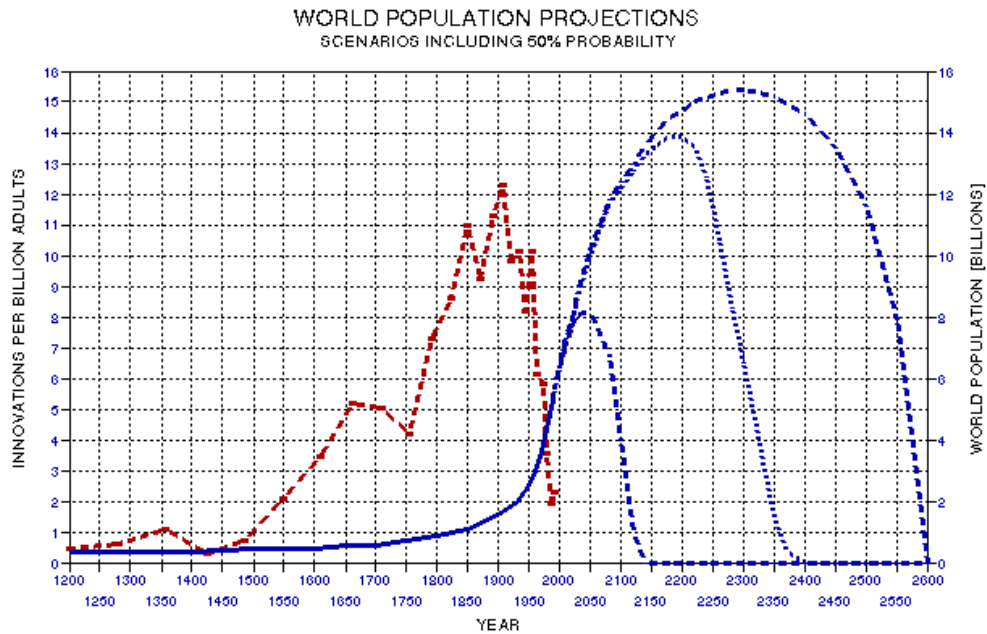


GENETIC ENSLAVEMENT: A CALL TO ARMS FOR INDIVIDUAL LIBERATION



Bruce L. Gary

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5320 E. Calle Manzana
Hereford, AZ 85615.

Third Edition: 2008 November 27

Printed by Fidler-Doubleday, Davenport, Iowa 52807; USA

ISBN 978-0-9798446-0-7

Books by Bruce L. Gary

ESSAYS FROM ANOTHER PARADIGM, 1992, 1993 (Abridged Edition)

GENETIC ENSLAVEMENT:

A CALL TO ARMS FOR INDIVIDUAL LIBERATION, 2004, 2006, 2008

THE MAKING OF A MISANTHROPE: BOOK 1, AN AUTOBIOGRAPHY, 2005

A MISANTHROPE'S HOLIDAY: VIGNETTES AND STORIES, 2007

EXOPLANET OBSERVING FOR AMATEURS, 2007

QUOTES FOR MISANTHROPE: MOCKING HOMO HYPOCRITUS, 2007

THE MAKING OF A MISANTHROPE: BOOK 2, MIDNIGHT THOUGHTS (2009)



"The topic for today is: What is reality?"

"Men value women because they can make babies. Women value men because they can support and protect a family. The genes value both because their enslavement offers a prospect for genetic immortality." Bruce L. Gary

"So free we seem, so fettered fast we are." Robert Browning, *Andrea del Sarto*, 1855

*Do you know what the real question for a thinker is? The real question is: **How much truth can you stand?**"* Spoken by Nietzsche character in *When Nietzsche Wept*, by Irvin D. Yalom, 1992

"When God is at last dead for Man, when the last gleam of light is extinguished and he is surrounded by the impenetrable darkness of an uncaring universe that exists for no purpose, then at last Man will know that he is alone and must create his own values to live by." Nietzsche (altered quotation)

"It's a privilege to have been born and to live on this planet for a few decades." Richard Dawkins, in a debate June 2007

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PROLOGUE

"Generally speaking, it is quite right if great things - things of much sense for men of rare sense - are expressed but briefly and (hence) darkly, so that barren minds will declare it to be nonsense, rather than translate it into a nonsense that they can comprehend. For mean, vulgar minds have an ugly facility for seeing in the profoundest and most pregnant utterance only their own everyday opinion." Jean Paul, as quoted by Friedrich Nietzsche, *Philosophy in the Tragic Age of the Greeks*, 1872.

Dear reader, you normaloid idiot!

Well, maybe you deserve an explanation for that greeting.

A perceptive alien visitor to Earth might report home that humans are the dumbest and most despicable creatures on the planet!

At least the other animals don't claim to know things which, in fact, are absurd nonsense. Only humans believe in such imaginary things as heaven, hell, guardian angels, telepathy and all kinds of gods. Only humans maintain that the world was created by some imagined godly entity just for them and that this God continues to watch everything and tests humans so that He may reward or punish them in accordance with how pleased He is by their behavior. Only humans believe that they are so different from non-living things that their "consciousness" exempts them from the laws of physics. But the most incriminating human trait is that *homo sapiens* is the only species that has itself for its most dangerous enemy, and a revealing irony is that most killing is done on behalf of this thing they call "religion."

Human conceit and imagination is so poor that people cannot imagine themselves as automatons that are assembled by genes. Even those few humans who do accept that they were assembled by genes seem unable to imagine that these genes have achieved longevity in the species gene pool by assembling automatons that serve those very genes instead of the individual. This saves them from the indignity of realizing that they are foolish slaves to tiny lifeless molecules that use them for aimless ends.

The humans, these aliens might conclude, are hopeless!

So now, dear reader, we must have a delicate conversation about you in relation to this book. If you are like that clueless 99% of humans, those I call "normaloids," then let me suggest that you abandon this book and resume your pathetic, unthinking life! You may do so now! Please do so now!

Are you still reading? Are you a normaloid pretending to be one of that 1% of thinking humans? I give you one last chance to feel the guilt of reading something not meant for you.

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Cognoscenti

The following was written for the diminishing numbers of “the cognoscenti.” And to the cognoscenti who may be holding this book, I apologize for writing things that are inherently self-evident. You may have already thought of them yourself, and gone beyond my modest collection of thoughts. But if, by chance, you have not already discovered the self-evident ideas in this book then I hope you enjoy the following.

Reductionism and Hypocrisy

I'm a robot! So are you! This book views people as robots assembled by genes for the "purpose" of serving them by behaving in ways that have led to genetic prosperity in the ancestral environment. Only this “reductionist” viewpoint provides insight into the many bizarre aspects of human nature.

Every thinking person should be disappointed in humanity! Indeed, every thinking person should become a “misanthrope.” In youth it is easy to idealize human nature, to believe what people say about themselves. Later, perhaps in the teen years, human hypocrisy is discovered. The so-called “pursuit of Truth” becomes a hollow promise. Adults who continue to believe in childish notions of human nature look foolish.

I'm more disappointed than bitter. I can say that with each year's accumulation of disappointment in human nature my interest in writing this book wanes. Among the plethora of book publications there are only a handful for the reader who knows how to think. Even most of those intended for serious reading are fundamentally flawed. Why, I keep asking, are so many people incapable of thinking!

Alas, there is an explanation; an explanation, indeed, for all the flaws in human nature! We are the way we are because the genes have constructed us this way because it serves them!

The genes that assemble us were survivors in the "ancestral environment" (AE). Not only did they make fools of us in the AE, but in the modern environment our inherited tendencies make new fools of us in ways that were not even anticipated by the genes.

Anyone who occasionally glimpses humans this way has the opportunity of choosing a path leading to a belief that humans are victims of **genetic enslavement**. Life takes on new meaning for the person who then wishes for liberation from that enslavement. This book is dedicated to that rare person already on such a journey of liberation.

The mind is a terrible thing to trust

Humans are severely handicapped at comprehending such things as sub-atomic strings vibrating in 11 dimensions, a universe that will expand forever and cause all matter to "evaporate" in 10^{100} seconds, or even the everyday experience of seeing a

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commercial jet airplane that appears to be 35 degrees ahead of where the sound is coming from. The list of things we are ill-equipped to understand is immense!

We cannot readily understand these things because they never affected the survival of our ancestor's genes. How many more aspects of our world are inherently elusive because they never mattered to genetic survival? Or worse, how many things are hidden from us because they belong to a category of knowledge that would have adversely affected the survival of the genes our ancestors carried, even though this insight might have enlightened the individual?

The layman seems stubbornly committed to the belief that our minds can be trusted to have an intuitive understanding of all things. Both the layman and professional alike will instinctively object to any suggestion that our genes construct brains that "intentionally" handicap our ability to comprehend the way the genes have enslaved us. To put it bluntly, I am suggesting that our minds are designed to steer us away from Truth when alternative false beliefs safeguard genetic enslavement of the individual, even when this blinded vision diminishes individual well-being.

Humanities versus Physical Sciences

Don't expect humility from humans. Just as every serious thinker must become exasperated with others, so should he become exasperated with himself (I use "him" instead of "him/her"). Even within the physical sciences, where I earned a living for 43 years, it is necessary to consciously maintain vigilance against well-meaning, intruding intuitions. Imagine how difficult the task must be within the humanities, which are blatantly undisciplined compared to the physical sciences. Physical scientists deal with quantifiable predictions which can be tested by observations. In the humanities, on the other hand, practitioners seem more concerned with loyalty to charismatic leaders, and their beliefs, than to the pursuit of objective truth. Imagine, then, how easily investigations in the humanities can go astray.

And gone astray they have! The long endeavor to understand "human nature" has had more false leads from well-meaning professionals with social agendas than probably any other field. For example, some people contend that "human nature" doesn't exist, believing instead that our minds are "blank slates" at birth, ready to be written upon for the creation of whatever mental structures conform to the external world. Others state that "human races" don't exist, yet insist on affirmative action preferences for non-existent minority races. Such beliefs are congenial to those who secretly wish to fiddle with the social environment for the purpose of correcting social injustices. Marxist minds are naturally attracted to the humanities, and have tried for nearly a century to hijack anthropology and distort it for their purposes.

In spite of the odds against progress, and in spite of energetic people who seem bent on leading others astray, there are achievements to be proud of in the study of human nature. Anthropology and psychology may have a sordid record of undisciplined meddling by people with political agendas, yet uphill progress in these fields has surely occurred.

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Academic Quarrels

I recognize that most readers will object to this misanthropic portrayal of human nature and my cynical description of "human behavioral scientists." They may be inclined to agree with some of it, but they will quibble with specifics, or insist on different ways of approaching the subject. Just as tribes need to fission when they become too big, major subject areas within academe need to splinter to form "schools of thought" that go their separate ways by maintaining petty quarrels. For example, evolutionary psychologists complain about sociobiologists not having the proper "nuance" concerning adaptation versus optimization, and they use this minor complaint to build a wall of separation when as a practical matter the two fields are essentially one.

I am mindful of the need for petty carping by academics, or the inevitability of it, but I deplore the loss of vision that it inflicts upon those caught-up in it. Sometimes a professional becomes so involved with argument over petty differences, and concern over whose grant request will be funded, that he forgets to stand back from day-to-day controversies in his field to see it in the larger perspective. The preoccupation with professional details may render the professional practitioner blind to bigger visions that can only be seen from a distance. An outsider, looking in, will occasionally be worth listening to, for he brings with him that distant "big picture" perspective. I claim to bring a "big picture" perspective to the subject of sociobiology, and this should interest the serious lay reader as well as the professional sociobiologist.

This book asks a lot from the reader without a background in sociobiology, and I realize that few, if any, will read it through. The professional sociobiologist will readily understand most of my message, but he will be troubled by the fact that he does not recall reading other articles by me in sociobiology journals. The lay reader will not be bothered that my publications are in a totally unrelated field, but he will find much of the material unfamiliar and will be repelled by it.

I will not be disappointed if neither the sociobiologist nor the lay person reads what follows. My life-long romp in the realm of ideas, and my writing of essays that appear in this book, has been more fun than what I imagine it would be like to have positive reader feedback or book sales. Indeed, as of this Second Edition writing (2008 November) fewer than a dozen of the first edition, and none of the Second Edition, have been sold.

When I'm optimistic I recall Henri Beyle (Stendhal), who believed that his writings would escape notice until a century after his death. His forecast was amazingly accurate. Such a fate could in theory happen to this little book, but I now realize that the process of creating it was reward enough. I had more fun writing it than any reader could possibly experience in its reading. Like any creation, this book was written for the author.

INTRODUCTION

BEGINNINGS OF AN IDEA AND BOOK OVERVIEW

Washington, DC in 1962 was an exciting place. President Jack Kennedy created a “Camelot” aura that fed hope for unbounded progress. But the Cuban Missile Crisis brought a sobering chill to the country, especially to residents of Washington, DC. On my way to work I'd look north at the Capitol Building and wonder if it would be blown-up by a Soviet missile while I was looking at it.

My first job after college was at the U.S. Naval Research Laboratory, where I worked as a radio astronomer specializing in Jupiter's radiation belts. Freed of time-consuming college coursework, I was able to broaden my reading. A few years earlier, the double-helix structure of DNA had been discovered. Perhaps stimulated by this, or maybe from the sheer momentum of a childhood fascination with the way genes influence behavior, I stumbled upon a thought which I now believe is the second-most profound one of the 20th Century: “outlaw genes.”

1963 Identification of Outlaw Genes

On February 23, 1963 I was imagining the possibility of categorizing gene mutations as either promoting or subtracting from their ability to survive into the future and I needed terminology for this gene attribute. "Gene Survival Value" came to mind. Given a sufficiently well thought out measurement protocol any gene could theoretically be placed on a GSV spectrum, with endpoints labeled PGSV and NGSV - standing for "positive GSV" and "negative GSV." (I recall being dissatisfied with such awkward terms). At about the same time I was also struggling to devise theoretical concepts that might guide an individual in choosing a "rewarding life path," as ill-defined as such a concept can be in youth. Longevity was one factor, so given the GSV example I invented ISV, for Individual Survival Value. The ISV extremes, of course, were PISV and NISV. At this critical juncture, it seemed right to draw an X-Y coordinate system, representing GSV and ISV. (In retrospect, "individual well-being" would have been a better parameter to adopt than Individual Survival Value.) The figure on the next page is a rendition of this scatter diagram.

In theory, any gene could be "placed" in such a diagram (I hadn't encountered the concept of polygenes or pleiotropy at that time, to be discussed in a later chapter). I imagined genes for this and that, and placed them in the diagram. I recall thinking that there had to be more dots in the upper-right quadrant, corresponding to PGSV/PISV.

I realized that there shouldn't be many dots in the opposite corner since NGSV/NISV mutations should quickly disappear. Likewise, there shouldn't be many dots in the upper-left NGSV/PISV quadrant, though wouldn't it be nice if genes flourished when

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they promoted individual happiness regardless of the cost to themselves. But it was the lower-right corner that awaited me with a surprise! Gene mutations of this type would "by definition" flourish while "punishing" the individual carrying them! And nothing could be done about it, short of replacing the forces of natural selection with artificially created ones. This gene category has fascinated me ever since!

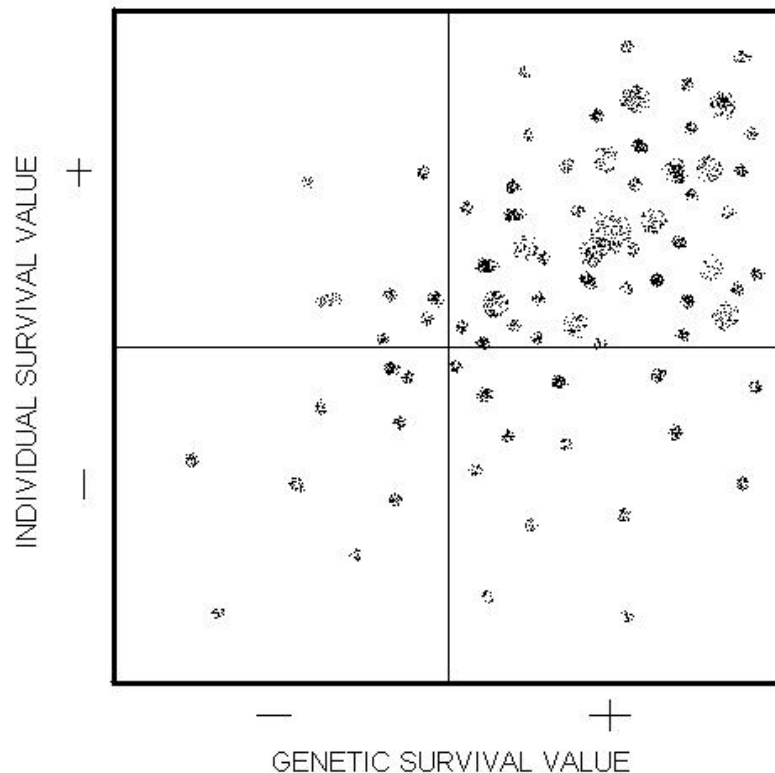


Figure 1.1 An X-Y matrix of "genetic survival value" and "individual survival value" with hypothetical markings of the locus of individual genes (as conceived in 1962).

Why hadn't I read about such genes? Surely others knew about the inherent conflict between the individual and some of the genes within! I looked forward to someday reading about these "outlaw genes," and the philosophical dilemmas they posed. I stashed these original diagrams and writings on the matter in a file, which remained closed for decades. Nevertheless, I did not forget about these genes and during the past four decades I have written about the subject in my spare time.

Coincidences

In the Fall of 1963 I enrolled at the University of California at Berkeley for graduate studies in astronomy. As the prospect of taking required courses on such topics as stellar spectroscopy sunk in, I realized that my career path had taken a wrong turn, of sorts, since my heart was with the humanities. I managed to add classes in psychology and anthropology as a consolation for the dry astronomy stuff. (I quit

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before semester's end, and have been gainfully employed in the physical sciences ever since.)

Although coincidences can shape lives, more often they don't. While I was at Berkeley a little-known biologist, George C. Williams, was using the school library to write a manuscript that would be published in 1966 as *Adaptation and Natural Selection: A Critique of Some Current Evolutionary Thought*. He was making a case for the view that selection forces work at the level of the genes, not the individual (and definitely not the species). Although this perspective was inherent in my thinking I failed at the time to grasp its novelty. I assumed that somewhere in the humanities was a field in which everyone believed this. Of course I was wrong, for Williams was engaged in creating such a field.

In this same year, 1963, William D. Hamilton prepared manuscripts describing "inclusive fitness" (Hamilton, 1964a,b), which is an essential part of understanding how gene competition drives evolution. The work of both Hamilton and Williams were essential footings, one decade later, for Edward O. Wilson's milestone book *Sociobiology: The New Synthesis* (Wilson, 1975). In my opinion, sociobiology is the most important idea of the 20th Century.

I sometimes wonder how my life's path might have differed if I had met Williams at Berkeley in 1963. A conversation with him could have clarified for me the emerging nature of the new field, and the opportunity for a role that I might have played in that emergence. Although the field was closer to my heart than astronomy, I never ran into G. C. Williams, and I never realized that he was helping to give birth to "my" field.

Overlooked Idea

Even now, 4 ½ decades later, no one has written clearly about the mischievous genes (to my knowledge). *The Selfish Gene*, by Richard Dawkins (1976), comes close; but it never explicitly states that genes "enslave" the individual for their selfish advancement while harming the enslaved individual. *Mean Genes* (Burnham and Phelan, 2000) comes even closer, but its emphasis is on practical steps for resisting self-defeating behaviors rather than the theoretical origins of the genes responsible for those behavioral predispositions.

Why is there such a paucity of discussion about the philosophical implications of such a profound flaw in our origins and present nature? Why have the professional anthropologists, philosophers and others been so slow to address a subject that captured my unwavering attention 40 years ago, when I was fresh out of college and struggling to establish a career in an unrelated field? Sociobiologists have written about conflicts between competing gene alleles carried by individuals of various relatedness (Hamilton, 1964a,b), between parents and offspring (Trivers, 1974), and between siblings (Sulloway, 1996), but not between the individual and his genes! If any field has a mandate to ask the questions I stumbled upon in 1962 it is the new field of sociobiology!

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If my idea has merit then sociobiologists have simply overlooked an obvious “next step” in the unfolding of implications for the basic tenet of the field. The history of science has many examples of simple yet profound new ideas being overlooked by the professionals. Every idea has many discoverers, and probably most of them only half realize the import of their discovery. The oft-discovered idea remains out of the public domain until it is grasped by someone having the energy to push it into the mainstream.

Some of the genes within us are enemies of the individual, in the same sense that outlaws are the enemies of a society. This thought should challenge the thinking of every sentient being. The discipline of philosophy should be resurrected, and restructured along sociobiological precepts. If this is ever done the new field would have as its major philosophical dilemma the following question:

"What should an individual do with the mental pull toward behaviors that are harmful to individual welfare, yet which are present because they favor the survival of the genes that create brain circuits predisposing the individual to those behaviors?"

In other words, should the individual succumb to instincts unthinkingly, given that the gene-contrived emotional payoffs may jeopardize individual safety and well-being? Or, should the individual be wary of instincts and thoughts that come easily and forfeit the emotional rewards and ease of living in order to more surely live another day - to face the same dilemma? Should some compromise be chosen? How can any thinking person fail to be moved by these thoughts?

Overview of This Book

In writing this book I have wrestled with the desire to proceed directly to the matters of outlaw genes, and how an individual might deal with them. But every time I returned to the position that a proper understanding of the individual's dilemma requires a large amount of groundwork. For example, how can I celebrate the artisan way of life without first describing why the genes created the artisan?

In the first edition of this book I included the many groundwork chapters in their entirety before the culminating chapters. The first person to read the book (Dr. M. J. Mahoney) stated that “Once I hit *Levels of Selection* [Chapter 11] I couldn't put the book down.” That’s when I realized that I had violated the first principle of writing, which is to “quickly engage the reader before you lose them.” In this edition I have shortened the groundwork chapters by moving most of that material to appendices. The groundwork chapters have become a primer for the paradigm that leads inevitably to the positions of the main message of this book.

The remainder of this introduction is a précis for the book chapters.

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There is no guiding hand in evolution; the natural process of the genes acting on their own behalf leads to individuals who are mere "agents" for these genes. This is the perspective of "sociobiology," also called "evolutionary psychology," and presented most effectively for the general public by Richard Dawkins in *The Selfish Gene* (1976). To understand the "blindness" of evolution one must first understand that the universe is just a "mechanism," that every phenomenon reduces to the action of blind forces of physics acting upon dumb particles. This outlook is called "reductionism," and is the subject of **Chapter 1**.

Lest the reader surmise that this book is about the physics of life, I attempt an impassioned appeal, in **Chapter 2**, for an embrace of modern man's scientific approach to understanding life, and a rejection of the primitive backwards pull that captures most unwary thinkers. This appeal provides a foretaste of the spicy sting of chapters found in the second half of the book.

Since genes are such an essential player in everything, I found it necessary to include tutorial chapters on genetics. The first of these genetics tutorials, **Chapter 3**, presents general properties of genes, such as how they compete and cooperate with each other, and have no concern for individual welfare beyond what serves them. The second genetics tutorial, **Chapter 4**, explores some subtle properties of genes that will be needed by later chapters. For example, since in every new environment some genes will fare better than others, it is useful to think of genes as being "pre-adapted" and "pre-maladapted" to novel environments. This will be an important concept in considering artisan niches in the modern world.

