. Brown Publishers

Silk, J. (1987). "Social Behavior in Evolutionary Perspective", in Primate Societies (eds. Smuts, et. al.). University of Chicago Press

Simon, H. (1983). Reason in Human Affairs. Stanford U. Press

Simpson, George G. (1951). The Meaning of Evolution. New American Library

Skutch, A. (1987). Helpers at Bird's Nests: A Worldwide Survey of Cooperative Breeding and Related Behavior. University of Iowa Press

Smith, A. (1952). An Inquiry into the Nature and Causes of the Wealth of Nations. Encyclopedia Britannica (Great Books Series)

Smith, J.N.N. (1990). "Summary", pp. 593 to 611, in Cooperative Breeding in Birds (eds. P.B.

Sober, E. (1984). The Nature of Selection: Evolutionary Theory in Philosophical Focus. Bradford/MIT

Solomon, R.C. (1979). History and Human Nature: A Philosophical Review of European History and Culture, 1750-1850. Harcourt Brace Jovanovich.

Stevenson, L. (1974). Seven Theories of Human Nature. Clarendon Press

Stevenson, L. and Haberman, D. L. (2008). Ten Theories of Human Nature. Oxford U. Press

Steward, Julian (1988). "The Concept and Method of Cultural Ecology", pp. 319-332, in High Points in Anthropology (2nd ed.)(eds. Bohannan and Glazer). McGraw-Hill

Strum, S. (1987). Almost Human. Random House

Tomasello, M. (2009). Why We Cooperate. MIT Press

Trivers, R. (2011). The Folly of Fools: The Logic of Deceit and Self-Deception in Human Life. Basic Books

Trivers, R. (1971). "The Evolution of Reciprocal Altruism", The Quarterly Review of Biology 46:35-57.

Trivers, R. and Hare, H. (1976). "Haplodiploidy and the Evolution of the Social Insects", Science 191:249-263

Tuchman, B. (1984). The March of Folly: from Troy to Vietnam. Ballentine Books

Turnbaugh, W.A., Nelson, H., Jurmain, R., Kilgore, L. (1993). Understanding Physical Anthropology and Archeology. (5th ed.). West Publishing

Trivers, R.L. and Hare, H. (1976). "Haplodiploidy and the Evolution of the Social Insects" Science 191: 249-263

Tylor, Edward Burnett (1988). "Primitive Culture", pp. 61-78, in High Points in Anthropology (2nd ed.)(eds. Bohannan and Glazer). McGraw-Hill

Tylor, Edward Burnett (1871). Primitive Culture. Reissued by Cambridge U. Press

Velasquez, M. (1994). Philosophy (5th ed.). Wadsworth Publishing Co.

Wakeman, F., Jr. (1975). The Fall of Imperial China. Free Press

West-Eberhard, M.J. (2003). Developmental Plasticity and Evolution. Oxford U. Press

West-Eberhard, M.J. (1988). “Phenotypic plasticity and ‘genetic’ theories of insect sociality” in Evolution of Social Behavior and Integrative Levels (eds. Greenberg and Tobach), pp. 123-33. Lawrence Erlbaum.

West-Eberhard, M.J. (1987). “Flexible strategy and social evolution” in Animal Societies: Theories and Facts (eds. Brown and Kikkawa). Japan Scientific Societies Press.

White, Leslie A. (1988). “Energy and the Evolution of Culture”, pp. 337-355, in High Points in Anthropology (2nd ed.)(eds. Bohannan and Glazer). McGraw-Hill

White, Leslie A. (1949). The Science of Culture: A Study of Man and Civilization. Farrar, Strauss and Co.

Williams, G.C. (1965). Adaptation and Natural Selection. Princeton U. Press

Wilson, D.S. and Sober, E. (1994). “Re-introducing Group Selection to the Human Behavioral Sciences”. Behavioral and Brain Sciences 17:585-654

Wilson, E.O. (2012). The Social Conquest of Earth. W.W. Norton and Co.

Wilson, E.O. (1998). Consilience: The Unity of Knowledge. Alfred A. Knoff

Wilson, E.O. (1980). Sociobiology (abridged). Harvard U. Press

Wilson, E.O. (1978). On Human Nature. Harvard U. Press

Wilson, E.O. (1971). The Insect Societies. Harvard U. Press

Wolff, R.P. (1970). In Defense of Anarchism. Harper & Row

Wynne-Edwards, V.C. (1962). Animal Dispersion in Relation to Social Behavior. Oliver and Boyd