Chapter 5 is not necessary for the development of the book's theme, but for those who understand it the chapter will provide a deeper insight into the mathematics of pre-adaptation and pre-maladaptation.

Chapter 6 pulls together some of the genetics ideas and applies them to human evolution. Certain insights are needed for a person to intelligently deal with emotions that control or attempt to discredit intellect. For example, how can a person handle jealousy without understanding cuckoldry?

Chapters 7 and 8 are devoted to the brain. The most recent advance in the evolution of the human brain is the refashioning of the left prefrontal cortex. It is important to view the brain as an organ designed by the genes to aid in gene survival. Rationality is a new and potentially dangerous tool created by the genes, and it must be kept under the control of "mental blinders" to assure that the agendas of other genes are not thwarted. Competing brain modules, cognitive dissonance, and self-deception, are just a few concepts that any sentient must know about when navigating a path through life's treacherous shoals.

In **Chapter 9** I write about the first artisan, whose precarious role as a full-time tool and weapon maker may have begun 60,000 years ago. When the climate finally warmed 11,600 years ago at the start of our present "interglacial," called the Holocene, the small number of existing artisan roles served as a model for an

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explosion of new ones. The new artisans made high-density populations possible and eventually led to the creation of civilizations (**Chapter 10**). Since I will celebrate the artisan way of life it is necessary to understand how it came into existence and why others in society are likely to view it warily. I will outline a theory for "anti-intellectualism" and suggest that it may play a role in a civilization's decline.

I use "group selection theory" to argue that tribal warfare led to ever-larger tribes, which required that its membership be ever-more subservient to "tribal requirements" since the entire tribal membership had a shared destiny. Recent publications place group selection theory on firm ground and **Chapter 11** reviews the provocative suggestion that the behavior of individual tribal members alternates between "altruistic" during inter-tribal conflicts to "selfish" during peaceful interludes.

I argue in **Chapter 12** that when group selective forces were at their maximum during the Holocene the rewards for artisans rose and started the first-ever "individual selection" dynamic. The artisans assumed a leadership role in molding culture, governance, and opening opportunities for individual expression of creative and productive labors that led to a state that we now call "civilization."

But a civilization is vulnerable to outside attack by societies that remain uncivilized, that foster religious fanaticism. These stay-behind societies harbor resentment of the material wealth of the civilized society, and instead of achieving wealth for themselves by surrendering their group-serving grip on the individual, they instead mobilize the individual to discredit their rich neighbor and declare cultural warfare on them. Religious zeal serves these super-tribes by fostering fanatical, suicidal attacks on those societies that respect the individual. But since individuals in the civilized society think first of themselves, the civilization's defense is half-hearted and ultimately ineffective.

It is inevitable that civilizations arise with an ambivalent self-hatred. This is because people whose thinking style is overly influenced by their "primitive" right brain are naturally resentful of the world created by those new left-brain artisans. The new world order favors the left-brained artisan (engineer, scientist and other rational thinkers) and relegates to some vague periphery the contributions that can be made by the old-style people. Thus, every civilization should have "two cultures" that are in conflict, and this is treated in **Chapters 13 and 14**.

Chapter 15 begins to address the matter of what factors might contribute to the decline and fall of civilizations. One theory invokes a back-and-forth dominance of artisan "producers" versus opportunistic "parasites." Another suggests that the two cultures war, or the "War of the Brain Halves," is eventually won by those who succumb to the primitive pull. Gingerly, I also suggest that dysgenia might undermine our genetic vigor and sap societal energies.

Chapter 16 suggests a role for "social parasitism" in weakening a civilization and making it more vulnerable to collapse. **Chapter 17** addresses a possible role for troubadours, and the awe-struck girls who adore them, to undermine "producer" men

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- who, after all, create civilizations and maintain them. Women's fascination with fashion is accused of hastening the decline of civilization in the way they favor men who appear best able to "game" civilization for short-term advantage. **Chapter 18** wonders about the role of the growing "roob revolution" in undermining the strength of a civilization. The chapter also gingerly raises the question of "mutational load" – or what some people would claim could be a basis for eugenics if only the concept of "mutational load" was more widely known.

Chapter 19 is a review of American history with reference to Chapter 11's group selection theory. A case is made that the American experience illustrates how rooted human nature is in a way of life called "feudalism" and which renders modern democracies prone to regressing into a form of government called "fascism." It is suggested that many signs point to the collapse of the American Empire, and this can be instructive in understanding how civilizations can decline and fall.

The Anthropic Principle has many discoverers, and I'm one of them. I learned that it had been written about and published obscurely a few years before my discovery of it. I use this idea to predict the approximate date range for a significant crash in the human population. In the process of calculating this horrific event, I show that the rate of technological innovations exhibits a trace over time that foretells population patterns. From this analysis it appears that we are now in the second major "rise and fall" pattern of innovation rate and population, the latter pattern being displaced a few centuries after the first. This is described in **Chapter 20**.

I attempt to survey some possible population crash scenarios in **Chapter 21**. Although I state a belief that the future is so difficult to predict that it is prudent to only present possibilities, I use one scenario to illustrate possibilities.

In **Chapter 22** I begin my "call to arms" for individuals to emancipate themselves from the genetic grip. All previous chapters are preamble to this one and those that follow. Because any reader will expect a book such as this to give specific suggestions for how to use insight to live wisely, I feel obligated to present in this chapter my feeble attempt to address the subject. It is an attempt to describe ways that an individual may live wisely in a world wracked with defects caused by outlaw genes.

Chapter 23 is an overview of "outlaw genes." Any such list must be qualified by some nitty-gritty facts of genetics, such as pleiotropy and polygenes. Nevertheless, I present a litany of "genetic pitfalls" that any emancipated person should wish to avoid. Some genes are our enemy because they lead to dysfunctional human societies, while other genes are our enemy because they lead us as individuals to want the wrong things. The individual's task is to liberate oneself from the genes, and choose wisely. The IQ form of intelligence allows insight, and this insight must be placed into the service of an enlightened "emotional intelligence" to arrive at new personal values to live by. The questing person will understand the wisdom in the saying, which applies to the unthinking person: "If you get what you want, you deserve what you get." However, I readily acknowledge that my attempt to realize

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this chapter's goal is feeble, and the reasons for this are developed at the end of the book.

Chapter 24 follows naturally from the previous chapter, since an individual who wishes to pursue an individual-emancipated life must do so within the constraints of living in a society where individual liberation is difficult. When a sufficient number of people awaken to their enslaved condition, thoughts may turn to a way for them to coalesce in a shared search for a winning place. I describe utopias and prospects for isolated enclaves as a path toward a stable community where individual liberation may be sought. However, I warn that the world is becoming too "small" for enclaves to remain safe from meddlesome outsiders. Since the door of feasibility for creating isolated space communities has shut, and since the earth is already "too small" for self-sustaining communities to remain secret, there are no feasible refuges for utopias. I conclude that today's world will not tolerate the formation of an enlightened society of liberated individuals, and that those who might wish to live in such a society must be content with learning how to live a good life as individuals with secret dreams while being surrounded by an ever-increasing number of primitive *hoi poloi*. The "society of the cognoscenti" will remain dispersed, and may only occasionally recognize each other during normal encounters.

Chapter 25 is supposed to be a surprise, but the subtitle sort of gives it away: Repudiation of the Foregoing. I will say no more.

Chapter 26 is an annotated version of Bertrand Russell's essay, "A Free Man's Worship." It is an excellent example of how a liberated person thinks, and I use it to illustrate the point of the preceding chapters. Namely, once a person is liberated from genetic enslavement and free to choose values to live by that are compatible with the cognoscenti's insights, an aesthetic and poetic attitude toward "existence" can be achieved. The existentialist need not be a sourpuss, nor must he become a passive esthete. The thoughtful existentialist may end up a compassionate humanist with a lust for existence!

So now dear reader, if you exist, do take the following speculations with a light heart; hopefully your thoughts will be led in directions that are as congenial to your inherited ways of thinking as the following are to mine.

CHAPTER 1

REDUCTIONISM

*An intellect which at any given moment knew all the forces that animate Nature and the mutual positions of the beings that comprise 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. Pierre Simon Laplace, *Philosophical Essay on Probabilities* (1814).*

The highest object at which the natural sciences are constrained to aim, but which they will never reach, is the determination of the forces which are present in nature, and of the state of matter at any given moment - in one word, the reduction of all the phenomena of nature to mechanics." Gustav Robert Kirchhoff, 1865.

The idea that all movement could in theory be reduced to simple laws of nature was first recorded for posterity by Democritus of Abdera in 4th Century BC Greece. This reductionist outlook was also expressed by the Roman philosopher Lucretius during the 1st Century BC. After the Dark Ages, when Greek and Roman ideas lost favor, disillusionment with religion grew among thinkers and they became curious about the ideas of those ancient challengers of piety and ritual. Isaac Newton wrote about the forces of nature as a basis for understanding movement during the 17th Century. The *Philosophes* of 18th Century France restored rationalism as the ultimate guide to Truth. Scientific discoveries continued to provide support to the reductionist notion, as shown by leading 19th Century scientists such as Laplace and Kirchhoff.

During the early 20th Century the reductionist paradigm came under challenge by Quantum Physics. The new physics does not claim to require divine intervention or primitive spirits, but it does appear to require randomness for events at physical scales the size of the atom and smaller. The so-called Newtonian physics is correct as far as it goes, but it cannot explain a category of physical events associated with the atom and its interaction with light. At some future time it may be possible to portray quantum physics with the same deterministic quality as Newtonian physics, but for now it is prudent to assume that some events are subject to random outcomes. The strict form of determinism called for by Newtonian physics should be replaced by a probabilistic form of determinism. However, both forms of determinism are reductionist since they are based on the notion that the movements of all particles, and their interaction with light, conform to the laws of physics. This last phrase is key, "conform to the laws of physics," and it is dealt with at greater length in Appendix A.

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"Reductionism" either angers people or delights them. The entire enterprise of science is based on reductionist tenets. Whereas all scientists practice their profession in accordance with the reductionist paradigm, there's a part of the brain that is so opposed to it that ~40% of scientists claim to not believe in reductionism. These conflicted scientists are found mostly in the humanities, where muddled thinking is less of a handicap; within the physical sciences there is almost universal belief in reductionism (especially among the most esteemed scientists).

The end-point of reductionist thinking can be most easily described by the following analogy: the universe is like a giant billiard table, in which all movements are mechanical - having been set in motion by the explosive birth of the universe 13.7 billion years ago! Of course this analogy neglects quantum physics, but nothing essential to our understanding of the evolution of life, and of human nature, is lost by this simplification. The march of events, from one moment to the next, is captured by this simple-minded, deterministic view. Since this version of reductionism is essential to the rest of this book, and since it is a fascinating subject in its own right, I devote the rest of this chapter to a brief description of reductionism and an appendix to its fuller treatment.

A Rigid Universe

"The Universe Rigid" was possibly H. G. Wells's most important manuscript. It languished with the publisher, who didn't understand it, and eventually it was lost. Instead of reconstructing it, Wells turned its central idea into a story, *The Time Machine* (1895).

Two dozen years later, Albert Einstein published his Special Theory of Relativity (1920), which expanded upon the idea, already familiar to physicists of the day, of time as a fourth dimension. This concept was treated in "The Universe Rigid" essay with unusual insight, especially for a non-physicist. The following is a brief summary of it that appeared in *The Time Machine*:

"... Suppose you knew fully the position and the properties of every particle of matter... in the universe at any particular moment of time:.. Well, that knowledge would involve the knowledge of the condition of things at the previous moment, and at the moment before that, and so on. If you knew and perceived the present perfectly, you would perceive therein the whole of the past. ... Similarly, if you grasped the whole of the present, ... you would see clearly all the future. To an omniscient observer ... he would see, as it were, a Rigid Universe filling space and time - a Universe in which things were always the same. He would see one sole unchanging series of cause and effect... If 'past' meant anything, it would mean looking in a certain direction; while 'future' meant looking the opposite way. From the absolute point of view the universe is a perfectly rigid unalterable apparatus, entirely predestinate, entirely complete and finished... time is merely a dimension, quite analogous to the three dimensions of space."

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This passage describes the underlying principle of what is referred to in today's parlance as "reductionism." It leaves no room for spirits, mysticism or gods. Most intellectuals use the term "reductionist" as a disparaging epithet, but I believe that *reductionism is the crowning achievement of human thought.*

Mechanical Materialism

Reductionism is the belief that complex phenomena can be "reduced" to simpler physical processes, which themselves can *in theory* be reduced to the simplest level of physical explanation where elementary particles interact according to the laws of physics. The ancient concept of Mechanical Materialism captures the essence of reductionism, but relies upon the outdated concept that at the most basic level the particles are like stones, and interact by hitting each other like billiard balls.

Nevertheless, reductionism is the fulfillment of what Democritus and Lucretius dreamed about, a mechanistic world-view that as a bonus could also deliver people from the tyranny of religion. Lucretius would agree with the statement: "There is no need for the aid of the gods, there is not even room for their interference.... Man's actions are no exception to the universal law, free-will is but a delusion." (Bailey, 1926, describing how Lucretius viewed the world).

It will be instructive to review mechanical materialism before describing the version of reductionism required by modern physics.

Imagine a game of billiards photographed from above, and consider frames redisplayed in slow motion. After the cue sends one ball into motion, the entirety of subsequent impacts and bounces are determined. If this were not so, if the balls had a mind of their own, or if some mysterious outside force intervened, then consistently good players would not exist. Now imagine a very slow replay of the motions of the billiard balls; millisecond by millisecond the movements unfold with an undeniable inevitableness. A careful analysis would reveal that sustained momentum and elastic collisions govern the placement and velocity of each ball in the next millisecond.

Given two successive "frames," an observer would know the positions and velocities of every ball, and he could calculate their placement, velocities and future impacts for any arbitrarily short instant later. He could thus predict the following frame, and the process that allowed the prediction of frame 3 from frames 1 and 2 could be repeated for frames 2 and 3 to predict frame 4. And so on, for all future frames. In this way, the observer could predict all future movements (don't worry about the fact that we've ignored friction).

By a similar process the observer could infer a previous frame from any two neighboring frames. Thus, frames 1 and 2 could be used to predict frame 0, etc. Therefore, by knowing any two frames, all future and past frames could be inferred. This is the thought H. G. Wells captured with his unpublished *Universe Rigid* essay.

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Reductionism as a Basis for Physics

The 19th Century saw a de-mystification of various science disciplines. The reshaping was done by rationalists, building upon the legacy of the 18th Century *philosophes*. The rationalists firmly placed science on a footing that has endured throughout the 20th Century. Like the machines of 19th Century inventors, the paradigm developed by 19th Century scientists was "mechanistic."

Ernst Mach forced metaphysics out of physics (Holton, 1993, pg. 32). Chemistry was changed from a floundering quest for transmuting common elements to gold, into a physics-based understanding of atoms and molecules. Darwin displaced God from the creation of life by presenting his theory of evolution, even though this may have saddened him personally.

By the end of the 19th Century, when Wells began to write, the intellectual atmosphere was congenial to ideas that reduced mysterious happenings to a juxtaposition of commonplace physical events. Each event in isolation was conceptually simple. It is the mere combining of many such events that cause things to appear incomprehensible.

Reductionism is based on a concept taught in college Physics 101. I remember well that without fanfare the physics instructor stated that there are only four forces in nature (gravity, electro-magnetism, the nuclear force and the weak force), and that these forces act upon a finite number of particles that are pulled this way and that by the summation of all forces acting upon each particle. In laboratory experiments where the number of relevant forces can be confined to only 1 or 2, motions are observed to be governed by a simple law: $\mathbf{F} = m \cdot \mathbf{a}$, or "force equals mass times acceleration" ("acceleration" is the rate of change of "velocity vector"). It is easier to understand this law of nature by rewriting it in the form: $\mathbf{a} = \mathbf{F}/m$, which states that a particle's acceleration is proportional to the sum of forces acting on it divided by the particle's mass. Mathematically, \mathbf{a} and \mathbf{F} are vectors, which is why these symbols are written in "bold" typeface, and "m" is a scalar (no orientation is involved); thus, the equation $\mathbf{a} = \mathbf{F}/m$ keeps track of the 3-dimensional orientation of forces and accelerations. Since forces can originate from many sources, they must be added together to yield one net force.

At every instant a particle is responding to just one net force. It responds by accelerating in the direction of that force (which has a magnitude and direction). The particle's velocity vector changes due to its acceleration. Since the time history of a particle's velocity specifies where it goes, the particle's "behavior" is completely determined by the forces acting upon it. This description is called Newtonian physics, and it reigned supreme throughout the 19th Century.

Quantum Physics

During the late 19th Century a disturbing number of laboratory measurements were made that defied explanation using Newtonian physics. Radioactivity was a puzzle,

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for it seemed that atoms of certain (radioactive) elements would spontaneously, and at random, emit a particle. There was also the puzzle of atoms absorbing and emitting light at only specific wavelengths, producing a unique spectral pattern for each atomic element. Newtonian physics had no way to accommodate these and other puzzling phenomena.

Quantum physics was developed in response to these puzzling measurements, all of which were related to mysterious phenomena inside the atom. The new physics expanded upon the idea that everyday objects were constructed from electrons orbiting a nucleus composed of protons and neutrons (now known to be constructed from 12 elementary building blocks of matter). It was proposed that electrons could be thought of as a wave, with a wavelength such that the only permitted orbital circumferences around a nucleus were those with an integer number of wavelengths. Changes in an electron's orbit involved changes in energy, so if an electron moved to a higher energy orbit (farther from the nucleus and larger in circumference) it must absorb energy from somewhere (such as a photon of light) that had an energy corresponding exactly to the difference in the electron's energy in the two orbits – hence the quantization of spectral absorption features for each atomic element.

As quantum physics developed to explain more laboratory experiments related to the atom, the theory became weirder and weirder. Quantum mechanics (QM) was developed to deal with particles, and quantum field theory was developed to explain radiation and its interaction with particles. Quantum physics has been described as inherently probabilistic, or indeterminate, and has been characterized as having so much "quantum weirdness" that our minds are intuitively unprepared to comprehend it. Quantum physics "works" in the sense that it gives a better account than any other theory for atomic scale physical phenomena. Contrary to popular belief, it does not discredit Newtonian physics, which is still valid for large scale phenomena; rather, it is more correct to say that quantum physics supplements Newtonian physics. Almost every physical situation can be easily identified as requiring one or the other embodiment of physical law.

It now seems that two of the aforementioned four forces can be "unified" (the weak and the electromagnetic). One of the main goals of physics today is to create a "unified" theory that incorporates all the explanatory power of the four forces plus the weird but useful explanatory power of quantum physics.

One of the most counter-intuitive properties of quantum physics is the notion that events are not strictly determined but are only probable, and that particles are not tiny things at a specific location but are probability functions in 3-dimensional space. When a particle moves the probability function describing its location moves. In the laboratory it is impossible to measure a particle's position without changing its velocity; and it is similarly impossible to measure a particle's velocity without changing its position. The Heisenberg Uncertainty Principle quantifies the partitioning of position and velocity uncertainty.

Einstein believed, but could not prove, that although we didn't know of a way to measure a particle's position and velocity simultaneously with great accuracy, the particle nevertheless has a well-defined position and velocity, and it interacts with

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other particles as if this is so. His speculation was described as needing a “basement level” of physical laws, which had not yet been discovered. With a “basement level” of physical laws the apparent “unknowableness” of a particle’s properties would be just that, **apparent** “unknowableness.” The particle “knows” where it is located and how fast it is going, and in what direction relative to the rest of the universe - even if humans can’t know.

This “quantum weirdness” is often cited to discredit the idea that events are “determined.” But we cannot rule out the possibility that future physicists will discover a basement level of physical law, and that this will restore Newtonian physics as a complete theory for all size scales. The new Newtonian physics would have the old Newtonian physics as a first approximation, valid for use with the vast majority of physical phenomena dealt with on a daily basis.

Starting here I will present only brief summaries of chapter sub-sections that have been moved to Appendix A for this Third Edition of *Genetic Enslavement*.

Levels of Physical Explanation

The matter of “levels of physical explanation” must be dealt with for the reader who is not prepared to accept the existence of a basement level of physical law.

In the physical sciences it is common to treat a physical process at a “higher level” than atoms interacting in accordance with the most basic level of physical law, $\mathbf{a} = \mathbf{F}/m$ and quantum physics. Instead, other “laws” are constructed for everyday settings, either derived from the basic level of laws or derived from experiment and deemed compatible with the basic laws. One example should serve to illustrate this.

Consider the atmosphere, which consists of an immense number of molecules. Any thought of using $\mathbf{a} = \mathbf{F}/m$ applied at the level of molecules for the purpose of predicting the weather would be silly because of its impracticality. There is no way to know the position and velocity of all the molecules in the atmosphere at a given time for establishing the “initial conditions” required for subsequent calculation using $\mathbf{a} = \mathbf{F}/m$. The meteorologist employs a “higher level of physical explanation” by inventing “laws” that govern such aggregate properties as “atmospheric pressure,” “temperature,” and “wind speed.”

In each case the invented property and rules for using it can be derived from $\mathbf{a} = \mathbf{F}/m$, so these handy properties and rule for usage are “emergent properties” of the basic level of physical laws. Every atmospheric scientist would acknowledge that whenever a meteorologist relies on a handy rule, such as “wind speed is proportional to pressure gradient,” what is really occurring in the atmosphere is the unfolding of an immense system of particles obeying $\mathbf{a} = \mathbf{F}/m$.

Just because scientists find it useful to employ “emergent properties” does not mean that the emergent properties exist; rather, they are no more than a **useful** tool for dealing with a complex system. A “pressure gradient” doesn’t exist in nature; it exists only in the minds of humans. Model idealizations of an atmosphere can be used to

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prove, using $\mathbf{a} = \mathbf{F}/m$, that the thing called a "pressure gradient" is associated with wind. But these very proofs belie the existence of the concept, for they "invent" the concept of a pressure gradient for use in a model that then uses $\mathbf{a} = \mathbf{F}/m$. The handy meteorology rules, and their "emergent property" tools, are fundamentally redundant to $\mathbf{a} = \mathbf{F}/m$.

The refinements of modern physics do not detract from the central concept of materialism, which is that everyday (large-scale) phenomena are the result of the mindless interaction of a myriad of tiny particles in accordance with invariant laws of physics. Reductionists acknowledge the importance of the many levels for explaining complex phenomena, but they insist that all levels higher than the basic level of physical explanation are fundamentally "unreal" and superfluous, even though the higher level of explanation may be more "useful" than a lower level of explanation.

Science embraces what might be termed the "first law of reductionism," that whenever a phenomenon can be explained by recourse to a more basic level of physical law, the "higher level" explanation should only be used when it is drastically simpler to use and unlikely to be misleading. Whenever a higher level of explanation is used, there should be an acknowledgement that it is being used for convenience only.

Living Systems

Reductionists view living systems as subject to the same physical laws as non-living systems. Therefore, the behavior of a living system is an emergent property of a complex physical entity. A living thing is thus an automaton, or robot.

The thing we call "mind" is an "emergent property" of an automaton's brain. The brain consists of electrons and protons, and these atomic particles obey the same physical laws as inanimate electrons and protons.

Such things as "thoughts, emotions and intentions" are mental constructions of the brain that in everyday situations are more "useful" than the laws of physics for the study of behavior. In spite of their usefulness, they are not actually causing the movement of particles in the living organism, and they don't exist at the most fundamental level of understanding. Even "free will" must be shorn of its essential features, and recast as another "emergent" product of real causes.

"Consciousness," like "free will," is also an emergent property of automatons, just as the "wind" is an emergent phenomenon of the atmosphere. I don't object to the use of "consciousness" for the same reason that I don't object to the use of "wind" when an atmospheric science problem is to be solved.

It has been argued that the physicist exhibits "faith" in extending what is observably true in simple settings to more complicated ones. This assertion of faith is true, but the faith follows from the physicist's desire to invoke a minimum of assumptions for any explanation.

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Some Practical Considerations Concerning Levels of Explanation

The brain evolved, like every other organ, to enhance survival of the genes that encode for its assembly. It should be no surprise, therefore, to find that it is an imperfect instrument for comprehending reality. If it is more efficient to construct brain circuits for dealing with the world using concepts such as spirits and prayer, rather than reductionist physics, then the "forces of evolution" can be expected to select genes that construct brain circuits that employ these pragmatic but false concepts. Since no tasks pertaining to survival requires the $\mathbf{a} = \mathbf{F}/m$ way of thinking, the brain will find this to be a difficult concept. It is a triumph of physics to have discovered that $\mathbf{a} = \mathbf{F}/m$ and quantum physics rule everything!

A naive person might believe that the primitive person, viewing everything in terms of spirits, is thinking at a higher level than the scientist. This would be a ludicrous belief. A primitive is a lazy and unsophisticated thinker. He is totally oblivious to reductionist "levels of thought." As I will describe later, he uses a brain part that is incapable of thinking rationally: the right prefrontal cortex. Human evolution's latest, and possibly most magnificent achievement, is the *left prefrontal cortex*, which evolution uses to usurp functions from the *right prefrontal cortex* when rational thought is more appropriate (*i.e.*, feasible). Too often contemporary intellectuals will unthinkingly succumb to the pull of primitive thought, as when someone proudly proclaims that they are "into metaphysics" (an oxymoron).

A fuller exposition of this topic cannot be given without a background of material that will be presented in later chapters. For now, I will merely state that mysticism is a natural way of thought for primitive humans. It is "easier" for them to invoke a "wind spirit" explanation than the reductionist ones, such as $\mathbf{a} = \mathbf{F}/m$, or higher level derivative physical concepts. They do this without realizing how many *ad hoc* assumptions they are creating, which in turn require explanations, and this matter is never acknowledged (as with invoking God as an explanation, without explaining "God"). Their thinking may seem acceptable from the standpoint of a right prefrontal cortex (or "efficient" from the perspective of the genes that merely want to create a brain that facilitates the gene's "goal" of existing in the future), but it is terribly misguided from the standpoint of the thinker endowed with a functioning left prefrontal cortex, that demands rational explanations with a minimum of assumptions. This unthinking proliferation of *ad hoc* assumptions bothers the reductionist, but it doesn't bother the unsophisticated primitive.

Reductionism is for the Few

H. G. Wells must have understood the issues of this chapter. The reductionist paradigm was an important part of intellectual thought during the 19th Century, and Wells grasped it more surely than even many scientists today. Scientists, engineers and inventors must have been held in high esteem during the second half of the 19th Century, and the first half of the 20th. The per capita number of significant discoveries and innovations, as measured by Asimov's Chronology of Science and Discovery (Asimov, informally distributed in the 1980s, formally published 1994)

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peaked at about the middle of this period (actually, 1910 AD, as described in Chapter 20, and specifically Fig. 20.12).

Late in the 19th Century, after Darwin's evolution by natural selection instead of divine guidance had time to register with intellectuals, the idea of "humans as automatons" was part of the climate of opinion. Thomas Huxley was intrigued by this idea, and Darwin humored him by signing letters with a reference to it (Sagan and Druyan, 1992, pg. 70). Reductionism requires that all living things be viewed as automatons, or robots created by evolution. Yet none of today's academics seem brave enough to defend this idea.

Ernst Mach (1893) deserves mention as an early champion of the idea that all branches of science will eventually be viewed as unified. He was a continuing inspiration for those who attempted to advance this perspective (Holton, 1993) throughout the first half of the 20th Century. His was one of the most important in a series of "flame-bearers" for keeping alive an idea that came out of ancient Greece with the writings of Democritus of Abdura (Sagan, 1980).

Reductionist ideas were at least understood by literary people during the early 20th Century. In 1931 novelist Theodore Dreiser, for example, wrote "I have pondered and even demanded of cosmic energy to know Why. But now I am told by the physicist as well as the biologist that there can be no Why but only a How, since to know How disposes finally of any possible Why." (Dreiser, 1931).

Sadly, we cannot expect today's intellectuals to have the same profound understanding of the nature of reality as was exhibited a couple generations ago by such writers and social commentators as Wells and Dreiser. The quality of thought over time, in a specific subject area, is not always progressive. As with civilizations, there is a rise and fall in the sophistication of world views. Indeed, as the 21st Century begins we are in the midst of a renewed interest in returning to the comforts of primitive outlooks, as described in the next chapter.

CHAPTER 2

RESISTING THE BACKWARD PULL TOWARD OUR SPIRITUAL HERITAGE

"O miserable minds of men! O blind hearts! In what darkness of life, in what great dangers ye spend this little span of years! ... Life is one long struggle in the dark."
Lucretius, *On the Nature of Things*, ca 60 BC.

"It does no harm to the mystery to know a little about it. For far more marvelous is the truth than any artists of the past imagined! Why do the poets of the present not speak of it? What men are poets who can speak of Jupiter if he were like a man, but if he is an immense spinning sphere of methane and ammonia must be silent?" Richard Feynman, *Lectures in Physics*, Vol. 1, Addison Wesley, 1963.

The term "New Age" is a misnomer, and an insult to better ages. It is a misnomer because it is a regression to primitive ways of thinking, ways which should have remained buried, yet which have resurfaced due to a mysterious mental pull toward the primitive. This pull is unfortunately endemic to the flawed human mind. "New Age" embraces the occult, a belief in angels, spirits, astrology, magic and life after death. It is a return to the kinds of enslaving thoughts which Lucretius urged his disciples to be rid of 2000 years ago.

The Primitive's Reliance on Spirits

The environment of our primitive ancestors, including both the physical and social aspects, rewarded genes that constructed brains that could deal with the world, which is profoundly different from stating that their environment rewarded brains that could understand the world. As I argue in a later chapter, primitive people did not employ the full powers of a modern left prefrontal cortex, but instead relied upon a more primitive right cerebral cortex design for both cerebral hemispheres. To the extent that "producing grandchildren" (a convenient measure of genetic success) became more dependent upon mastery of a world of human relationships instead of mastery of the natural world, the architecture of the human brain evolved in ways that favored comprehending the social world at the expense of the natural one.

The social arena is less predictable than the natural one, so different mental abilities were rewarded in an environment requiring social skills. When a brain that evolved for the social setting addresses matters in the inanimate world, it should not surprise us to find that such a brain employs "weird logic" in this neglected realm. The primitive's vision of the world, being unguided by rational thought, was filled with spirits that behaved like people. Primitive people have gods for lightning, wind, rain, light, dark, and whatever seems important to a primitive's precarious life. Thus, when

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the sun god loses a conflict, according to this weird logic, it follows that there shall be wind, rain and lightning.

Today's common belief systems provide evidence that for our ancestors the need to competently deal with human affairs was more important to the evolving human genome than the corresponding need to competently deal with the inanimate world. In high-tech modern Japan, for example, the indigenous Shinto cult and religion remains popular. Shinto worship centers on "a vast pantheon of spirits, or kami, mainly divinities personifying aspects of the natural world, such as the sky, the earth, heavenly bodies, and storms. Rites include prayers of thanksgiving; offerings of valuables..." (Encarta Encyclopedia, 2000). Even well-educated Chinese still believe in Feng Shui (the need to please spirits by a proper placement of furniture, entrances, etc). American Indians, who crossed the Bering Strait 13,000 years ago, brought with them a burdensome need for believing in spirits that demanded ritual obedience. There seems to be an abundance of depressing examples from every culture.

The Dyads of Primitive Thinking

Dyads abound in primitive thinking. Night and day, good and bad, friend and foe, birth and death - they all contribute to a "yin and yang world." It is not surprising that when primitive men floundered to explain the world, they relied upon a dyadic competition. Thus, night and day are engaged in a daily struggle, literally; and at sunrise the "day" has become victorious over "night," and so on. But it gets complicated, for during winter the stronger competitor is night, whose exhaustion gives day the upper hand during summer.

Conflict permeates a primitive's thinking, because conflicts between tribes define primitive life. Nevertheless, men battle upon a stage set by even stronger forces than themselves. The weather is overwhelmingly strong, as is the ocean, the occasional earthquake, tsunami and volcano. There must be gods in heaven who unleash the thunderstorm and lightning, that punishes and rewards men. Since powerful men can be appeased, or slightly influenced, so might the gods. Man's quest for control over his fate led him in false directions, for gods cannot be appeased when they don't exist.

We should laud the primitive's urge to explain, even though it seems to be only weakly motivated by an urge to understand. The human claim for nobility rests upon this urge. But let us also not be mistaken about the explanations created by primitive men: Primitives have been stupendously wrong in almost every instance!

Their explanations were wrong because they arose from a primitive right brain. Only recently, with the ascendancy of the aforementioned, fast-evolving left brain, with its logical mode of thought and lack of traditional "wisdom," has it been possible to conjure up correct explanations. But, so strong is the irrepressible right brain that even many contemporary "intellectuals" still believe that primitive explanations contain some profound and subtle wisdom that makes it "just as valid."

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Thinking men of every age seem to have sensed a pull toward primitive thinking, and worse, toward primitive behaving. The decay of civilization has been an ever-present concern for those who live in a civilized state. This concern was expressed by ancient Greek philosophers, just as it is in today's world.

We know that the civilized state is not secure, because we sense the presence of that insistent and primitive right brain. To use the primitive's own metaphor, we are engaged in a struggle between good and bad, between light and dark, and it is now "late afternoon." Some of us who worry about the approach of evening, and a long night, admonish our contemporaries to resist the "primitive pull," to stay the course that brought us to this glorious noon, atop the highest mountain, by keeping the new faith as it struggles with the old. It has become a battle between the two titans of human history: the two brain halves!

The Modern's "Spiritual Cleansing"

The primitive way of thinking is more efficient to implement than the modern physicist's cumbersome $\mathbf{a} = \mathbf{F}/m$ and quantum physics way of thinking.

We moderns smile at those faltering attempts to see order in nature. From our 21st Century perspective, we see that their "explanations" are pathetically simple-minded, and emphatically wrong!

Yet most people today feel comfort in being pulled in this primitive direction. It's as if the more complicated and up-to-date explanations require too much effort, resisting as they must the objections of old brain circuits. The result, for most people, is that the brain maintains old and new understandings side-by-side. The human brain is amazingly adept at compartmentalizing thought, and allowing the most irrational beliefs to coexist beside enlightened ones. "Cognitive dissonance" is minimized by insulating brain circuits from each other.

More than a few scientists surrender rationality on Sunday. I once worked with a scientist, a master of magnetic fields on planets in our solar system, who believed in the many levels of heaven taught by the Mormon Church. I give more examples of this in Chapter 14.

During Humanity's long march to the present, we have progressed from "magic" explanations to "rational" ones. Those brave thinkers who led the march have shed the magic and embraced the rational. Rationality led to reductionism, which I believe is Humanity's greatest intellectual achievement! The march forward has been led by people whose style of thinking adheres to the values of our left cerebral hemisphere, or left brain. The regressive, backwards pull is from a majority of "neurologically primitive people" whose thinking style remains right-brained.

Humanity's path to reductionism has been "forced" by necessity. Imagine the consequences of taking your car to a minister for its repair, instead of a car mechanic; or seeking medical help from a shaman medicine man instead of a medical doctor or

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nutritionist. Our primitive ancestors had no need for car mechanics, and in their time medical doctors didn't exist, so they had less to lose by adhering to magic. With the unfolding of time, and the accumulation of technology, there has been a growing need to distinguish between spiritual and rational explanations.

Not all aspects of modern life require rational explanation. My friend who believed in many levels of heaven was unencumbered by this belief during his work hours. His spiritual beliefs might, in fact, have had a stabilizing effect in his personal life. It is relatively inconsequential whether a person believes they will go to heaven when they die, or dissolve to dust! It is more important that they know about family budgets, cars, computers, and nutrition.

Whereas it may not matter to a person's success at living whether all remnants of spirituality have been purged from his intellectual outlook, it does matter to the person engaged in a serious endeavor to understand "the nature of reality." Every serious thinker is obligated to undertake a lifelong vow to cleanse away all vestiges of spirituality!

We must control the impulse to regress to a world of spirits, no matter how comforting it may be. As argued by Lucretius, we must move forward, abandon belief in personal guardian angels and protecting gods, and replace them with understandings based on rational thought.

Are We Making Progress?

During the past 80 years scientists have slowly aligned their personal beliefs with rationality. In 1916 Leuba surveyed the beliefs of 1000 randomly selected scientists and found that 42% of them believed in God, whereas a similar survey conducted in 1996 showed only a modest decline to 39%. The belief in immortality declined by a slightly greater amount, from 51% to 38%. Perhaps more revealing, the more accomplished scientist is less likely to believe. Leuba (1914) surveyed 400 "greater" scientists and found belief in God to be 28%, whereas Leuba (1933) found that 19 years later the belief rate declined to 15%.

Today, Larson and Witham (1998) report that among 517 American scientists who belong to the prestigious National Academy of Sciences only 7.0% believed in God. Considering a belief in immortality, the above studies report that for 1916, 1933 and 1998 the belief rate was 35%, 18% and 7.9%. Among the general population of non-scientists, 96% believe in God!

There appears to be a decoupling of what people of accomplishment believe and what the *hoi poloi* believe. Thus, among "greatest" and "accomplished" scientists the rates of belief in God and immortality are low and declining dramatically, among the ranks of scientists as a group the belief rates are less than half and declining slowly, whereas among the general population the belief in God is high and remains unchanged. Only the intellectuals are abandoning God!

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Faltering Progress

As my chapters on the brain explain, I believe that the right prefrontal cerebral cortex finds mysticism and religion congenial to its way of thinking, whereas the left prefrontal cerebral cortex is inclined to think rationally. There is little doubt that the left cerebral cortex is a more recently evolved brain area than the right, as it is responsible for speech, conceptual thought and logical thinking. The practice of science requires a well-developed left brain, although a well-functioning right brain is also required in a supporting role. I speculate that scientists typically have left brains that "dominate" their right, in the sense that the left brains use the right brains as "tools" in the pursuit of left-brain-directed activities. The scientist values things that the left brain values, and the scientist's approach to studying a problem, and the standards of proof, are consistent with the style of thought of a left brain. Among the others, it is the right brain that employs its left as a tool, keeping it subservient to right-brain values and goals. This more common style is a phase humanity must continue to "evolve through" if it is ever to reach a winning place as a sentient species.

As I look back upon the recorded history of the human groping for an understanding of who we are I discern good and bad eras. The first good era was 5th Century BC Greece, when the Ionian philosophers articulated the reductionist paradigm, as described by Sagan in his book *Cosmos* (1980, pg. 175). Democritus was the shining star of that era. The next era would be 1st Century BC Rome, when Lucretius wrote his famous poem *On the Nature of Things*. There followed a Dark Ages millennium during which anyone who thought rationally had to keep their thoughts secret. Stirrings of rationality started in 17th Century Denmark. The 18th Century *Philosophes* in France produced a full-bloom resurgence of interest in Greek thought, but this rebirth was short-lived due to the French Revolution. During the 19th Century European discoveries buttressed support for rationalism and the reductionist paradigm in particular. The new physics of the early 20th Century began to discredit reductionism, unfairly in my opinion, though rationalism continued to prevail. The global depression quieted many independent thinkers (like H. L. Mencken), and this marked the beginnings of a slow return to spiritualism. At this writing, in 2006, I see only a downslide of critical thinking that cannot compete with the primitive appeal of religion and an excess of politically-correct embrace of diversity of thought, no matter how irrational. A new Dark Ages might be approaching.

Laying a Groundwork of Understanding

The prospects are poor that during the next century the general public will embrace a rational outlook. Most people, even most intellectuals, are inclined to use the term "reductionism" disparagingly. This can be understood if their belief systems are influenced by a primitive, right prefrontal cortex. Rationality, which is a left prefrontal cortex creation, is in conflict with the old right pre-frontal cortex. A fuller explanation of this will follow chapters on human evolution, the brain's role in human evolution, the appearance of the artisan, his role in the rise of civilizations, and the resentment of the artisan's rapid rise to power.

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These chapters, in turn, will be preceded by a tutorial on genetics, using the sociobiological paradigm. This will be our task for the next three "genetics tutorial" chapters.

If, dear reader, you find the genetics tutorial chapters tedious, then skip them if you must. You merely risk not having some tools for understanding the "micro-motives" underlying the "macro-behaviors" under discussion. The genes, after all, underlie everything pertaining to life!

The chapters describing human evolution (Ch. 6) and the brain's role in human evolution (Ch 8) are intended to illustrate reductionist ways of thinking about the evolution of human nature, and should not be skipped. They provide a background for understanding the following speculations on the rise and fall of civilizations.

The utopias and living wisely chapters will resume the main theme of this book, which is concerned with the individual's predicament of living with "outlaw genes." The intervening chapters present a story of how humans came by the weird human nature we're stuck with, and I see no way of resuming the main topics without the preparation of these intervening chapters.

CHAPTER 3

GENETICS TUTORIAL - PART I

"...organisms die but their genes pass on - often mutated and redistributed, it is true, but genes nevertheless; and it is difficult, therefore, to escape the conclusion that the design of the organism is merely to provide for gene multiplication and survival..." Carl Sagan, *"Radiation and the Origin of the Gene,"* Evolution, January, 1957.

People once believed that the universe was created for Mankind and all other life was placed here for our use. This was gradually replaced by the harsher belief that our species competed with other species, and that Human Nature was designed to do what was good for the species. Anyone who acted selfishly was aberrant, and would be punished in a later life. Darwin believed that individuals competed with each other, and the victors of individual conflict shaped human nature. But now, the level at which competition occurs has descended one more level: sociobiologists argue that gene alleles compete with each other for positions on chromosomes (W. D. Hamilton, 1964a,b; G. C. Williams, 1964; E.O. Wilson, 1975; R. Dawkins, 1976).

If the combatants are the genes, then what are we individuals? We are the "lumbering machines" carrying the genes that assembled us for the genetic competition (Dawkins, 1976). An individual is like a puppet, whose behavior is directed by strings that are pulled, ultimately, by tiny genes (please excuse the poetic license and anthropomorphism of this phrasing). The demotions our egos suffered during the past couple centuries continues into the 21st, as people must now deal with the thought that we are created by our genes for gene battles, and the genes do not care about the individual's welfare.

If the genes are this important then we should know their story, from the beginnings of life to the present. I shall present a recapitulation of the evolution of life on earth, with a proper emphasis on the role of genes. Some of these descriptions are speculative, yet illustrate ways that I believe the subject should be approached. The essence of every speculation is, of course, mechanistic reductionism!

A Brief History of Life

When earthly life started, 3.5 billion years ago, tiny replicating molecules resembling DNA (or maybe RNA) must have competed with each other for incorporating their molecular building blocks into copies of the replicating molecules. In time those molecules that accidentally created a protective "coating" survived longer. This crucial event might have been hastened by the existence of water droplets that would naturally form surface layers of like-charged molecules with hydrophobic ends

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(Donaldson *et al*, 2004). A droplet with such a covering is a rudimentary cell, as the cell "wall" may have protective properties.

Approximately 2 billion years ago, a well-functioning one-celled form appeared which housed cell-creating DNA floating inside (prokaryote). Later, a variant of the prokaryotic one-celled life form had the several DNA molecules confined to a cell nucleus (eukaryote). This represented one more structural level of protection of the DNA. Whereas it must have helped the DNA survive it also required that a solution be found for the slightly more complicated replication process.

A trend is evident, and it has continued throughout the long story of life on Earth. To compete better, DNA molecules have had to wrap themselves in an ever-more complex structure, devise ever-more complex methods for replication, and retain control of their protective structures for competition with other life forms.

Multi-celled creatures did not appear until about 1 billion years ago. Each cell contained a nucleus with an identical set of genes inside. It is possible that initially all cells in a multi-celled life form were identical. A grouping of cells has a smaller "surface area per mass" exposed to the watery environment than one-celled forms, and this added protection may have rewarded the forms that tended to stick together.

Specialization of some cells in a many-celled creature may have been the next step in the evolution of life. With a reliable association of cells having the same DNA, there existed a reward for any gene mutations that helped the outermost layer of cells to specialize in protective matters. Since all cells had the same nucleus, it could still be argued that the sacrifice of a few cells to become mere "protective skin" while forsaking reproduction themselves nevertheless enhanced the reproductive prospects of the identical genes inside the cells that were being protected. This concept is a kernel for "inclusive fitness," described below.

In this way, skin might have been the first "organ" to evolve. Once a method had evolved for guiding a cell's properties to be responsive to its surroundings, the path lay open for the evolution of any number of organs. Organisms competed with differently constructed organisms in seeking food - and perhaps in consuming each other. Although the organisms competed with each other for food, and perhaps attempted to destroy or devour each other, since the fate of this competition was determined by the properties produced by the genes within, it is more insightful to view the competition as occurring between the various gene groups than between individuals.

Gene Competition Within and Between Species

Specifically, only the genes that differed were in competition. Identical genes in competing organisms might appear to be in competition, but only because they were part of an organism that had different genes. Since the fate of identical genes in different organisms was not in question, they were not competing with each other. If organisms had chromosomes that differed at only one gene location, and only two

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gene forms (alleles) existed at this location throughout a population of organisms, then it would be the two genes (gene alleles) that were in "competition."

The casual observer who thought that two kinds of organisms existed that were competing with *each other* (for food, let's say) would be misunderstanding the situation. A deeper understanding shows that two genes were competing with each other.

The word "competing" is a human-invented concept. It is important to remember that the entire process of genes competing, with one gene mutation slowly yielding to another, is purely mechanistic. Obviously, the genes are unaware that they are "competing." Only a human observer would remark "these two genes are in competition."

Individuals within a species may "compete" with each other, and so may individuals belonging to different species. The underlying dynamic is the same: every gene acts as if it wants to proliferate and last forever. Again, a gene does not "want" to proliferate. Rather, those that in fact proliferate are the ones that express themselves as individual characteristics that the human mind will identify as "wanting" to proliferate. Thanks to our primitive right brain (that evolved for dealing with social settings) it is helpful to use social metaphors for explaining mechanical processes.

It is theoretically possible that two species could exist in competition with each other while having no genes in dispute within each species. In other words, all individuals of one species would be genetically identical, and the same for the other species. Yet, since we are supposing that they are competing for the same resources in their environment, for example, the two species are in competition with each other. We should further specify that the two species hold some of the same genes (this is very likely, since they have common ancestors). For this hypothetical situation, two large chunks of genes are in competition with each other and the "winner will take all" after one species is exterminated (which is common for species that occupy identical niches).

This is one extreme of a continuum of situations. At the other end is a situation in which there is no between-species competition, but there is competition between genes within the single species. In other words, some gene loci on the chromosomes have two or more alleles, and these alleles are in competition with each other. The simplest case would be one gene locus with two alleles, and the two alleles are competing with each other for exclusive presence at one locus on the chromosome.

This simple situation is likely to end with a complete win by one of the alleles. However, there are special cases where there will be a steady-state percentage representation of both gene alleles (*i.e.*, an evolutionarily stable strategy, or ESS, as described originally by J. M. Smith and later by Dawkins, 1976).

In the real world there will be some within-species competition of counterpart gene alleles and some between-species competition between all the genes that are different

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between the two species. For the between-species competition, large chunks of genes are involved; but only some of these will be under the influence of selection pressures.

Thus, for the typical situation, some gene alleles will be changing their representation frequency within the species gene pool due to "other species" selection forces, while other gene alleles will be changing their representation frequency within the species gene pool due to "within species" selection forces.

Appendix B presents examples of the ruthless nature of gene competition using human virus examples.

Inclusive Fitness

The individual organisms called humans should be forgiven for seeing everything in terms of what they're good for to the individual organism. Dawkins (1982) describes an aberrant period in biology when the paradigm shifted from a "selfish organism" perspective (starting with Darwin) to "adaptation for the benefit of the species" paradigm (during the mid-20th Century). Given that many (unsophisticated) people believe that people do things that benefit the species, the level at which people perceive evolutionary competition to occur should shift in the other direction, leading eventually to the "selfish gene" paradigm.

In other words, if we seek insight into how evolution works we should not ask "what good are genes to individuals?" but "what good are individuals to genes?"

An example will serve to show how ridiculous an imperfect paradigm can be. A graduate student, who must still retain remnants of the belief that adaptation is for the good of the individual, studied the Australian redback spider. She describes how the male positions himself during copulation so that the female can eat his body during a leisurely insemination process, thus satisfying her into not seeking another male. This assures that the sacrificing male's sperm will not be competing with the sperm of another male. To sum up the article, the magazine author presents the following astounding quote attributed to the student: "Sexual cannibalism has always been thought of as a conflict between males and females, in which males are just being overpowered. It's important to realize that it can be advantageous for the male."

Only someone handicapped by the "good of the organism" paradigm could say such a ridiculous thing! The benefactor, clearly, is the gene that causes the male to behave in this bizarre manner, not the individual male. He is a victim, more than the female. What's missing in this summarizing statement is an acknowledgement that genes produce behaviors which can manipulate and victimize individuals with behaviors that benefit only the genes that create the behavior?

Inclusive fitness states that genes tend to produce individual behavior which maximizes the presence of the behavior-producing gene in succeeding generations (Hamilton, 1964a,b). Since biological relatives are likely to be carriers of the same

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genes as the behaving individual, the fate of the genes in relatives matters as much as the genes in self. For social animals that live among relatives the merit of an action must take into account the consequences upon those "genetically related" carriers of the genes.

The mathematical treatment of inclusive fitness is straightforwardly presented in many places. I shall simply give a feeling for it by repeating a traditional example. A gene will reward a self-sacrificial act if it saves at least two cousins, or at least four second cousins, *etc.*, as in each case the same number of identical genes is preserved (on average).

Inclusive fitness provides an explanation for "altruism" by the argument that an altruistic act promotes the proliferation of genes generating the act. Sometimes these altruistic acts are at the expense of the individual; but that's OK from a gene's perspective, for the individual is merely a tool created by the genes for gene proliferation!

The inclusive fitness paradigm is useful in many other situations, some of which will be dealt with in the following chapters.

CHAPTER 4

GENETICS TUTORIAL - PART II

*"Thus the earliest vertebrates, like the earliest amphibia, the earliest mammals, and the earliest primates, were small predators. Over and over again in evolution, the originators of new modes of life were small predators, and the key innovations at each stage conferred a selective advantage in predation." John Morgan Allman, *Evolving Brains*, 1999, p. 73.*

In this chapter I continue describing some basic principles of evolution that apply to all living things. It will serve as a foundation for the more speculative and interesting evolutionary results found in human nature.

Pre-Adaptation

Some genes are "pre-adapted" for new environments. A gene is pre-adapted if there was a negligible reward for its presence in the genome at the time some new environmental challenge appears for the first time, and for which the gene then confers a significant genetic benefit.

Modern society provides many examples. Computers didn't exist before the mid-20th Century, yet we find that many individuals are naturally talented for computer programming, design, networks, and other aspects of computer use. These people have genes that are pre-adapted for the computer environment.

Pre-adaptations are always present, as the following thought experiment illustrates. Imagine any task, and a procedure for reliably measuring performance of that task. The task could be jumping as high as possible, or remembering a sequence of numbers - any task will do provided performance can be measured objectively, producing a continuous range of scores (a binary result, such as pass/fail, does not meet this "continuous range of scores" criterion). After two people have performed the task, there will invariably be a "better" and "worse" performance. After many people have performed the task, the test scores may form something resembling the Gaussian, or "bell curve" distribution, with many scoring near a middle region, and fewer scoring really well and poorly. The top scorers can be described as "pre-adapted" for the task (provided the task is novel or evolutionarily "new").

In real-world situations, whatever the change in environment, whatever the change in job opportunities, whatever new sporting games are invented, there will always be new consistent winners and losers. Winners in the new task might have been mediocre performers in the old ones (and old winners may become the new losers).

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"We are what we're good at," and the forces of selection measure us by what we're good at in the context of our times. Whereas the computer whiz is pre-adapted to this era, so might a "nobody" of today be pre-adapted to some future era. We should be careful in judging others, for they might have shined outstandingly in past settings, or be examples of a type that will shine in future ones. Faceless nobodies of times past might have rivaled the best of today's stars, if only given the chance by a change of environment. Chance is everything!

Pre-Maladaptation

But if the winners are pre-adapted, the losers are "pre-maladapted." It may seem "unfair" to a civilized mentality to believe that "pre-ordained" winners and losers will exist when new opportunities appear, but every species has been molded by this unfair rewarding of individuals through abrupt environmental change. We may not like it, but this is the way things work.

Anyone feeling gratitude for evolutionary accomplishments should also feel thankful for the diversity of individual performance. Thanks to "inequality" evolution proceeds! But while we celebrate inequality, and rewards for the pre-adapted, let us also have compassion for the pre-maladapted, the world's ill-fated losers, for they cannot be responsible for the changes that doom them.

Over and over, in this book, we shall encounter repugnant examples in nature. Our lesson is to accept that Nature doesn't care about individuals, only the genes! And the genes have no qualms about wasting individuals for their sake. Fish lay thousands and millions of eggs, so that on average one or two will survive. Several insect species produce male brains that are programmed to allow the female to make a nutritious meal of him after copulation - to postpone her mating with a competitor or for nourishing his offspring! The historical record shows that humans will send legions of young men to battle, like fodder, who in the prime of their life become maimed or killed. The victors in battle rape the vanquished men's women, then march home as heroes, with greater rights for domestic breeding. In all these settings, the individual is "sacrificed," for he is engaged in risky behaviors with benefits that accrue reliably to only the genes.

Humans who ponder the consequences of what I'm calling a pre-maladaptation have grounds for bemoaning their bad luck. I like the thought that each person "has their time," a time when they would have some maximum of pre-adaptation, and since people are born into times "at random," they most often are "out of their preferred time." Imagine how frustrating it would have been for Beethoven to have been born before pianos existed, and before orchestras. Or for Einstein to have lived before the preliminaries of 19th Century physical theory had been set. Delay Darwin's birth a century; would he have become the giant we know today? Bring to the 21st Century such notables as H. G. Wells, Lucretius, Democritus, Shakespeare, Homer, and others; what would become of them? We cannot know how fortuitously attuned to their age these giants were, or what nobodies they might have been had the "roll of their genes" occurred at some other time.

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Species Shaping Forces

Pre-adaptation is a useful concept calling attention to the fact that whatever an organism's make-up it will have some kind of "match" to every hypothetical new environment, and the match of some individuals will be adaptive. It might be adaptive whether or not the environment in question has ever existed before, and whether or not any of the organism's ancestors have been exposed to that environment. In such cases, we should not say that the organism has become adapted to the environment in question, just because it fares better than some of its cohorts. Rather, it is adapted due to a pre-adaptation.

Most organisms will be pre-maladapted to the new environment. Thus, most individuals will fall behind, watching a minority of pre-adapted individuals leap forward. The greater the number of changes to the environment, the greater will be the disparity in relative rewards between the pre-adapted and pre-maladapted. A species should evolve "faster" at such times.

When I refer to changes in the "environment" I mean to include not only the climate for a region, and the disappearance of a food staple (plant or animal), or appearance of new foods, but also the appearance of a new predator, the invasion of a new parasite, or the adoption of a new element of "culture" (in the case of humans, and perhaps chimpanzees).

There is a special case, unique to humans, in which culture has created an entirely new environmental condition: the removal of most of the natural threats to survival.

An advanced civilization shields people from diseases, animal predators, and, in some cases, the need to work. It even shields people from each other to a great extent, by reducing the frequency of outbreaks of "tribal warfare." In this environment genes that in harsher, unforgiving environments would be maladaptive would now be neutral. Only the most severe genetic defect will be eliminated from a human genome shielded this way.

Under these conditions we might want to think in terms of "potential pre-adaptation" and "potential pre-maladaptation." Today's genome is accumulating a large reservoir of potential pre-maladapted genes, carried unknowingly by individuals who may be reproductively successful only because they are not subjected to selective forces.

At the risk of getting ahead of my story, I believe that such genes will become apparent only after natural forces of evolution are restored, and put "the squeeze" on our burgeoning global population. Winners and losers in this new environment will not be close-call winners and losers, they'll be clear-cut winners and losers. The disparity between those now destined to win and those destined to lose is greater than ever, and growing faster than ever. The complexion of Humanity could change dramatically *apre le deluge*.

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To understand a species we must consider the selective forces that have "shaped" it. In other words, we must learn what kills individuals before they reach reproductive age, what factors determine which individuals reproduce after reaching maturity, what foods are eaten, and how precarious is the supply.

For example, if our ancestors 5 million years ago were eaten by lions the survivors would have been good at avoiding lions. This might have rewarded the evolution of bipedality, which would have enabled standing tall and running fast. It might also have rewarded the capacity for social cooperative strategies, a precursor to intelligence.

Another theory speculates that our ancestors had to learn how to find and store root plants that would have grown on the grasslands (Wrangham and Peterson, 1996). This would have rewarded the creation of digging tools, and the ability to carry extra roots to a storage place at a home base, which in turn would have rewarded bipedalism and a self-control that provisioning requires.

Whichever environment accompanied the branching of bipedal chimpanzees from their jungle-dwelling forebears 5 million years ago, we can be sure that the forces of selection rewarded individuals carrying genes for dealing with whatever were the causes of mortality in their new environment, whether they were escaping from lions or digging and storing roots.

Perhaps 500,000 years ago some humans migrated to the edge of constantly-moving glaciers. Mortality in this new setting would have been climate-related, such as cold and hunger. We may presume that genes for planning and foresight were rewarded. To the extent that large animals were hunted, and meat became an essential food source, genes for a strategic type of cooperative hunting would also have been rewarded.

After the last glacial cold period, that peaked 19,000 years ago, humans had to adapt to an ever-warming climate. For some, this meant adopting an agricultural lifestyle. Those who were pre-adapted for farming would have prospered, provided they could also band together for mutual protection from raiders. Others remained nomadic, and targeted the new farmers. Thus, the main killer of Man became other men (it probably has been "other men" for the past 100,000 years, at least). As farming achieved unprecedented success, urban living became possible, sometime after 3000 BC. This created opportunities for microbes, which competed with Man as the main killer of men. Our ancestors are the ones with immune systems that afforded protection against "urban" diseases.

In every step of this evolution toward modern Man, the change in what killed people was a principal selective "force."

H. G. Wells made the point, 100 years ago, that long-lived life forms cannot adapt to fast changes of conditions, unlike short-lived forms, that can adapt. This leads more often to the demise and replacement of long-lived large creatures by other large

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creatures, both of whom are competing with small, short-lived creatures. He warns that humans, with a long life span, are vulnerable on this account.

The looming threat to Humanity posed by viruses and bacteria may become a classic example of this evolutionary dynamic. How ironic if our demise, or loss of greatness, which is most often portrayed in terms of dramatic events, such as global thermonuclear war, instead is dealt by tiny viruses!

If in fact viruses produce large-scale human die-offs during the 21st century (Garrett, 1995), the survivors will be those with pre-adapted immune systems; not the physically strongest or most intelligent. This possibility illustrates in dramatic fashion the principle that "a species is shaped by what kills its members."

How Many Genes Can Compete?

Human tribes are supposed to have numbered 50 to 100 individuals throughout much of our prehistory. The number of adults in such a tribe would have been about half this number, half of whom would have been adult males (12 to 25 in number). It is tempting to think that fewer than this number of genes can be evolving in the tribal genome. But such an assumption is erroneous, as I will illustrate.

When a man goes into the world "to be measured," it is his **phenotype** that is being measured. And his phenotype will be the result of many genes (interacting with each other to produce a unique phenotype). Consider the extreme case where each of the men in a tribe differs from "an average" by just one allele. Consider 4-year intervals, during which each woman of child-bearing age bears one baby. During each 4-year interval, if only one man prospers and is accorded sole breeding status, then every 4 years one allele can be declared a winner over its competitor(s). In a lifetime, 10 alleles can be declared winners (where we imagine the environment places great importance upon different aspects of phenotype each 4-year period). After 80 years, 20 alleles could be declared winners, etc.

Even though this is a thought experiment, it proves that there is no fundamental, mathematical reason forbidding the number of gene sites for allelic competition to exceed the number of adult males in a self-sufficient tribe, or the total number of tribe members. (A "multiple regression" statistical argument is also possible, and more persuasive for me, but I shall spare my readers of this daunting argument.)

Every individual is a carrier for many genes that are competing with allele counterparts. The number could be 50, or 500; and it doesn't matter if the individual is a member of a tribe with only 50 or 100 members.

Migration, New Gene Competition, and Pace of Evolution

The number of gene loci hosting allelic competitions has undoubtedly increased in number since the advent of urbanization, and the more recent globalization of our species. A tribe of Africans may be homozygous for genes influencing skin color, but

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if they were captured and brought to America as slaves their ancestors would find that those same genes influencing skin color had become a factor in determining individual welfare in the non-African society. The same argument would apply to many genes.

The inescapable conclusion is that the more diverse a population becomes, due to migration, the more genes there are in competition with each other. Does this mean human evolution is progressing faster today, or slower? If a person's "measure" is affected by more genes, it must take longer for all genes to have their measure taken. Stated another way, when more genes enter the fray of competition, those already in competition may feel a decrease of selective pressure influencing their fate. Aspects of a person which were important in the tribal setting suddenly recede in importance, as other genes, which had been firmly established many generations earlier, resume their competition with alleles they had never before encountered, or had encountered long ago and had triumphed over. The coming together of ethnicities must introduce major changes to the set of genes that are subject to evolutionary forces, in terms both of which genes are in competition and the relative strength of selective forces upon specific genes. These considerations suggest that the pace of evolution has slowed in modern times.

Another slowing influence is the declining rate of infant and childhood mortality. Unless something important has been overlooked, these arguments suggest that the pace of evolution has slowed in modern times (Kondrashov, 1988).

Conservation of Selective Pressures: Pleiotropy and Polygenes

When selective forces suddenly reward a new capability the species undergoes a quick disintegration in other, more recently-acquired capabilities. This is due to the random, unintended deleterious effects that any mutation produces, which places a brake on the speed with which new capabilities can be acquired.

To understand this, recall that a gene has many effects, referred to as pleiotropy. This is most dramatically illustrated when a mutation occurs that has no redeeming consequences. For example, one mutation causes its carrier to have 6 fingers, short stature and heart murmurs (Ellis-van Creveld syndrome). These phenotypic effects are seemingly unrelated, yet they are caused by just one allele. Mutations that are adaptive, judged by the fact that they have been selected during the course of evolution, will also have many effects, with perhaps just one of them being adaptive to a far greater extent than the numerous, small negative effects. Thus, whenever a mutation occurs and confers an increment of adaptive advantage, its future in the gene pool will depend not only on how well it performs its adaptive task, but also upon how many unintended, deleterious effects come with it.

Assuming for the moment that there are only 40,000 genes in the Human genome, since there are more than 40,000 properties defining a human, each gene must have more than one beneficial effect. This implies that after a gene is "in place" it can be modified over time to produce more desired effects. An "old gene" may thus have

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several beneficial effects, in addition to a few small negative ones. The selection of a modified, dual-purpose (or multi-purpose) gene must occur with "painful slowness" since the original function of the gene should not be disturbed appreciably, and since every mutation is likely to produce other unwanted effects. To get things "just right" must require many generations and many small compromises.

Whenever a new selective force becomes important, the other selective forces must lose importance, else the population will drop to dangerous levels. This "partitioning" of selective pressure leads to a more conservative behavior of our genome, causing already established gene alleles to remain longer than otherwise.

By the same reasoning, a recently-established gene allele is more likely to be disrupted with deleterious effects than a long-established gene allele. This "genetic entrenchment" is due in part because of the rewards of redundancy for genes that are important enough to respond to selective forces for long periods of time. A task that must be done by a gene will be less vulnerable to mutation to that gene if it has been exposed to mutations and selection for a long time. In addition, genes that exist for a long time may become "depended upon" by other genes that are selected after the first gene and which in some way depend upon the presence of the first gene for its new effect to be expressed properly. When two or more genes must be present to produce a specific phenotypic trait that has adaptive value, those two or more genes are referred to as a "polygene" group. Genes that are members of a polygene are more difficult to get rid of, provided they have not become harmful. New genes have not had this opportunity to achieve robustness, or become entrenched, and they are thus more likely to be lost by random mutations because they are likely to have small phenotypic consequences. The concept of "genetic entrenchment," and a culturigen counterpart to this concept, is treated at greater length in Chapter 21.

Brain Genes

For humans it has been estimated that at least 20% of the genome influences the brain. This is not to say that 20% of human genes are present exclusively for brain wiring, since many genes will exist mainly for other purposes which have "acquired" brain wiring roles. If one of these genes mutates it is more likely to affect its new brain task than the older, original task. Undoubtedly some genes are mostly brain-related, and probably some genes are exclusively brain-related. Whether a gene is partly, mostly, or exclusively brain-related, if it recently acquired this role it is likely to be more vulnerable to random mutation than the other parts of the genome, or to older genes that mostly affect anatomy or physiology.

Parts of the modern human brain evolved during the past 100,000 to 200,000 years, and some people speculate that for the past 40,000 years little has changed. I will argue later that brain genes continue to evolve in response to changing social conditions, which add in subtle ways to the repertoire of human behaviors. For now, I merely claim that behaviors which are uniquely human, and which are recently evolved, are most vulnerable to disruption by the appearance of new selective forces.

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If a new adaptation has been selected for strongly, it might acquire robustness even in a relatively short time. Human language, which may have appeared 200,000 years ago, is a candidate example. Language played such a crucial role during its evolution that the genes that code for it are probably already robust.

The capacities for reading and writing have a briefer evolutionary history, and the genes that code for these abilities are more vulnerable. Until recently, few people engaged in reading and writing. These genes provided a niche to only a small fraction of the population during the past 4000 years. It is therefore not surprising that dyslexia affects several percent of the population, whereas verbal language impairment is virtually unknown.

Unintended Deleterious Effects

I suffer from occasional 20-minute blind spells, called "scintillating scotoma." It is an impairment produced by a gene that in women produce migraine headaches. As I type with difficulty through a flashing zig-zag blind-spell pattern, it occurs to me that I am paying a penalty for some genetic mutation that is doing good somewhere else. Every mutation does many small bad things for every big good one, and the sum of bad ones found in most people must be worth their penalty; otherwise the gene allele would not have evolved.

In the case of my blind-spells a dilated blood vessel is putting pressure on a nerve fiber carrying signals from my eyes to my brain's occipital lobe. What if the dilation occurred elsewhere within my brain? I might not know that it was occurring since I could not see it. But it might nevertheless have subtle effects upon mood or thought. There must be people, probably many people, who do indeed experience mild mental afflictions, lasting 20 minutes for example, which are counterparts to my scintillating scotoma. We should be prepared, then, for the possibility that a certain amount of irrational human behavior is caused by genes that are conferring a greater adaptation benefit in some other behavioral realm, with the unintended side effect that behavior is mildly irrational in a different realm.

I frequently think about the penalties that are paid when evolutionary pressures for one trait rise above the others. Sure, you can quickly evolve skin color in response to latitude migrations, but you'll pay with other unintended defects that accumulate, until the new skin has been achieved and a better balance of evolutionary forces has been established.

Only 12,000 years ago, just after the climate warmed but before the glaciers had melted enough to raise the world's sea level, people in Siberia migrated across Beringia to the new world. As they moved south, generation after generation they would have lost their need for light skin. Central American Indians are dark-skinned, and this must have been achieved in less than 10,000 years. But those who continued their migration southward, past the equator, they would have needed to re-achieve light skin. Perhaps at each migration juncture those who were best adapted to the latitude stayed behind and the others continued the migration. This could have

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minimized the risks of unintended deleterious mutations, but it is more likely that the southward migration was so hurried that skin color played no role.

Such fast adaptations must have produced defects in other aspects of the American Indian. Perhaps they lost the ability to metabolize alcohol; we shall probably never know what compromises the genes had to make to adapt quickly to the need for a different skin color.

Cancer may afflict humans more than most other species because we have recently undergone a rapid evolution under strong selective forces that rewarded brain re-wiring (to accommodate behavioral adaptations) and immune system enhancements (to fight pathogens seizing the opportunities offered them by the newly evolved super-tribe human lifestyle). To achieve these new traits, genes must have been selected that would normally not be acceptable because of their unintended deleterious effects, and a defense against cancer may have been one such compromised ability.

The Dangers of Fast Evolution

Species evolve at different rates. Even a given species may remain genetically static many generations, then respond to an abrupt change in climate by evolving fast. Rates of change must vary by orders of magnitude, with long eras of equilibrium punctuated by short periods of disruptive change. Mammals lived throughout most of the dinosaur era, and flourished only after the meteorite impact of 65 million years ago (which killed the dinosaurs because of a brief, disruptive climate change lasting several years).

The equilibrium periods are available for "clean up" of unintended deleterious effects created during the fast evolving times.

The great diversity of human anatomy, relative to other animals, testifies to the great potential for fast human evolution. Strong selective forces must have superceded such things as head shape, for example.

When a species is suddenly subjected to a strong selective pressure, a few gene sites will suddenly grow in importance. More than two alleles may exist at each "hot" site (if only one allele exists, it won't be a site for selective pressure). Other sites, being relegated to lesser importance, are likely to accumulate mildly deleterious mutations with less consequence than before the fast evolution (to use a metaphor, it's as if no one is "minding the store" when a new one appears). Humans, who have been evolving fast for the past 7 million years (since separating from the chimp lineage) must have many multi-allelic gene sites. The more alleles that are in competition, the greater the fraction of maladaptive offspring. Thus, the faster evolution occurs in response to some new selective pressure, the greater the likelihood of a low offspring survival rate in order to prevent a proliferation of the unfit.

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Is it not ironic that today, after coming out of a phase of extremely fast evolution in several traits, humans have just achieved what must be the highest offspring survival rate ever? Does this not mean that humans also must be exhibiting the greatest rate of survival of maladaptive individuals? How long can this last? This topic will be returned to in Chapters 6 and 8.

Lag and Regression

An abrupt environmental change, such as those at the onset of an interglacial (occurring every 120,000 years, typically), must set evolution in motion in new directions. Until a new "optimum" has evolved, producing stasis (and genetic consolidation), there will be "lag." Some things are easier to evolve than others, and they will lag less. Skin color may be one example.

Because adaptation takes time, there could be a lag in many traits after an environmental change. Present aspects of human nature should "make sense" only in the Pleistocene context, not necessarily in that of the Holocene (the past 12,000 years). For this purpose it has been useful to create the term "environment of evolutionary adaptation" (EEA), also referred to as the Ancestral Environment (AE). Common behaviors that were adaptive 20,000 years ago need not be "adaptive" today (Symons, 1979).

The Yanomamo Indians of South America appear to be more "primitive" than their Asian stock who began migrating to the New World ~12,000 years ago. How can this happen? Could the forces of evolution actually cause a population to regress? Yes! And maybe this happened with the Yanomamo. Their regression is only in relation to what was adaptive in their former setting. By definition, they must be better adapted to the Venezuelan jungle than were the original Siberian stock, or even the partially modified Central American Indian stock.

The longer the race, the greater the disparity between the contestants – especially between winners and losers. This is certainly true for a foot race, but is it true in evolution? Consider that our ancestry traces back to a chimpanzee-like animal 7 million years ago, or 2 billion years ago to a one-celled life form, and 3 or 4 billion years ago to strands of DNA. Things like those early DNA strands may exist today, as do many one-celled life forms that may resemble those in our ancestry. So "yes," the longer the race, the greater the spread between the evolutionary contestants (note that all extant living forms are "winners").

In human affairs there is a discernible spreading in the quality of life of winners and losers. The most prosperous people of today have a higher standard of living than the most prosperous of yesterday, yet there are people living today who are no better off than the worst off yesterday. Can there be stability in a world where the rich get richer, and the poor stay poor? This is a topic for Chapters 11, 14 and 16.

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Evolutionary Reversal

Random mutations rarely produce benefits to the individual organism (*i.e.*, for the ability of the organism to stay alive, out-compete its contemporaries and to out-reproduce them). A mutation that alters a gene is likely to have effects on many phenotypic traits (pleiotropy), and usually all or most traits suffer from random mutations. For a mutation to succeed, it must confer some advantage that outweighs damage done to many other traits. "Forward" evolutionary change is thus difficult.

After a genetic mutation spreads throughout a gene pool, it becomes part of a genetic setting that new mutations must deal with. If a new mutation relies upon the presence of the first one, and if this second mutation also spreads throughout the gene pool, then the first gene has a more secure future. This occurs because any challenge to the first gene must confer an advantage that outweighs the contributions of two genes - the first one and the other gene that relies upon the first one for its proper expression. The longer a gene stays within a genome the greater is the chance that other genes will become dependent on it and therefore provide it with additional security. When this happens, the gene has become "entrenched."

Consider the situation of environmental change that reverses itself at some later time. The first change may lead to the appearance and widespread acceptance into the genome of a mutation. Let us assume that this new gene, which has almost completely displaced an older one, confers an adaptive advantage in the new climate. Suppose, now, that before this new allele has time to become entrenched, the climate changes back to the original state. The few individuals who carry copies of the original gene allele will become a source for the quick re-emergence of the original allele. Evolution can be said to have "reversed" itself.

If the second climate change occurred much later, however, this evolutionary reversal might not be feasible. First, the original allele may have disappeared, and second, other genes may have become dependent upon the presence of the new allele, making it more difficult to dislodge from its entrenched location. In theory, both difficulties for an evolutionary reversal can be overcome, but they may constitute an insurmountable obstacle to the reversal.

Laboratory evidence exists for "reverse evolution" (Teotonio and Rose, 2000). Fruit flies from a standard stock were selected for various experiments over the course of 20 years (200 generations) and were subjected to new environments to produce variant strains. When fruit flies from these new strains were subjected to the original environment, in every case reverse evolution was observed. In two cases, the reversal was almost complete after only 10 generations; others required 50 generations. In some cases the amount of reverse evolution was small.

At every instant of a species evolutionary history, the most vulnerable genes are the most recently-acquired ones. This concept will be returned to in later chapters.

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Culture can be thought of as a collection of "culturgens" or "memes" - similar to a genome being comprised of a collection of genes (Lumsden and Wilson, 1981). Although some similarities exist between genetic and cultural evolution, the differences are striking. This topic will also be dealt with in a future chapter (Chapter 16), as a unifying theory for understanding the rise and fall of civilizations.

Mutational Load

Although the idea of "mutational load" was described by Kondrashov (1988), we owe H. G. Wells its first brief expression (ironically, in the same journal, almost 100 years earlier). In 1895 Wells wrote: "Has anything arisen to show ... that where the life and breeding of every individual of a species is about equally secure, a degenerative process must not inevitably supervene?" (Wells, 1895).

Primitive people today produce about 7 offspring per woman. Allowing for slightly shorter life spans in past times, about 6 offspring per woman was normal. On average, only 2 survived to adulthood. Is it possible that some of the 4 who died were genetically inferior? Yes, of course.

Approximately half of all conceptions fail to produce a live birth. It is speculated that the half that die are genetically defective due to some incompatibility between the paternal and maternal alleles. It is a small step to suggest that there will be a residue of live births that are also destined to fail to survive childhood due to genetic defects. If this is true, then what would be the genetic consequences of intervening medically to sustain all live births through childhood and into adulthood?

If some of the 2/3 of live births that formerly died were due to genetic defects (a fraction derived from the ratio of childhood mortality rates in primitive and modern societies), and if all live births now live a full and reproductive life, then surely the genetic defects which they carry will be contributed to the gene pool in larger numbers than would have occurred in the ancestral environment (AE). Our gene pool must inevitably accumulate these defective genes at a higher rate than in the past. This phenomenon is called "genetic load" (Kondrashov, 1988).

It may be impossible for a species to average only one offspring per adult for a long time. With no excess of births, the downward pulling force of "genetic load" would degrade the gene pool of the species. Therefore, the survival ratio must be kept well below one if humanity is to maintain a healthy genetic future! We who survive without serious genetic defects should be grateful to those less fortunate, whose deaths in the past made us possible.

I feel sorry for the bent masses of future people, for they will suffer from cruel disabilities that were traditionally weeded out by the neglect of less benign times in the AE. Humanity reaps what it sows, and it is sowing the wrong genes ever more often and preserving defective offspring with an excess of unthinking compassion.

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Compassion can be a double-edged sword. What seems laudable for one generation may in fact create unlaudable consequences for many future generations. I shall return to this moral dilemma in Chapter 15.

CHAPTER 5

GENETICS TUTORIAL - PART III

Adapting to Novel Environments

I want to distinguish between "outlaw genes" and those that are innocent by virtue of a changed environment. The genes that reward eating sweets are usually mal-adaptive in today's setting, but in the ancestral environment (AE) they were adaptive. If we moderns lived in the AE we would categorize the sweet-tooth genes as helpful to individual welfare as well as genetic welfare. This concept can be illustrated using something that is well known in the remote sensing field called *statistical retrieval theory*. This is described in Appendix C; a very brief description is given here.

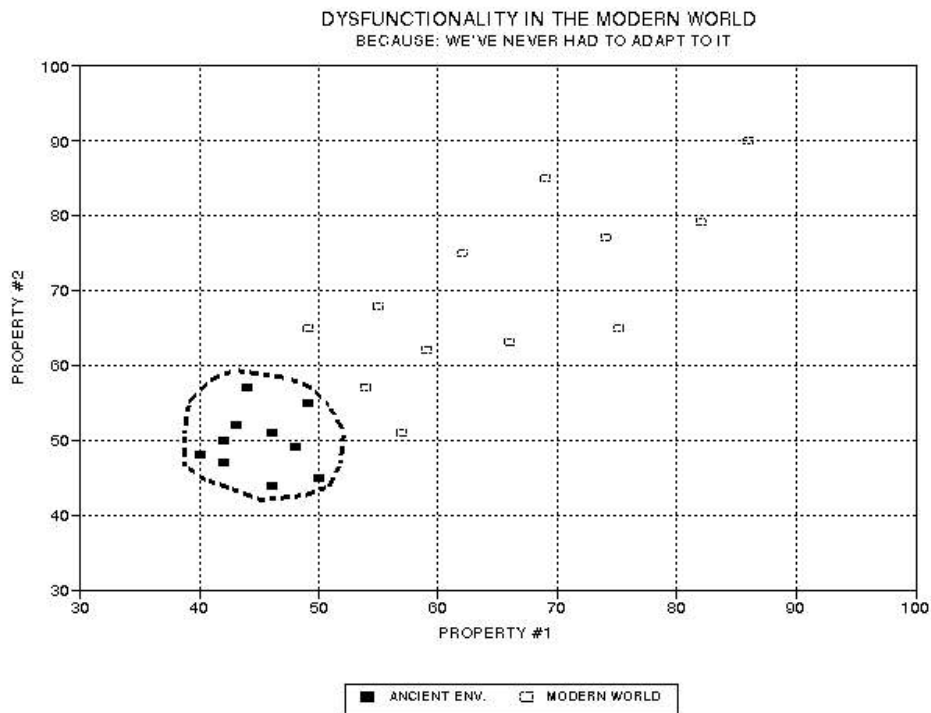


Figure 5.01 The filled square region contains environments, physical and social, that have been encountered in the past by our ancestors, and for which we are adapted. The open square symbols represent modern world environments which humans are experiencing for the first time, and for which we may not be pre-adapted. This is a mere 2-D representation of a many-dimensional world environment.

The basic concept is that evolution creates organisms that are relatively well-adapted to their AE, and when the environment abruptly changes to something that the species has never experienced the individuals are likely to be mal-adapted in ways

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that cannot be easily imagined. In theory the individuals could be better off in the new environment, but it is more likely that they will be worse off.

In the above figure, think of the region in which the solid square symbols are found as corresponding to one climate regime, such as a jungle environment, and think of the open squares outside that region as representing the environmental conditions for another climate regime, such as the glacier's edge. When our human ancestors migrated northward from Africa into Europe they were moving from one environment to another, and some of their genes had to "adapt" (be replaced). One of the genes that adapted controlled skin pigmentation. Others were nose length, eye color, hairiness, stature, etc. After the adaptations were essentially accomplished, the new set of genes achieved a better performance in the new reality space. It could be said that the new race of people were comfortably within the environmental regime "outside" the environment from which they originated (indicated by the dotted circle and solid squares in the above figure).

Adapting to Changeable Environments

There is also the matter of having to adapt to a climate that has greater annual variations. At mid- and high-latitudes the seasons are more pronounced than in the tropics; a tribe of people who must endure climate extremes during the course of a year will have to adapt to a wider range of conditions than a tribe that lives in the tropics. Cro-Magnon man, who evolved adaptations for the mid-latitude climate extremes in Europe, must have made the compromises that rendered him less than perfectly adapted to hot summers and cold winters, yet able to survive in both. A region that is subject to periodic climate changes, which occur faster than the time needed for the gene pool to evolve a new adaptation, is in effect a region with a bigger reality space to which the genes must adapt.

For another example, El Nino weather patterns repeat every 4 to 7 years, creating at some mid-latitude regions shifting amounts of rain, temperature and other seasonal properties. It is unclear how long El Nino/La Nina cycles have been occurring, but this is a convenient example for illustrating how our ancestors who had left the jungle may have had to deal with wide ranges of reality space. When the genes adapt to climates that shift back and forth on timescales that are shorter than evolution can track, the adaptation will have to be for the entire range of climates and fauna. However, if the range of settings is large, penalties will grow for life within each setting.

Tolerating Diversity as a Solution

One way the genes may have solved this problem is to "tolerate diversity." In any diverse population some individuals are likely to be pre-adapted to never-before encountered environments. This is a "group selection" argument. Populations that are relatively isolated compete without coming in contact by merely surviving or perishing when environmental conditions change wildly. We can speculate that those that survived will be the ones that tolerated diversity, given that some of their

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members were pre-adapted for future conditions. Such populations would be especially pre-adapted for climate changes that had never occurred in the past. The drastic climate fluctuations that occurred during the transition from Pleistocene to Holocene (18,000 to 10,000 years ago) would have been relatively unprecedented (a similar period of climate change occurred at about 120,000 years ago). Thus, the introduction to the Holocene may have favored those tribes that were inherently more tolerant of diversity.

Evolution of Behavior Repertoires

Most environmental changes are repetitive, such as the El Nino/La Nina cycles. Environments that occur at intervals of less than 10,000 years, for example, are candidates for another genetic solution, described next.

When an environment changes wildly a person may take a reading of present conditions, which could be climate, population density, food scarcity, or social setting, and then change behavior in response to the perceived change of setting. Humans have a larger repertoire of behavioral responses to situations than any other animal! Humans whose ancestors have encountered a variety of distinctly different environments may have unknowingly prepared their descendants for a faster “within a lifetime” adaptation to any of these environments compared with humans who have never encountered the same range of environments. This is asking a lot from natural selection, for we are assuming the creation of individuals who are pre-adapted in a very sophisticated way to environmental change. These people are capable of instinctively responding to a specific environmental change by changing their behaviors in a specific manner that is adaptive. Is it asking too much to invoke the evolution of this capability?

In essence, we're asking if natural selection can evolve a human brain that has circuits that do the following: "IF (this setting) THEN (employ that behavior or lifestyle)." These circuits are analogous to the human immune system's large repertoire for doing "IF (this pathogen) THEN (employ that immune response)," as pointed out by Gazzaniga (1997). We know that the human immune system is immense, so the evolution of the capability is apparently possible. Its evolution may have been forced by the coming together of tribes to form large settlements, and eventually urban centers. Some diseases flourish when population density is high, or when the population size is large. These new diseases would reward people with more capable immune systems.

I am suggesting that humans today are prepared to read their setting and shift their behaviors, and even their group's lifestyle, in a way that is adaptive. An extreme example would be a tribe that is sedentary when the environment produces abundant supplies of food, but switches to a hunter/gatherer mode when the environment is less bountiful. When the switch occurs, requiring a new lifestyle, many things related to behavior might have to change - such as marriage customs, property ownership, status hierarchies, etc. The genes would simply code for a switch-over in many behaviors in response to a new perceived setting.

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Our ancestors probably encountered many environmental changes, especially during the Holocene, presenting many opportunities for the genes to develop a reliance on requiring lifestyle mode changes based on a perception of "conditions." The adaptation to variable environments would simultaneously have rendered us physically adapted to no one environment in particular, giving us the appearance of inferiority to other animals, which are well adapted to narrower range of environments. The human brain, on the other hand, has become capable of switching between a large repertoire of behaviors, and when a mode switch is made correctly, the new lifestyle can be well adapted to the new environment. These factors are ideal for the creation of "culture" - which allows for quick behavioral "adaptations" to environmental changes.

How lucky for humans if a fluctuating environment produced mental abilities for adjusting behavior that were made available to the challenges of non-environmental changes. It must be common for a mental "tool" to be created in response to one challenge and only later become useful for other tasks.

Risks of Behavior Repertoires

How unlucky for humans if this same capability for achieving adaptive changes in lifestyle by "taking readings" of one's setting could render civilizations vulnerable to "opportunistic" individuals. This speculation is dealt with in Chapter 11, 14 and 16.

The mismatch between the modern brain, evolved for an ancestral environment, and the modern world, recently shaped by Man himself, is treated (but not from a rigorous sociobiological perspective) in the book *New World, New Mind: Moving Toward Conscious Evolution*, by Ornstein and Ehrlich (1989).

Later chapters will come back to this point, so for now just remember that the modern world is a man-made environment with very little of the ancestral environment to provide assurance that our living in it will appear to be adaptive, or even stable.

CHAPTER 6

EVOLUTION CONCEPTS AND HUMANS

"In a very real sense human beings are machines constructed by the nucleic acids to arrange for the efficient replication of more nucleic acids. ... We are, in a way, temporary ambulatory repositories for our nucleic acids."
Carl Sagan, *The Cosmic Connection*, Garden City, NY: Anchor Press, 1973.

Having described some basic tenets of genetics in the previous two chapters, we are now ready to undertake theoretical understandings of human behavior. It is important to keep in mind throughout the rest of this book that all behavior is the outcome of a competition among gene alleles for representation at specific locations on chromosomes. Thus, the "macro-behaviors" at the individual level, which will be the subject of the rest of this book, are the result of "micro-motives" at the gene level.

GEP

An individual's "phenotype" is "the way it is" - its anatomy, physiology and behavior. An individual's "genotype" (inherited genes) interacts with environment to produce the "phenotype." Thus, a person's phenotype is who the person has become, as opposed to who they might have become had their environment been different. This powerful concept (Symons, 1979) can be referred to by the equation: $G + E = P$, or GEP.

Anatomy includes, for example, stature, the height a person achieves in adulthood. In a society where food is plentiful, as for most people in the United States, stature is determined almost entirely by the genes. But in a society where food is scarce for some people and plentiful for others, stature is determined most strongly by food availability (the environment, unless the genes determine access to food).

Consider the case of Japanese stature before and after World War II. Children after the war grew taller than their parents. Between the generations the disparity in the availability of food was large, and this diet difference was large "in relation to" the genetic variation between individuals. Stature differences were determined almost entirely by environment. This example illustrates that if the variation of environment is large, environment can be the dominate cause of phenotype variation, whereas if the variation of environment is small, making the variation of genotype more important, genotype can be the dominate cause of phenotype variation.

Physiology includes, for example, immune response. The genes create an immune system that includes a repertoire of responses to specific pathogen stimulations. A virus will elicit an immune response that is appropriate if our ancestors were

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survivors of the same (or similarly-shaped) virus. The repertoire is limited by ancestor experience, so an individual is likely to be vulnerable to new viruses with novel shapes.

If the environment harbors the same viruses and bacteria that our ancestors survived, and if we are considering a stable population with no immigrants from other regions, then essentially all people who get sick will recover, and it will not be apparent that genotype is affecting phenotype (vulnerability to disease). But if the population includes immigrants from distant places, where there has been a different virus exposure history, there may be dramatic differences in who recovers and who dies from local sicknesses. The immigrants will be at a disadvantage when infected by local viruses and the native population will be vulnerable to any viruses brought by the immigrants. For dramatic illustration, old world explorers came to the new world and brought diseases that killed most people in the new world (Diamond, 1996).

The "behavior" component of phenotype is the most interesting, and the most challenging to understand. The "immune system's response repertoire" is a useful starting analogy for understanding behavior (Gazzaniga, 1992; Gazzaniga, 1997; Jerne, 1967). A "stimulus" in the environment can produce a "behavioral response," as when an abrupt approach of something to the face produces an eye blink. We blink our eye because we have ancestors who survived more successfully than those who didn't have the eye blink response.

A reductionist will want to employ the "stimulus/response" (S/R) explanation for behavior as much as possible. With effort, this approach at understanding behavior is broadly successful more often than is conventionally acknowledged. Since it is the simplest possible explanation type, it should be invoked as a first hypothesis.

S/R fails to account for behaviors that are self-initiated, *i.e.*, motivated behaviors. For example, this morning I decided to hike in the mountains in the afternoon. Planning a day's activities, as with life goals, requires something that in humans is identified as "prefrontal" cerebral activity, and a general sub-cortical "drive" mediated by a "reticular activating system" (as described in Chapters 7 and 8). The prefrontal cortex initiates broad goals, such as a career path, it initiates behavioral programs, such as preparing a speech, and it also initiates specific behaviors, such as talking.

I will argue that the "shape" of behavioral programs, and the "shape" of life paths, are initiated by brain circuits that we inherit. The specific behavioral programs, and specific life paths, are the product of an interaction between inherited brain circuits and the environment.

Not only is an individual's environment a changing thing (career opportunities, available books, current beliefs, etc), but the human environment can change dramatically from one generation to the next, and especially from one millennium to another. It is very likely that everyone was capable at birth of adapting to a hunter-gatherer lifestyle, as was common in the AE (ancestral environment).

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A human trait that seems to be common, such as "greed," may be expressed in only specific environments. A person born into a tribal hunter-gatherer setting, where there are few possessions (because it's hard to carry things from camp to camp) may grow up without expressing greed. The same person growing up in an agrarian society might be greedy. In other words, the person's "genotype" will interact with "environment" to produce a lesser or greater amount of "greed" (phenotype), which illustrates $G + E = P$.

There are limits to an environment's influence. This is easiest to illustrate using dramatically different genotypes, such as individuals of different species. We cannot make a snake behave like a cat just by cuddling it while it grows up. The snake is limited in what it can become. No amount of environmental adjustment will ever make a snake cat-like, because snake genes do not have cat behavior in their repertoire. Instead of $G_{snake} + E_{cat} = P_{cat}$ we are limited to $G_{snake} + E_{cat} = P_{snake}$. Although snakes and cats are different species, the GEP equation still holds. Illustrating this concept using such different critters the point is easier to understand.

In any population there is a variation of genetic predispositions, or genotype. Thus, given a fixed environment, there will still be a variation in phenotypes, and in this case it will be due entirely to the variation of genotypes. Where there is wide variation in the environment, even a uniform genotype will produce a variation of phenotype, and such variation will be due entirely to environment. The normal situation, of course, is for variations in both genotype and environment, which obscures the sources of observed phenotype variation.

Every population must have unfortunate cases of bad genotype coupled with bad environment. Whereas either one might produce a bad adult, together they could produce a really bad adult. (Do you think Attila the Hun may have been the product of bad genes and a bad environment? Was he maladapted from the perspective of his genes?)

IF/THEN Brain Circuits

It is reasonable to assume that each person inherits genes that pre-wire their brain to recognize situations that elicit appropriate behaviors (S/R) for situations that our ancestors repeatedly encountered and survived. Like any computer program with many IF/THEN sections of code, some of the IF/THEN code will not be used during normal experience. Indeed, most IF/THEN code that exists may only be used in response to rare experiences, especially so for humans, who have an unusually large repertoire of conditional behaviors and personality development paths.

Once a specific piece of IF/THEN code comes into existence, in response to a sustained period of selective pressure in which a recognizable situation occurs and responses have reliable benefits or costs, this piece of code can remain in the genome almost forever. If it later comes into conflict with a similar situation requiring different responses, then this old code will be modified or may disappear. Since the code that elicits a behavior is almost always produced by a combination of genes, if

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any of these genes are modified in response to other adaptive pressures the original code could inadvertently be modified. If this occurs, the gene pool would have to be exposed to the original adaptive pressures again to restore the original, or equivalent, IF/THEN code.

If it someday becomes possible to list the IF/THEN circuits in a typical human brain, we may wonder when and where each evolved. If this were possible it would probably turn out that most code sections were created during specific eras in our ancestry, with few (or no) recurrences. Each distaste may thus owe its existence to a time when we lived among a specific inedible plant. The plant might have existed for only a few centuries, during the past 2.5 million years of the human past, yet its IF/THEN legacy stays with us.

Many of our ancestors were nomads, living in wandering tribes. Behaviors required by nomadic tribal life are part of our repertoire, and if a "modern" non-nomad were raised in nomadic setting he might develop with the same nomadic functionality as present-day nomads. Settled farmers, living as single family units, are also part of our ancestry, probably confined to parts of the past 10,000 years. Each of us probably has the code necessary to grow up into fully functional, single-family farmer. Large settlement living must have been a part of some other of periods of our ancestry, confined perhaps to the past 5000 years. Each of us is presumably capable of becoming functional urban dwellers. Our large brains are "ready" for many lives that cannot all be lived!

Men Bear More of Evolution's Burden

Paternity success, as measured by offspring per male, exhibits a wider range than maternity success (offspring per female). Every tribe will have some males who don't reproduce, whereas it is rare to find women who are childless. For sexually mature women, after weaning an offspring she is likely to become pregnant soon after menstrual cycles return.

As with any species, whenever a dominant male controls access of other males to females, there will be a large disparity in breeding success among males. Harems were common in human history, and presumably pre-history as well. Even when males do not dominate other males, females are prone to prefer to breed with specific males.

Whereas women typically give birth to about 6 or 7 babies during their lifetime, with little difference between women, men may sire from zero to hundreds of babies! Why is there such a disparity?

The human ancestral environment is presumed to have been exclusively tribal. The men of most tribes, it is thought, engaged in hunting expeditions. It was also probable that they engaged in brief raids of neighboring tribes, as well as more dangerous inter-tribal warfare. Such male activities entail an extra burden of mortality. A man could die not only from combat, but from a mismatch of anatomy or physiology to

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climate. A man could also die by formulating less successful strategies in warfare, or by not adhering to a planned strategy requiring careful social coordination.

An extreme view of this situation is to state that the purpose for men is to go out and be measured. Those who come back, and especially those who come back as heroes, will have survived the measurement test, and the women shall deem them more valuable as potential fathers for their children. All women will prefer to mate with heroes than with the others. (It goes without saying that they won't mate with those who died in the process of being measured.)

Any man who refused to "play this game," to go out and be measured, could expect to be shunned by women - as well as by men. Such a man may even have been banished from the tribe (leading eventually to death). It has only been during the present interglacial (during the past 12,000 years) that alternative niches proliferated for the less adventurous man. Although there might have been a small, exempt class of weapon makers, most men could not have escaped the high-mortality life style.

Consider the first people who migrated from Africa to the mid-latitudes. Dark-skinned men would have fared less well, all other things being equal, than slightly lighter-skinned men, as the dark-skinned men would not synthesize as much Vitamin D. Vitamin D deficient men would be at higher risk of succumbing to the physical demands of traveling, hunting and warfare. On average, the lighter-skinned men would be more likely to return from exploits. The women, who stayed home, would be less affected by lowered Vitamin D, so their mortality would have been less affected than their male counterparts. After no more than 200 to 400 generations (based on the New World immigration experience), the entire group's skin would have evolved to a new, more adaptive color. This process would have been achieved by a differential survival of men, combined with a differential breeding success of men. Thus, the burden of adapting would have been borne more heavily by men.

Takeover Infanticidal Males

Male lions kill a female's young lion cubs after they overpower the male lions in a pride. Not only does this remove lion competitors for the male's offspring, but the female soon stops nursing, becomes fertile, and is available for mating with the killer male. We humans might think that a female lion would be upset to see her cubs killed by the new males, but amazingly, the female quickly makes the best of a bad situation by becoming coquettish with the killers. By these actions, the female increases the prevalence of the very genes that thwarted her initial reproductive investment; by favoring this behavior, which humans find so repugnant, the lioness helps shape the male genotype.

Infanticide by males has been documented for species of birds, fish, insects and mammals - such as rodents, carnivores and primates (Wrangham and Peterson, 1996). The following description is for primates.

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"Hrdy noticed an invading male charge after a mother, attempting to snatch away her baby. For several days, the other females in the group tried to defend the mother and her baby. But the male persevered, and finally managed to deliver a slash to the infant's stomach that left the intestines exposed. Taking the wounded infant to her breast, the mother looked up at the sky, as though in despair. 'It was the only time in my professional career that I wept.' // Because females are usually outmatched in the physical war between the sexes, they are helpless to protect their offspring against an infanticidal male. // Female gorillas respond to infanticide ... they leave the father who allowed their baby to be killed and run off with the murderous male. Infanticide, along with various female defenses, has been seen in 13 primate species. (Angier, 1983.)

We humans find such behaviors repugnant, so surely men do not act this way. Alas, they do! Studies of infanticide in Canada (Daly and Wilson, 1988a) and the United States (Daly and Wilson, 1988b) reveal that step-fathers are 75 and 100 times more likely to commit infanticide than are biological fathers.

In any species where males "take over" a female by overpowering the resident male and kill the offspring, females should evolve an aversion to males who cannot protect her and her offspring from takeover males. Thus, women should find weak and low-status males unattractive, in relation to strong and high-status males. This should be especially true for attractive women, who are more likely targets for takeover males. These predictions are borne out by "common knowledge."

Monogamy and Cuckolding

Monogamy, and the associated female faithfulness which monogamous husbands require, give every man a more or less equal influence on the next generation's genetic pool. This must retard the potential speed of evolutionary adaptation of that gene pool. Thus, the stronger the forces of evolution, the greater the reward for polygamy.

It would be surprising if the genes have remained blind to this. Women, for example, should sense when evolutionary forces are strong, and in response, they should seek consort with men who are "successful." If monogamy were the norm (which would have been more likely only during the past 12,000 years), then women should be expected to try to cuckold their husband (secretly mate with a man who is not the husband) in order to bear children carrying the more "adapted" man's genes. Since monogamy was probably rare before 12,000 years ago, in the human ancestral environment the need to cuckold was also probably unimportant before that time. Cuckolding, I suggest, is therefore a "recent" tool in women's behavioral repertoire.

Blood tests of Canadian and American families reveal a cuckoldry rate that ranges from 15% to 25% (see Christenfeld and Hill, 1995 for additional material). Presumably, cuckoldry rate varies with time and conditions in accordance with some optimizing algorithm created during the AE.

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Knowing the optimal time for a wife to cuckold her husband would have evolved during the time that societies became monogamous. Refinements in a woman's cuckolding wisdom would have improved the most when evolutionary forces were greatest. If a gene pool underwent a period of polygamous evolution, the previously gained cuckolding wisdom would have remained "ready" but not expressed until monogamy was restored. This is similar to the way an immune system accumulates a repertoire of immune responses, each specific one of which remains "ready" for expression when exposed to a pathogen that is "recognized."

Recent studies (Hazelton, 2006) show that women have a heightened interest in cuckolding their husbands when they are most fertile. This logical female strategy is matched by an equally logical male strategy of exhibiting a higher level of mate-guarding at the same time. The real challenge for women is to recognize when it is appropriate to cuckold, and with whom. As for "when," being in a monogamous relation is one precondition. Sensing that "times are tough" would be another (*i.e.*, evolutionary forces are strong).

As for "with whom" a woman must be capable of measuring her husband against other men. One measure of the successful man is "fashion"; the man who is sought by other women is likely to produce boys who will grow up to also be sought by the next generation of women - regardless of the intrinsic worth of the type. Another way to identify a good candidate is to determine who is dominant over whom. Men live much of their life within a male society, and the men who are most successful in male activities, such as the cooperative hunt, will be accorded privileged positions by other men. Women are sure to notice how men sort themselves while establishing the male hierarchy, and those who are esteemed by other men are good candidates for a cuckolding episode. Women who are fascinated by men's sporting events might be "doing their homework" for optimizing their future cuckolding.

The main effect of this increased attention by women to male worth is to increase the imbalance of reproductive activity among men; fewer men will account for a greater fraction of a generation's paternity. A secondary effect of this enhanced reward for whatever the forces of evolution deem important is to reduce genetic diversity. In a one harem society all offspring will resemble the harem master. If he is vulnerable to a specific disease, most children of the next generation will be similarly vulnerable.

Thus, there are risks to tribal organizations that give excessive reproductive rewards to small numbers of men. It is in a woman's genetic interest to not succumb totally to fashion; but it is always in a man's interests to be the most successful man and to dominate male reproductive activity.

Women understand that husbands should be loyal "producers" even though they should favor *other* men for cuckolding. There are "husband material" men, and then there are "exciting affair" men. Women are attracted to both types, but in different ways. A faithful husband type is attractive at the time a commitment is to be made, and the exciting affair type is less attractive at this time. Some time after marriage, however, women's interest in "affair men" should increase. Thus, women regard

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some men as good on long timescales, serving as loyal husbands and fathers, whereas some men are good for short timescales, serving as cuckold consorts to provide offspring with genes specialized in victimizing the next generation.

Men likewise automatically categorize women as good for the long term, serving as loyal wives and mothers, while other women are good for short-term consort. Men and women must automatically categorize each other as belonging to one or the other category.

Men and Women Shape Each Other

Men and women have made each other what they are!

Men have a greater variance in IQ, and we men also exhibit higher incidences of genetic deficiencies. For example, dyslexia (reading and writing problems) is most common among boys. This may merely be an effect of males exhibiting a greater genetic variance of recently-evolved traits (*i.e.*, men dominate both ends of the spectrum of most measures). Thus, there are more men geniuses, as well as more men among the learning disabled. Men are burdened by "high risk" mutation experiments that eventually benefit the larger population. Men appear to be more "expendable" than women.

To what extent are women responsible for making men genetically "fragile"? Women prefer men who "go out to be measured," and who come back with good measures. When women cuckold their husbands, they assure their male offspring a greater likelihood of being a cuckolding partner in the next generation. These women also assure that they will produce daughters who are prone to cuckolding their husbands. This occurs because the cuckolding males are likely to carry genes which predispose their girl offspring to cuckold when they are women, since they are likely to have been the result of women who cuckolded (this is a subtle argument).

Women shape men with every preference they express. If women favor men who are "travelers" (*i.e.*, vagabonds, minstrels, pirates), then each succeeding generation of men will tend to resemble travelers.

Why would women be attracted to travelers? When diseases are a principal cause of mortality, traveling men that women encounter are the ones who have immune systems with the best immunity to diseases beyond the village. This may account for girls going crazy for pirates, traveling musicians, and other itinerate roustabouts who have no long-term parenting value.

Birth Order

Frank Sulloway (1996) has presented an immensely well documented case for the influence of family birth order on specific personality traits. The theoretical argument for such an influence begins with the fact that in the ancestral environment children often died before reaching adulthood (approximately 2/3 of children perished).

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Surviving childhood requires that the child adopt strategies for maximizing parental investment. By this logic, firstborns should ingratiate themselves to their parents, and gain their favor by appearing to be good prospects for their investment. Firstborns should be obedient, conscientious, hard-working, and they should internalize the values of their parents.

Laterborns, noticing that there already exist firstborns who have acquired parental confidence by becoming what the parents want, must create for themselves a different identity. They must distinguish themselves from their older sibling by excelling in another endeavor, for if they tried to compete in the same arena, and became equally successful at comparable age, they would be destined to always be a worse investment prospect due to their age disadvantage. All other things being equal, older children are a better investment option because they've already survived more of the childhood risks, and they are closer to childbearing age. Thus, laterborns try to excel in things untried by the firstborn, and perhaps unfamiliar to the parents. Laterborns are more open to new experiences, and are more adventurous. As stated by Sulloway (pg 98), "...the addition that each child makes to the parents' inclusive fitness will tend to be proportional to the development of skills not already represented among other family members."

Firstborn boys followed by a laterborn girl are a congenial combination, since the girl is naturally inclined to have different interests than the boy. From the parents' perspective, both children are like first-borns and represent good investments.

Firstborn boys feel threatened by a laterborn boy. They are likely to fight, and the younger brother must become proficient with wit, words or some other clever strategy to compensate for his smaller body. The older boy will become accustomed to dominating his younger brother, whereas the younger brother will become adept in the use of social skills for minimizing the disadvantages of being dominated by the older brother. These effects appear to be maximum when the age difference is about 3 years (close enough in age to be competing for similar age-related niches, yet different enough that the younger is weaker and can be successfully dominated). Sulloway writes (pg 79) "Like the alpha males of primate societies, firstborns covet status and power. They specialize in strategies designed to subordinate rivals."

To the extent that Sulloway's birth order correlations are correct, women should prefer men who happened to be firstborns with younger brothers. They are more likely to be "masculine" and capable of protecting their wives from "takeover" males. On the other hand, these men are less likely to tolerate cuckolding wives, rendering cuckoldry a more dangerous option for the wife of a firstborn husband.

How confusing (at a subconscious level) this birth order "environmental monkey wrench" must be to women! Men who appear to be strong and domineering may be so merely because they had a brother 3 years younger. They can probably be counted on to protect them and their children from takeover males, but they will not necessarily provide "domineering" and "high status" genes to her offspring. Do

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women have methods for identifying "genotype-produced" versus "birth order-produced" dominant men? We await further studies in this young field.

Sexually Specific Morality

Women complain that men can philander with less consequence than women who cuckold. They attribute this disparity to the fact that men can get away with dominating women due to their greater physical strength.

The real reason for this duality of morality has to do with the difference in natural consequences for out-of-marriage mating. A philandering husband does not necessarily diminish his "paternal investment" value for his wife's children, whereas a cuckolding wife who produces illegitimate offspring necessarily does cause her husband's "paternal investment" to be squandered.

If it Feels Good, Beware!

What is the purpose of emotions? They are meant to influence behavior!

In the particular case of humans, emotions are meant to influence behavior in situations where rational thought is also likely to subvert the genetic agenda. Some behaviors are too important to be meddled with by rationality. The Australian redback spider, in which the male is prone to allow itself to be eaten by the female during copulation, is incapable of rational thought. A simple, automatic instinct suffices to assure that his gene-serving deed be done. But what about humans?

Humans think, and are theoretically subject to influence by rational thought. The genes, in their infinite wisdom, have created emotions to safeguard behaviors that serve their interests. Emotions are employed to protect behaviors that are threatened by rational considerations of individual welfare!

Emotions symbolize the conflict between "outlaw genes" and a thinking, rational individual. Therefore, if something has a feel-good emotional payoff, beware!

This theory implies that only intelligent creatures have emotions. It suggests that emotions were "invented" by the genes as a quick solution to a fast evolving human intellect. The genes could not know what rational threats lay ahead, in untried environments, or even newly endowed rational brains, yet they "learned" from past experience that certain actions were at risk of being overturned by individuals who cared more for individual welfare than being an obedient tool of the genes (of course the genes didn't "know" anything; it merely happened that those that safeguarded important behaviors from the influence of other gene mutations prospered.)

We will return to this subject in a later chapter.

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Consciousness

It is difficult, at this point in my argument, to avoid the problem of "consciousness." It is tempting to speculate that C, as consciousness gurus refer to it, was invented by the genes to mediate conflicts between an old instinctual brain, and a new rational one. To the extent that C grew in power, emotions must also grow in strength.

A common sense theory for C is that it "exists" whenever a novel situation demands that brain modules compete for control of understanding and behaving. C almost certainly is generated by the prefrontal cortex, possibly on the left side. Measurements of brain activity show that this area is active when a novel task is being confronted, whereas tasks that have been mastered during previous encounters are not associated with the same level of activation. These cortical activity measurements may have been detecting something produced by C.

Are humans more conscious than chimpanzees? There is growing evidence that chimpanzees "think" - in the way that people commonly think of thinking (Goodall, 1986, and Wrangham and Peterson, 1996). Chimpanzees appear to have something called "theory of mind," or knowing what other chimpanzees are likely to know, and this also would imply that they have C, at some level.

It is important that thinkers with a sociobiological approach address the consciousness problem, as most of the C literature is devoid of an appreciation that 1) genes construct brains, and 2) genes exist because they're good at surviving. Anyone else who tries to investigate C is handicapped at the outset.

Books that treat consciousness with an adequate respect for the reductionist paradigm include *Consciousness Explained* (Dennett, 1991), *The Illusion of Consciousness* (Wegner, 2002) and *The Quest for Consciousness* (Koch, 2004).

In the next chapter we will return to this issue, which deals with neuropsychology and evolution

CHAPTER 7

BRAIN ANATOMY AND FUNCTION

"...intellect arose merely to serve the will [genes]. Most men ... are incapable of any other employment of their intellect, because with them it is merely a tool in service of their will and is entirely consumed by this service..." Schopenhauer, Aphorisms (1851).

"Men think themselves free because they are conscious of their volitions and desires, but are ignorant of the causes by which they are led to wish and desire." Spinoza, Ethics (1677).

The brain is an organ meant to help genes survive, and in this respect it is no different from the heart, liver, and reproductive organs. A thinking brain may not like this assessment, and it may prefer to view the body and its organs, as well as the genes, as existing to serve the brain. But modern science, spearheaded by sociobiological insights, is once again forcing Mankind to move further down from his pedestal by discrediting another cherished belief. This chapter will describe brain anatomy and function. The next chapter will address their evolution.

Part of my intent for this chapter is to remove some of the "mystery" from how the brain works. I want to convey a sense that the brain functions like a "machine," and that living things are automatons, consistent with this book's reductionist approach.

Brain Anatomy: Vertical, Horizontal and Front/Back Layout

The human brain consists of a primitive hindbrain, a small mid-brain section, and a large and complicated forebrain.

The hindbrain, which began its evolutionary existence ½ billion years ago, resembles the entirety of a reptile brain, and has been referred to as our "reptilian brain." The hindbrain's "stem" connects to the body; it receives information from sense receptors and issues commands to muscles and body glands via the spinal cord. The hindbrain's cerebellum stores motor commands and produces smooth movements.

The mid-brain has a minuscule function, and won't be described here.

The forebrain, on the other hand, is where uniquely human attributes are generated. It includes a limbic system, thalamus, basal ganglia, and two large cerebral hemispheres. The limbic system has many components; it maintains homeostasis (body temperature, heart rate, blood sugar, etc), and controls emotional state (things like hunger, anger, fear and sexual arousal). The limbic system's pea-sized

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hypothalamus performs many of these functions using electrical commands, some of which activate hormone producing glands in the brain. The thalamus and basal ganglia control conscious state and initiate movement, respectively.

The cerebral cortex, comprising 70% of human brain volume, consists of a left and right cerebral hemisphere, with an interconnecting corpus callosum. Although the cerebral cortex is only 1/8-inch thick, its surface area is about 1 ½ square feet, and it has evolved a folded configuration to allow the surface to fit within the human skull. The inside surface of the cortex (gray matter) has an immense number of nerve fibers (white matter) providing connections to other parts of the cortex, the limbic system and other brain components.

The cortex is the most recently evolved part of the brain, and fortunately it is also the most accessible to study. The left cortex and the right cortex each consist of 4 lobes: occipital, parietal, temporal and frontal. The occipital "sees," the parietal "feels," the temporal "hears," and the "frontal" thinks and commands! The "see/hear/feel" lobes are referred to as "posterior lobes" (since they comprise the rear half). They can be thought of as "receptive lobes" since they receive input from the body and environment. The "see/hear" lobes receive "remote sensing" information (visual and auditory input), while the "feel" lobe receives *in situ* information (touch, temperature, pain and body part position). The frontal lobes, the front half of the brain, receives input from the posterior lobes, and they "think" about the situation, formulate action plans and issue commands to muscles.

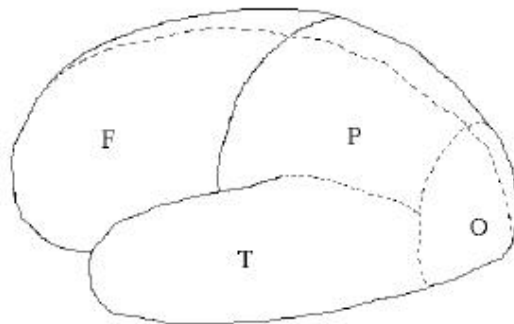


Figure 7.01. Brain lobes: Frontal, Parietal, Temporal, Occipital. View is of the left side, front is toward the left.

The corpus callosum (not shown) connects all four lobes of one side to the corresponding lobes on the other side. This nerve bundle is located underneath the frontal and parietal lobes, at about the same level as the temporal lobe.

Primary, Secondary and Tertiary Cortical Areas

Each of the 4 lobes, the frontal, parietal, temporal and occipital, consists of 3 cortical areas: primary, secondary and tertiary. These are shown in Fig. 7.02 using the numbers 1, 2 and 3.

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The part of the parietal lobe bordering the frontal lobe, area P1 in Fig. 7.02, is the "sensory cortex" (or "somatic cortex"). This strip of cortex is where *in situ* sensory signals from the body arrive. Next to the somatic cortex P1 is an area, F1, located in the frontal lobe and called the "motor cortex" or "motor strip." The motor cortex issues commands for movement (requests, actually, since sub-cortical regions may "veto" the requests).

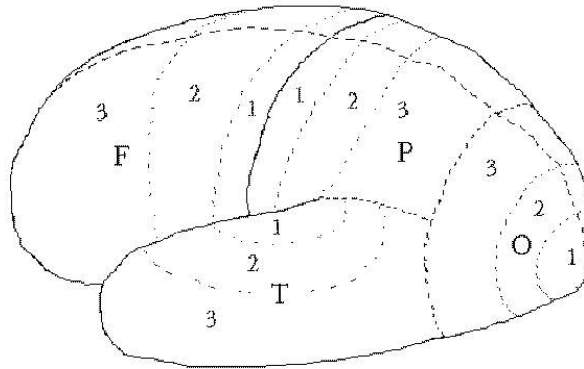


Figure 7.02. *Approximate boundaries for cortical primary (1), secondary (2) and tertiary (3) areas in each lobe.*

There's a one-to-one mapping of body location to position along the sensory cortex strip, P1, and motor cortex strip, F1. Starting from the part of the strips closest to the center-line (top of brain) and going outward, body positions are allocated in the following sequence: leg, neck, head, arm, elbow, etc, to face, lips, teeth and tongue.

For the posterior lobes raw sensory information arrives at the primary cortical areas, which deliver processed versions to the secondary areas, which in turn deliver even further processed versions to the tertiary areas. The 3 posterior lobe tertiary areas border each other, and this is where the most "conceptualized" versions of perceptions are inter-compared and elaborated.

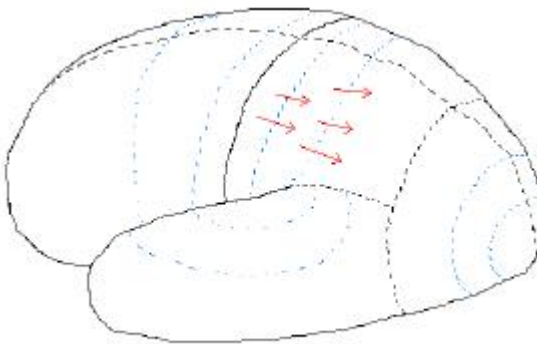


Figure 7.03. *Flow of nerve activity when something is "felt."*

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For example, when something is "felt" the flow of nerve activity "flows" according to the depiction of the figure above. When something is "heard" the flow of nerve activity "flows" according to the depiction of the following figure.

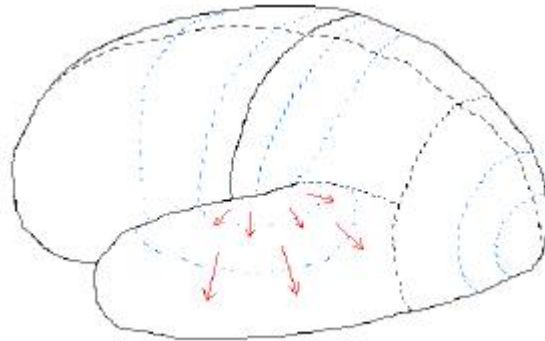


Figure 7.04. *Flow of nerve activity when something is "heard."*

When something is "seen" the flow of nerve activity "flows" according to the depiction of the following figure.

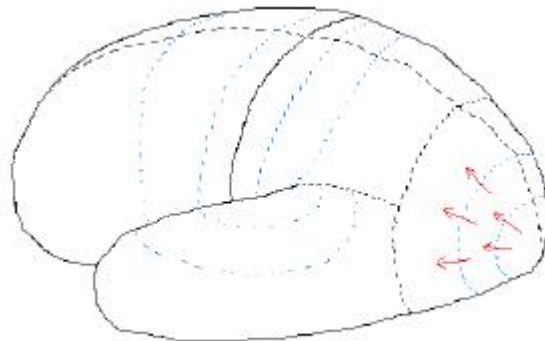


Figure 7.05. *Flow of nerve activity when something is "seen."*

For each posterior lobe the pattern of nerve activity is the same: primary activity leads to secondary activity, which then leads to tertiary activity. The next step is for tertiary activity in adjoining areas to "compare notes," or interact with each other.

Tertiary Cortex Convergences

When a familiar object is recognized a small set of tiny nerve circuits are set into "resonance." For example, when a coffee cup is seen, there's a flow of activity in the occipital lobe from primary to secondary to tertiary. When it reaches secondary cortex, *i.e.*, O2, there will be sub-features such as handle, rim, steam, etc "active" at their respective locations in O2 (created from interaction with the environment in

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childhood). These interact in O3 (occipital tertiary), setting into resonance a tiny circuit corresponding to "coffee cup seen."

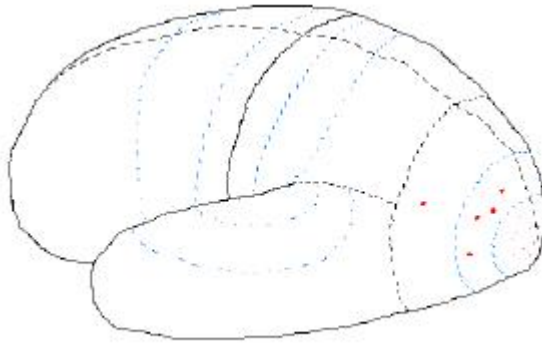


Figure 7.06. *Nerve activity when a "coffee cup" is seen.*

The same coffee cup can be felt. In this case the nerve activity will be as shown in the next figure.

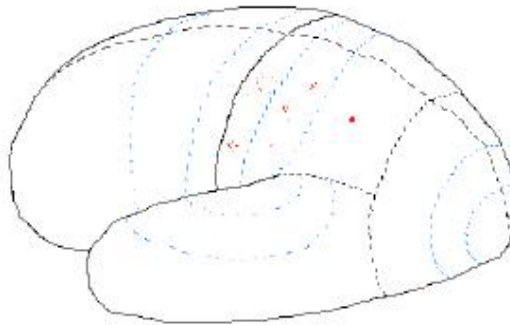


Figure 7.07. *Nerve activity when a "coffee cup" is felt.*

The coffee cup may be heard, as it is set down on a table. In this case activity will occur in the temporal lobe, such shown in the next figure.

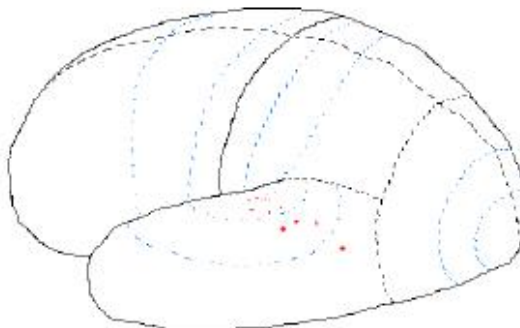


Figure 7.08. *Nerve activity when a "coffee cup" is heard, as for example being set down upon a table.*

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The concept "coffee cup" consists of the simultaneous activation of any, or all, of the three tiny regions in the three tertiary cortices of the posterior lobes. This is shown in the next figure.

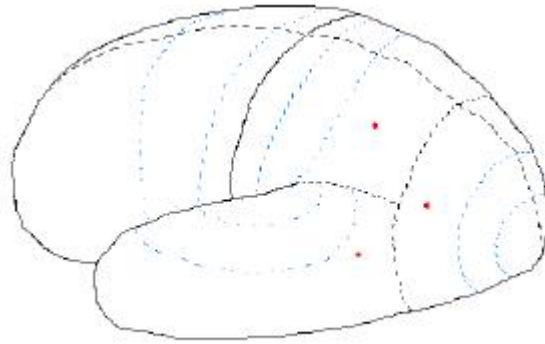


Figure 7.09. *Nerve activity corresponding to "coffee cup."*

The activity pattern corresponding to "coffee cup" depicted in Fig. 7.09 is said to be "generalized." That is, there are many specific ways a coffee cup can be perceived, and indeed there are many variations of coffee cup shape, appearance and sound, yet they all end up creating the one, generalized pattern "coffee cup."

Frontal Lobes

The brain not only perceives, it also generates movement. A movement that is thought about and later commanded is the result of nervous activity in the frontal lobes. There's a "reverse" pattern for this activity; the process starts in tertiary cortex, and proceeds in the direction of primary cortex. This is depicted in the next figure.

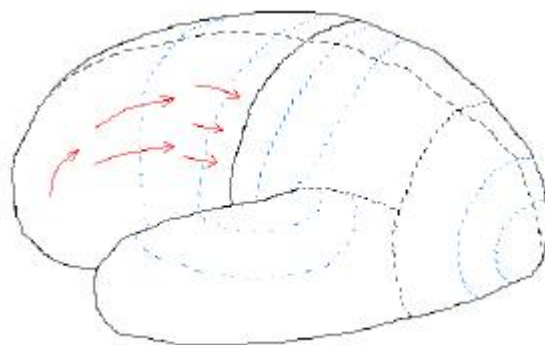


Figure 7.10. *Flow of nerve activity when some activity is planned and performed. The flow in this case is from tertiary to primary.*

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The frontal lobe architecture is analogous to that of the posterior lobes, in that the most conceptualized of ideas and plans are created in the frontal tertiary cortex, which delivers vague "executive" directives to the frontal lobe's secondary cortex, which formulates more specific action commands and delivers them (as necessary) to the motor strip. The motor strip requests permission from the sub-cortical "reticular activating system" (RAS), and if the RAS approves the request it is acted upon by sub-cortical brain areas (Luria, 1973), which carry out specific actions (orchestrated in detail by the cerebellum).

The frontal lobe's secondary and tertiary cortices are also referred to by the two terms "prefrontal" cortex and "pre-motor" cortex. The prefrontal cortex has undergone the greatest amount of recent evolution, according to arguments based on the increase in frontal lobe size versus phylogenetic location (*i.e.*, ratio of frontal lobe size to total cortex is greatest for humans, next greatest for chimpanzees, etc). Functions performed by the frontal lobes in humans are often unique, or most advanced, in humans, whereas most areas in the posterior lobes have pre-human analogues. The prefrontal lobes also reveal their evolutionary recentness by continuing to undergo rewiring until the age of 5 to 7 (Thatcher, 1997), and even the "late teens." Giedd and Thompson (2001) write "In late teens, the prefrontal cortex is the area that's changing the fastest..." (according to neuro-imaging studies). This is consistent with the general principal that "ontogeny recapitulates phylogeny."

Laterality

The right side of the body is commanded to move by the left cerebral hemisphere's (frontal lobe) motor strip. Likewise, the left side of the body is commanded to move by the right cerebral hemisphere. This left/right crossing-over architecture is also adopted by sensory input; sensory information from the right side maps to the left brain, and *visa versa*. The reason for this is still a subject for speculation. The corpus callosum, which interconnects the left and right cerebral hemispheres, allows for the coordinated movement of both sides of the body, and also allows for some of the computational results of specialized areas on one side to be exchanged with related areas on the other side.

Proto-humans probably had left/right symmetry, in the sense that the right and left cerebral hemispheres had identical capabilities, being mirror images of each other in layout. This would have provided redundancy in case one side was injured (by a fall or blow to the head). Modern humans have asymmetric brains: the left and right cerebral hemispheres, LB and RB, are somewhat different, and are "specialized" for certain types of tasks. RB has more long-distance inter-connections than LB, whereas LB has many areas that are highly intra-connected, which in turn are connected to other highly intra-connected regions within LB.

The best known of LB's highly intra-connected areas are Wernicke's Area (language comprehension) and Broca's Area (language production). Wernicke's Area is located near the interface of the three posterior lobes, in LB only (right-most pattern of dots in Fig. 7.11, upper). Broca's Area is located in the frontal lobe's secondary cortex, in

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LB only (left-most pattern of dots in Fig. 7.11, upper). There's a discernible pattern for the tasks performed in these specialized, highly intra-connected LB areas: namely, these tasks are inherently sequential, which means that the temporal order of events is crucial! For example, both receptive and productive language involves the processing of sequential events (sound perception and production). Changing word order can profoundly change meaning ("Ed ate the bear" versus "The bear ate Ed."). In contrast, RB tasks are holistic; they resemble those that a parallel computer processor (neural network) performs, such as instantaneous image recognition.

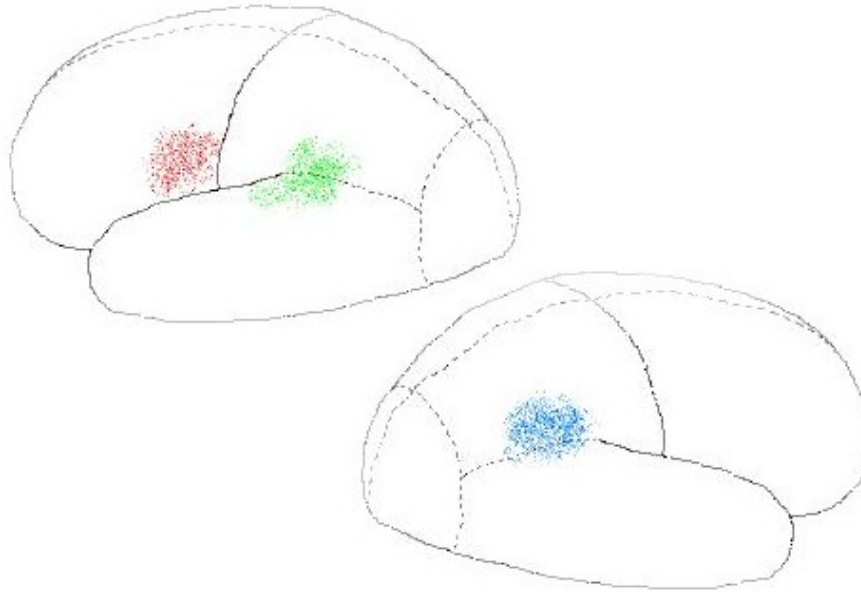


Figure 7.11 Upper panel shows location of language comprehension area, Wernicke's Area (right-most pattern of dots), and speech production area, Broca's Area (left-most pattern of dots). The lower panel shows the location of the inferior parietal lobule, IPL, which monitors the spatial relationship of body parts in relation to the immediate environment.

It is interesting that RB's counterpart to Wernicke's Area, shown in Fig. 7.11 (lower panel) is devoted to the task of monitoring the location of body parts in relation to each other and the immediate physical environment. This area, called the "inferior parietal lobule," or IPL, plays a critical role during manual interactions with the environment, such as reaching out to pick fruit from a nearby branch.

It is tempting to conjecture that before humans were capable of speech the left hemisphere's IPL counterpart region also functioned like the present-day IPL in RB. Because reaching out to pick fruit had sequential components, it would have been natural for mutations to modify what once was an LB IPL in a way that later presented an opportunity for further modification that led to a simple form of language capability. This region must have been built-upon to produce our present-day Wernicke's Area, which plays a critical role in language comprehension.

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This task consists of monitoring the relationship of sound percepts to each other over time, somewhat similar to the way the RB's IPL monitors body part relationships over time. As Wernicke's Area evolved in LB, it must have gradually displaced the former IPL function.

A great deal of public interest was generated during the 1970s and 1980s by reports of LB and RB differences, or lateralization. For example, RB is described as being intuitive, holistic, inductive, timeless, visuo-spatial, non-verbal and pessimistic, whereas LB is described as being verbal, analytic, logical, rational, time-oriented, deductive and optimistic.

Traditional psychologists must have resented the newcomers to their field who used instruments to measure things, and who used rigorous techniques to study long-standing matters that had been the subject of arm chair speculation. The old-fashioned psychologists accused those who studied split brain patients, and found LB and RB differences, as suffering from "dichomania" – as if the new investigators were over-interpreting their data due to an excess of enthusiasm. But the data is convincing, and often dramatic.

When LB is damaged (or when it is temporarily disabled by sodium pentathol injected into the left carotid artery) the patient's speech capability is almost non-existent. Curiously, though, the still-functioning RB does what it's able to do speechwise: the patient can swear, utter emotion-laden pat phrases, sing songs with the right words, and recite the alphabet. RB cannot (usually) put together a sentence, since grammar capability resides in LB.

Occasionally, a patient whose corpus callosum has been cut can still manage to communicate in a simple way using the rudiments of grammar. These cases offer very interesting insights into the differing "personalities" of LB and RB. One famous example was reported by Gazziniga (1978) which suggests that LB and RB can have different goals in life. Their oft-used subject P.S. was questioned about his job choice in an experiment that allowed only RB to answer, and "automobile race" was spelled out. As Gazziniga writes "This is most interesting, because the left hemisphere frequently asserts that he wants to be a draftsman" (p. 143). How poignant!

Chicken Claw Experiment

My favorite illustration of the independent operations of LB and RB has been referred to as "the chicken claw experiment." This experiment was conducted by Michael S. Gazzaniga and Joseph E. LeDoux using patient P. S., who had undergone a full callosal surgery (cutting of the corpus callosum, interconnecting LB and RB) to control seizures. I shall quote from descriptions appearing in two books: Gazzaniga and LeDoux (1978) and Gazzaniga (1985).

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Two problems are presented simultaneously, one to the talking left brain and one to the non-talking right brain. The answers for each problem are available in full view in front of the patient. Gazzaniga and LeDoux (1978).

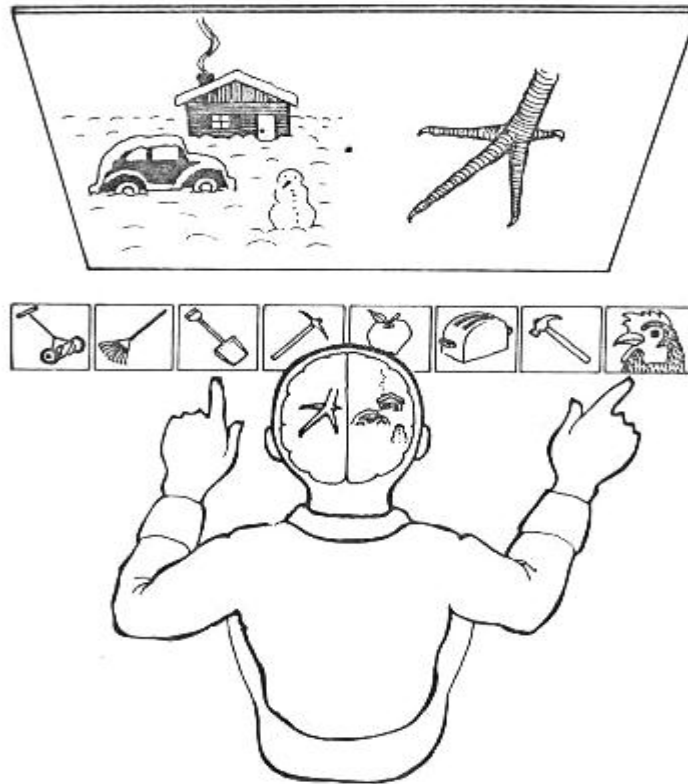


Figure 7.12. “Chicken claw experiment.” The “task” (top) has two parts, presented to a brain half. The answer choices, below, are in full view to both brain halves.

...the experiment requires each hemisphere to solve a simple conceptual problem. A distinct picture is lateralized to one hemisphere: in this case, the left sees a picture of a claw. At the same time the right hemisphere sees a picture of a snow scene. Placed in front of the patient are a series of cards that serve as possible answers to the implicit questions of what goes with what. The correct answer for the left hemisphere is a chicken. The answer for the right hemisphere is a shovel.

*After the two pictures are flashed to each half-brain, the subjects are required to point to the answers. A typical response is that of P.S., who pointed to the chicken with his right hand [controlled by the **left** brain] and the shovel with the left [controlled by the **right** brain]. After his response we asked him, “Paul, why did you do that?” Paul looked up, and without a moment's hesitation said from his left hemisphere, “Oh, that's easy. The chicken claw goes with the chicken and you need a shovel to clean out the chicken coop.”*

It is hard to describe the spell-binding power of seeing such things.

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My interpretation is that the normal brain is organized into modular-processing systems, hundreds of them or maybe thousands, and that these modules can usually express themselves only through real action, not through verbal communication. Gazzaniga (1985).

... a basic mental mechanism common to us all. We feel that the conscious verbal self is not always privy to the origin of our actions, and when it observes the person behaving for unknown reasons, it attributes causes to the action as if it knows, but in fact it does not. It is as if the verbal self looks out and sees what the person is doing, and from that knowledge it interprets a reality. Gazzaniga and LeDoux (1978).

Frontal Lobes

The frontal lobes play a key role in orchestrating behaviors associated with LB/RB specializations. For example, RB prefrontal (RBF) originates emotional outbursts, whereas LB prefrontal (LBF) works to produce socially responsible behavior. The limbic system appears to be more strongly connected to RBF, and uses it to elaborate emotionally driven behaviors. LBF, on the other hand, appears to be the seat of the "conscience" and inhibits any RBF desires for socially inappropriate behaviors.

This was dramatically illustrated by the famous case of Phineas Gage, who suffered a railway construction accident in 1848 that caused a metal tamping rod to explosively penetrate and destroy his LBF (and a small part of RBF). Without the inhibiting effect of LBF upon RBF, his behavior was "fitful, irreverent, indulging at times in the grossest profanity... at times pertinaciously obstinate... he has the animal passions of a strong man." (Harlow, 1868). This old example illustrates the well known finding that RB's language ability is usually limited to profanity, songs and other memorized verbal material, such as the alphabet. A wealth of studies show that LBF is the site of the most advanced and human traits, such as conscientiousness, positive social behavior, rationality, strategic planning, and positive affect (mood). LBF is often referred to as the site of "executive function." RBF, by contrast, is associated with lack of inhibition, anti-social behavior, emotionality, and negative affect. RBF is more closely connected to the sub-cortical limbic system, the source of emotions.

If RBF and LBF could take positions concerning the idea that "the genes enslave us for their sometimes pernicious activities, and that individuals should rise up and become liberated from this genetic enslavement," it is obvious which side LBF and RBF would be on, and they wouldn't be on the same side! More on this in a later chapter.

This chapter's brief description of cerebral architecture, and the functional relationships of components, is part of the accepted neuropsychology literature. Every normal person's brain functions this way. If the brain was a "blank slate," as Francis Bacon initially suggested, and philosopher John Locke systematically expounded, then how amazing it would be for the blank slate to form itself into the same well-defined areas, with corresponding functions, in all people - regardless of their individual upbringing and environmental experiences! This old idea is best

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forgotten. Even Bacon and Locke would probably disown the outdated notion if they were alive today and could know about recent neuropsychology findings.

The genes assemble brains with the same architecture, modules and functional relationships, and this process occurs automatically - shall I say "mechanistically." This view of the brain is consistent with the reductionist theme found throughout this book. The next chapter is more speculative as it treats the brain's role in evolution.



CHAPTER 8

THE BRAIN'S ROLE IN EVOLUTION

"Aristotle was famous for knowing everything. He taught that the brain exists merely to cool the blood and is not involved in the process of thinking. This is true only of certain people." Will Cuffy.

The brain is assembled by many genes. Each gene has had to establish itself within a species genome that, by definition, was successful at the time the new gene competed for a place in the gene pool. We should assume that each brain-affecting gene established itself in the human genome at a different time from all other brain-affecting genes. Obviously, all genes achieve their success without the benefit of how well it might work with any future gene. Each successful gene has had to compete with existing genes, or at least provide a benefit that exceeds penalties from incompatibilities with existing genes. From the perspective of the gene, the individual's brain has the responsibility of spreading the gene widely into future generations. This is another way to express the unavoidable tautological assessment that a gene's job is to try to infiltrate the species genome and persist forever.

When a new gene modifies the hardwired neural connections of some brain region (by creating new connections between neurons or by changing the size of synapses of existing connections), the function of the modified brain region is likely to be in conflict with other brain regions. Since the purpose of the brain is to influence behavior on behalf of the genes, brain regions necessarily are in competition with other brain regions for influencing behavior. Rarely is the individual aware of this conflict. When the conflict is extreme, when it affects emotional state, we might say that the brain is in an unsettled state of "cognitive dissonance." Almost all competitions for influencing thought and behavior are worked out peacefully below conscious awareness.

The Brain as a Mechanism

The brain is a mechanism, albeit a "wet chemistry" mechanism. Just as all chemical interactions are merely physical interactions at the atomic and molecular level, so are all brain interactions ultimately the working out of physical relationships between atoms and molecules. When we say that current flows along a neuron's axon, we refer to a physical process of the axon's membrane becoming more permeable to sodium atoms, allowing charged atoms to enter the axon from the surrounding fluid, etc. Every motion of every atom is governed by $\mathbf{a} = \mathbf{F}/m$ and quantum physics (as explained in Chapter 1). It would be cumbersome to try to understand brain function by invoking this basic level of physics since such a task would be incomprehensibly difficult. Wet chemistry is a less cumbersome level, but still too daunting for most brain studies. A more tractable, and hence powerful, level for understanding brain function is to think in terms of neural networks.

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A neural network is a partially interconnected group of neurons. One network may also have connections with other neural networks. The term "partially interconnected" is important, for it is the genes that determine the overall pattern of which connections exist. A "fully connected" network is impractical when the number of elements (neurons) exceeds a few hundred, since the number of possible connections between elements grows as "N-1 factorial." Synaptic connections between neurons are either excitatory or inhibitory. In the brain a neuron may have many synaptic connections to a specific target neuron, and absolutely no direct connections to most other neurons.

Consider all neurons in the network that are connected to one individual neuron. At any moment some of them will be in the process of "discharging," causing their synaptic connections to other neurons to become active (releasing neurotransmitters across a synaptic gap). Each target neuron sums the excitatory and inhibitory discharges on its cell body, and if this sum exceeds a threshold it in turn discharges, causing neighboring neurons with which it has output connections to possibly also discharge by the same process that led to its discharge. A neural network can be made to "resonate," which is a way of stating that a pattern of firings within the network continues for many clock cycles (tens of milliseconds in the brain) once triggered by an appropriate stimulation from the connections that the neural network has with neighboring neurons (or neural sub-networks). All of this is well understood by neural network specialists, and I provided a brief introduction of it here to give the reader a taste for the mechanistic, or reductionist nature of brain phenomena.

An even more useful level for understanding brain function is to speak of brain regions in terms of their function. When we use such terms as "the reticular activating system" (RAS) we know that the elaborate neural network explanation for the region's function is theoretically possible but at the present state of brain understanding these $a = F/m$ ways of accounting for a region's function are not very feasible or even useful. So we proceed by saying, with blatant anthropomorphism, that a cortical region sends a "request for activation" to the RAS, and if RAS "grants the request" this originating cortical area becomes more active, and this activity enables it to increase its inhibition of "competing" cortical brain areas, allowing it to succeed in "achieving behavioral expression." Even that way of speaking is cumbersome, but it captures the flavor of the mechanistic competition of one cortical neural network, having gene-directed hard wirings, with a neighboring cortical neural network, having other gene-directed hard wirings.

In any description that attempts to achieve brevity, such as this one, there are many unmentioned details about which a specialist could complain when they are left out. Sure, I didn't mention neurotransmitters, and their re-uptake, or their breakdown, and dozens of other things going on, but they are all mere elaborations of the same basic physical mechanism. Additional details are too numerous to mention, but also too similar in terms of their ultimately physical action to warrant mention for present purposes.

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I have risked boring you with some physics of the brain in order to show how in principle brain function can be understood as coming under the influence of the genes. For it is the genes that direct the process of "pre-wiring" the brain. Initially, too many connections are created, and for several years after birth approximately half of the neurons and their connections wither and are lost. But the starting point at approximately birth and some years later (depending on the brain region), the overall placement of neuron type and the majority of connections from each neuron to others, is supervised in a general way by the genes. Some genes influence one region (i.e., a neural network) and not others, while other genes influence several different specific regions. Any single neural network is most likely the result of several genes.

This way of viewing brain development, emphasizing as it does the role of evolutionary forces on the architecture and interconnectedness of the brain, leads to a perspective in which overall brain function is the working out of a competition of mental modules, each endeavoring to express itself by maximizing its influence over behavior. The "modularity of mentality" perspective, in which modules compete with certain others, is still controversial (for reasons I don't understand). And the idea of connecting specific modules to specific genes is so amorphous a speculation that it is not yet a sub-discipline of the brain sciences. Evolutionary psychologists adopt this view (see Barkow *et al*, 1992), and it seems inevitable to me that sometime in the 21st century neuropsychologists will also, and maybe late in the 3rd millennium people who call themselves psychologists will come aboard.

Recent Evolutionary Hotspots in the Human Brain

In humans the prefrontal cortex is proportionately larger than the rest of the brain compared with all other animals. Thus, there's an evolutionary trend revealing that the prefrontal cortex has been the focus of recent human evolutionary adaptations. This makes the prefrontal cortex one of the most interesting brain areas to understand.

Comparison with other mammals reveals that the tertiary cortices of the posterior lobes are also proportionately larger in humans, indicating that they also have been undergoing rapid evolution in recent evolutionary time. The most obvious example is Wernicke's Area, located in the temporal lobe's tertiary cortex. So add LB posterior lobe tertiary cortical areas to the list of interesting human evolutionary "hotspots."

Are there any evolutionary hotspots in the human right brain posterior lobes? The short answer is "no." It therefore seems that the left brain has evolved more during human history than the right. It is even tempting to suggest that what distinguishes humans from other animals is their left brain.

Note one qualification that applies to most usages of the terms "left brain" and "right brain": about 2% of the population has laterality reversed. In these people language and other sequential tasks are performed by areas in their right brain, and holistic functions are performed by their left brains. Most of these people are left-handed with the unhooked writing position. Neuropsychologists use the terms right brain and

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left brain to refer to the specializations found in that 98% of the population with "normal" lateralization. So, whenever the terms LB and RB are used, think of the left and right brains of the 98% of people who possess the normal lateralization.

Why is the Left Brain Evolving Faster?

What is it about the left brain that gave it the greater burden for advancing human evolution? One clue comes from the microscope. The left brain isn't as "white" because fewer neurons are coated with an electrical insulator composed of a whitish, fatty substance called myelin. The greater myelinization of the right side is required by the greater proportion of right side neurons that connect with distant neurons through long axons. In contrast, neurons on the left side are more often connected to nearby neurons, and therefore require less insulating myelin.

But what does this mean? The left brain is characterized by a neural architecture in which isolated neural networks perform their specialized tasks and then communicate their results among themselves through a smaller network of interconnections. Functionally, this is a better architecture for performing sequential tasks. Language is a good example. A sentence consists of a sequence of sounds that have to be in their proper place in order to convey the intended meaning.

Some have speculated that the evolution of lateralization started with our fruit eating ancestors, who would use their left arm and hand to support themselves and maintain balance while the right hand reached out to pick fruit. Fruit picking is somewhat sequential, as the hand must be guided by the eyes to reach for the ripe-colored fruit, grasp it with fingers using just the right force, tear it off the branch, and then bring it to the mouth for eating. Recall that the sequentially performing right hand is controlled by the left brain, which would therefore be the one requiring a sequential neuronal architecture.

If embryological development provided for a sequential brain architecture in one part of LB because it evolved in that location by chance for the purpose of picking fruit, then when another sequential task became adaptive the forces of evolution would more often find a favorable mutation of genes that code for the left brain, since fewer mutations would be needed to add to a pre-existing architectural capability for the task of producing a new sequential capability. This, according to one speculation, is why the left brain took on most new sequential tasks presented to it by subsequent evolutionary opportunities.

Brain "Dominance"

Damaging brain strokes in LB tend to produce more noticeable deficits than those in RB. This is because LB performs language tasks. For this reason, unfortunately, it has become customary to regard LB as the "dominant" hemisphere. But, to call LB dominant over RB for this superficial reason is misleading!

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The limbic system (that drives emotions) influences the RB frontal lobe more strongly than the LB frontal lobe. This makes RB a better candidate for playing a dominant role. RB gives overall shape to behavior, while LB is relegated to a supporting role. When LB began its sequential specializations it must have been a useful "tool" for RB (which in turn was a tool for the limbic system, which in turn was a tool for the genes). "Values" are more likely to originate with RB, and I claim that the genes have put in place more of their "agenda protection circuits" in RB. The natural condition, I suggest, is for RB to be "in control," using LB to help achieve genetic ends. This important thought will come up repeatedly in subsequent chapters, and it is a basis for the individual to design strategies for individual liberation from the genes!

Even though RB has control over decisions that matter to the genes, I believe the seat of consciousness is in LB's tertiary cortex. This may seem to be a curious arrangement, but upon further thought it makes sense. We associate consciousness with planning future activities. Recall that brain structures with a more ancient origin usually have veto power over behaviors, as when RAS handles requests for action and either "authorizes" or "vetos" them. It may happen that RB tasks LB with imagining future scenarios and their likely consequences, while RB, in close consultation with the (emotional) limbic system, then makes a "judgment call" and decides whether or not to proceed with the plan of action that was under consideration. After imagining scenarios, one may be accepted while others are vetoed; all of this may occur at a subconscious level, with RB working in conjunction with the ultimate authority: the limbic system. LB must make sense of the outcome, so it "confabulates" an explanation for the chosen plan of action. Michael Gazzaniga names the left prefrontal module that performs this confabulation the "interpreter" (see Gazzaniga, 1978, p. 146; especially Gazzaniga, 1988, p. 229; and Gazzaniga, 1992, p. 121).

Rational thought has become an ever more important tool for evaluating the consequences of hypothetical actions. This is why LB must have been such a "hot-spot" for human evolution for probably the past 130,000 years, and especially the past 12,000 years.

Before LB began to evolve its unique specializations, perhaps 250,000 years ago, the function performed by a damaged area of one side could be easily assumed by the counterpart area of the other side (relying upon the corpus callosum for inter-hemispheric communication). Lateralization brought with it risks of lost redundancy, yet this loss was apparently smaller than the gains from being able to solve problems that were common in the late Pleistocene and Holocene. We must assume that some important need started the selection for LB specializations. It may have been the payoffs for improved tool-making, language, or dealing with a more complicated social setting that required logical thinking skills (such as "theory of mind" abilities).

Whatever the original impetus for LB specialization, it seems to have assumed the new duties as if forsaking redundancy with abandon. Just consider the list of important LB skills that are unique to humans: verbal, analytic, logical, rational,

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time-oriented and deductive skills. It seems inescapable that LB has acquired more recently-evolved, distinctly human adaptations than RB. When you damage LB (posterior lobes), you get a regressed, more primitive person; but when you damage RB (posterior lobes), you get someone handicapped in mostly long-standing, primitive traits.

Since recently-evolved traits are the least entrenched, and are most subject to disruption by the latest mutations, we should expect to encounter a wider variation of ability for the recently evolved traits than long-established ones. This view correctly predicts that literacy, being a recent human achievement, should be more variable than other abilities; whereas verbal language ability, having started its evolution much earlier, should be more robust. It also explains why everyone is capable of anger, fear, sexual arousal, and jealousy, while some people are deficient in logical, rational and analytic ability.

Brain Modules and Genes

As with any organ, no single gene codes for the construction and function of an entire organ; many genes contribute. When several genes contribute to the same trait, they constitute a group of "polygenes." For example, one gene may play a major role in forming the heart's left ventricle, with minor support from other genes; another gene may have major responsibility for assembly of the right ventricle, but also contribute to the left ventricle's assembly. Both genes belong to a polygene group for constructing the heart.

The same argument applies to the brain. Many genes are required to assemble the primitive brain stem's reticular activating system, for example. Others assemble various parts of the limbic system. Finally, other genes assemble the surrounding neo-cortex, LB and RB, and the interconnecting corpus callosum.

All brain components are interconnected with other components, and they function together as if they were "designed" to work together. When the various components work together it is because they have been present in the genome together long enough to adapt to each other's presence. Initially, when a new brain component is mutating into existence, it is useful to understand that the pre-existing components were not meant to work together with the new component. Each new "addition" occurs against a background of pre-existing brain components which had worked together successfully prior to the appearance of the new component. As components appear, they, as well as the pre-existing components, co-evolve to enhance the working relationship.

When our ancestors began to lose their fur, the fur altering allele had to co-evolve with the gene(s) that made furry babies irresistibly attractive to mothers. There are many baby features that cue the mother to act like a mother, and the lack of fur amidst all the other baby features must have been disconcerting to mothers during the transition. Today, a cat resembles a primitive baby in size, weight and furriness. The fact that many people find cats irresistible, and sometimes hold them like a baby and

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speak "motherese" to them, suggests that the ancient collection of cues for eliciting mothering behaviors still exist in some residual form.

As the gene for a new brain module is selected, it evolves to be compatible with pre-existing modules, and the genes for the pre-existing modules simultaneously undergo modification in response to the new module. The evolution of genes that affect the brain is governed by the consequences each gene allele has on the success of the individuals carrying the genes to survive and reproduce. Or, to be more rigorous, a brain-related gene allele's success depends on its ability to produce phenotypic changes that work with the prevailing phenotype in a way that enhances the individual's success in delivering all of its genes to future generations, under a typical range of environments.

Since there are many ways to construct any organ, there will be many potential competitions between genes. An allele that produces a larger heart ventricle is in competition with alleles that produce smaller ventricles. Natural selection achieves a better heart by rewarding individuals having the better heart, and thereby rewarding those gene alleles responsible for producing the "better" ventricle size.

Whereas it may be easy to comprehend how a gene that codes for anatomy, such as heart ventricle size, can be in competition with another gene, it is more difficult to imagine the competition between genes that assemble brain circuits governing behavior; nevertheless, it happens. A brain gene may be in competition with another allele, even while it is "cooperating" with a different set of brain genes. (Excuse the anthropomorphizing; if it bothers you just convert my brief descriptions to a rigorous lengthy one).

Genes compete for phenotypic expression at impressively high conceptual levels. Language ability evolved by creating proto-Wernicke's Area circuits and proto-Broca's Area circuits within LB (plus other cortical areas, interconnections and anatomy modifications). This was a major accomplishment, involving many small incremental steps. Other frontal lobe traits, such as assertiveness, aggressiveness, nurturance, empathy and altruism, are under significant genetic control, accounting for approximately 50% of observed variance (Rushton, 1997).

It has once again become fashionable to think of brain function as being "localized." Although "phrenology" deserved to be discredited, its ultimate theme was correct: namely, that most attributes of brain function are determined by activity in specific brain regions. They were wrong to place "combativeness" where the temporal and occipital lobes join, for example, but it is localized, and belongs in the prefrontal lobes (probably in RB). Many functions require the participation of several specific areas. Productive language is a well-studied example, exhibiting involvement of specific parts of the left frontal, temporal, and parietal lobes. Physical damage to each region produces specific, predictable language deficits. This means that something as complicated as language requires the cooperation of regions with specialized capabilities, and the fact that these regions aren't next to each other, but are located in different lobes, does not undermine the view that brain functions are localized.

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This reductionist way of viewing brain function is supported by the notion that a finite number of genes assemble the brain. Polygenes create brain modules, consisting of specific physical networks of interconnected neurons along with an approximate set of synapse sizes.

Mental function, like brain architecture, appears to be modular (Fodor, 1983, Gardner, 1983, Gazzaniga, 1985, Restak, 1986, Cosmides, 1989, Cosmides and Tooby, 1992, Restak, 1994). Granted, the modules interact with each other, but they can be usefully considered as modules with functional specifications. Consider the analogy of a system's analyst parceling out the task of writing a large computer program to several teams of programmers. Each team is charged with delivering a module of code that meets functional specifications. A programming team is like a gene, their code is like a hard-wired brain module, the function performed by the module is like a mental module, the joining of modules is performed by the systems analyst, and the running of the completed program code is like a brain performing mental tasks.

Modules Compete With Each Other

Modules compete with each other for "expression." For example, one area in the occipital lobe may be able to correctly perceive and identify an object from its visual appearance, a cup for example, while another area in the parietal lobe may be able to identify the same object by its tactile feel, and another area in the temporal lobe may be able to infer the same object's identity from the sound it makes when set down upon a table top. Each will produce a signal of recognition when the necessary stimuli are presented, and somewhere in the adjacent tertiary cortical regions (where the three posterior lobes merge) the object identification of "coffee cup" is made.

It would be ridiculous to conclude from this capability that there's a "coffee cup recognition" gene. Rather, there's a polygene-created module for recognizing curved shapes, another for shadings that contain surface topography information, etc. These modules are interconnected so that experience with the real world, or at least one that contains coffee cups, allows synapse strengths to be modified such that when a coffee cup with arbitrary orientation is viewed the various percepts are joined together to trigger the perception "coffee cup."

The brain's experience with the real world adjusts synapse strengths so that no other region will be triggered to "resonant" activity when a cup is presented to the posterior lobes' primary cortex (sensory input) areas. If a totally unfamiliar object is presented, there will be a competition to identify it. When shown a German beer stein for the first time, the occipital lobe (sight) may report "something like a vase," the parietal lobe (feeling) may report "something like a large-handled cup" and the temporal lobe (hearing) might report "like a brick." The discrepant reports would compete, as the frontal lobe might want to engage in further exploration to resolve the discrepancy (which is a job for "consciousness").

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Figure 8.01. *Reversible Goblet, illustrating competition between brain regions vying for "acceptance" of their respective interpretations. Look for the two dark face profiles, facing each other.*

The many examples of images with "figure/ground reversal" conveys in the most dramatic way how competing modules strive to prevail in having their "interpretation" accepted. Escher drawings (Escher, 1961) exhibit a wealth of figure/ground perceptual competition.

Identifying situations, such as a "social situation," is subject to the same perceptual competition, although the frontal lobes will play a more active role in generating competing hypotheses. Context may be an important "input." "Do I know the person? Does he have a hostile stance? Does he have comrades?"

Consider the metaphor of a school classroom for understanding brain module competitions. The teacher poses a question, and the students try to understand the question and come up with an answer. Some students will both understand the question and have a possible answer, and they will raise their hand. The teacher calls upon a student to present an answer, quite often it's the student whose hand is waving most excitedly (or maybe the student with the best past performance), and after hearing the answer she passes judgment. If it is incorrect or inadequate, the teacher calls upon another student.

This classroom example is a good metaphor for how the brain works. When a person is presented with an unusual situation, some modules in the brain "recognize" something, and they request activation by the RAS (reticular activating system). The RAS, working in coordination with a higher level cortical system that keeps score of previous successes and failures, tentatively authorizes a module to "present its case" for evaluation. The module that wins the first round for presenting its interpretation may be the one that most strongly felt it understood the situation and had the correct interpretation (like the student who waved his hand most excitedly); its request to RAS may have been the strongest among the competing modules. When the first module presents its interpretation, some type of evaluation occurs (perhaps involving the reaction of other modules), and this interpretation may be accepted, or it may be

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tentatively rejected. If it is rejected, or set aside, another round of RAS requests for activation is performed, and another judgment is made. At some point, a winner is declared, and the winning module's interpretation is what serves as the basis for any required action. The losing modules do not simply stop trying to compete for RAS attention, however. As more perceptions occur, or as behaviors either validate the accepted interpretation or invalidate it, the other modules are ever-ready to renew their claim for being heard. The example of the "reversible goblet" shows how this process "feels" for the domain of visual interpretations.

The process of generating behavior is also a competition between competing frontal lobe modules. "Shall I turn and run? Or scream? Or attack?" Imagine that one person may inherit a propensity to "attack" in ambiguous social encounters, while another may be genetically inclined to "run away." Just as animals have inborn temperaments, so do humans. And the mental process that precedes an action consists of a competition between brain areas. To the extent that one brain area is assembled by a different polygene group than another brain area, which is inclined to a different type of behavioral response, the genes primarily responsible for wiring the competing brain modules are competing with each other for behavioral expression. The same classroom metaphor described above can be used to understand this situation. After a situation is understood, and when action is necessary, the frontal lobe modules will compete for expression (*i.e.*, control of behavior) in the same manner that the "understanding and interpretation of the situation" modules competed. The RAS (another part of RAS than used for "adjudicating" perceptions) receives requests for action, and eventually one module's proposed action is "accepted" (given "authorization" for initiating a behavior).

Thus, both perceptions and behaviors exhibit the quality of involving several mental modules in competition for acceptance and expression.

Does it matter whether the brain accepts, and acts upon, the perception that the sky is angry and the wind god and sun god are arguing, versus the competing perception that the wind is bringing clouds from somewhere which cover the sun and may cause rain? In the contemporary world it can matter more than it did in the ancestral world. For this reason, it matters whether RB interpretations versus LB interpretations tend to gain acceptance in an individual's brain. To the extent that genes wire brains to be predisposed to some "interpretation styles" over others, the respective genes are in competition. The next chapter will deal with this subject in greater detail.

Intelligence and IQ

"IQ is what IQ tests measure!" It should be emphasized that IQ, as measured this way, is just one of many components of what most people refer to by the term "intelligence." Ironically, IQ is not a prefrontal function. Prefrontal lesions do not reduce IQ; indeed, in some cases frontal lesions have enhanced IQ. This enhanced performance could be explained by a theory that views the frontal lobes as being prone to "interfere" with posterior lobe performance (such as a tennis player "thinking" too much); by injuring a prefrontal lobe the posterior lobes are freer to

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perform unhindered, boosting measured IQ. The WAIS (Wechsler Adult Intelligence Scale) IQ test has two parts: the "verbal" part and "performance" part, and these parts probe left and right (posterior) brain function, respectively. The Woodcock-Johnson has two parts, also probing left and right (posterior) lobes. The WAIS verbal and performance IQ scores differ by 3 points, on average. A difference of 10 points should occur in only 5% of cases; and differences larger than this are usually caused by a lesion to one side of a posterior lobe.

This concordance of IQ scores that separately probe LB- and RB-function invite speculation on the number of genes that affect posterior lobe capability on both sides. However, it is possible that a small number of genes contribute to "general" intelligence, and the rest contribute to specific abilities. This is consistent with the finding that a person's profile of subtests will have a pattern, with some parts of the "verbal" being low, and others high, while the average of the verbal parts average about the same as the average of the performance subtest parts. Psychometricians continue to find it useful to make a distinction between specific sub-test performances and Spearman's (1927) "g factor" of mental ability. Tests that identify g-loaded performance afford better correlations with genetic relatedness (*i.e.*, identical versus paternal twins), and g-loaded test scores are better predictors of academic performance than standard IQ tests.

Tests have been developed for assessing frontal lobe performance. The Halstead-Reitan Battery includes tests of frontal lobe assessment. Components of the Montreal Neurological Institute Battery, and also Luria's Neuropsychological Investigation, also test for frontal lobe function. The frontal lobes are so complex that no single test can capture all significant features. For example, effective business executives have especially capable frontal lobes, and they excel in the development, evaluation and implementation of "big picture" strategies. The business "world of hard knocks" reveals who some of these especially well-endowed frontal lobe "executive function" people are. Bill Gates, Steven Spielberg and Lee Iacoca are examples. It would be interesting to know if they would have been identified in childhood as having especially talented frontal lobes using existing tests purporting to probe frontal lobe function. Some day, tests for executive function may capture this elusive capability.

Whereas someone like Bill Gates must have superior scores for both frontal and posterior lobe function, it must occasionally occur that people are born with disparities. For example, president Jack Kennedy is supposed to have scored a mere 125 on IQ tests. He obviously would have scored higher on any executive frontal lobe test. It may be more common for people to be born with the opposite disparity, in which posterior lobe IQ is higher than frontal lobe executive ability. Indeed, this could be the more common disparity because frontal lobe function is a more recent focus in human evolution. The ability to create culture, and to absorb and use cultural elements that other people are observed to use, must have been an important pressure for human evolutionary selection during the past 60,000 years. This idea will be taken up in a later chapter.

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Number of Brain Genes

It has been estimated that as many as half of the entire set of human genes have some influence upon intelligence (Weschler, 1974, as cited by Seligman, 1992). For the calculations that follow, I will assume that 30% of human genes affect the brain. In theory, every aspect of brain function can be associated with a gene that has the most control over it. (To call such a gene the "whatever trait gene" overlooks another fact, that the same gene probably affects several other phenotypic traits which are sometimes unrelated to the main trait; this is referred to as "pleiotropy.")

If the human genome consists of 22,000 genes (functional sections in the "junk DNA" regions will also be present), and if humans share 98.77% of genes with living chimpanzees, then humans differ from chimpanzees at approximately 270 gene locations (1.23% of 22,000). Of these 270 genes, probably more than 30% have some influence over the brain's development. Let us assume that 80 genes are responsible for making the human brain different from the chimpanzee brain.

If the common ancestor for modern humans lived 200,000 years ago, and if the human/chimpanzee evolutionary split occurred 6 million years ago, then it is possible to estimate the number of brain genes that are more recent than 200,000 years to be $80 \times 0.2/6 = 2.7$ genes. This absurd result requires a few caveats. First, this calculation assumes that the pace of evolutionary change has been constant during the past 6 million years. Human evolution may have proceeded faster during the past 200,000 years than before this time, and the brain is likely to have been the focus of more than 30% of this evolutionary change, considering that major human brain expansions occurred at about 1.8 and 0.5 million years ago (Aiello and Dunbar, 1993). But the most important qualifier of this argument derives from the restrictive definition of a "gene." A gene is defined as a stretch of DNA that "contains the instructions for the production of a particular protein." Recent research has shown that non-gene DNA (in the areas once referred to as "junk DNA") can affect the expression of genes. Not enough is known about the number of these locations to include them in the present argument, so allow me to proceed while keeping this one important caveat in mind.

If during the past 200,000 years 80% of the genes that were actively evolving were brain-related, then the 2.7 multi-allelic number increases to 7. If the evolutionary pace for recent times (the past 200,000 years) versus before (6 million years to 200,000 years) is greater by the factor of 10, then there could be 70 multi-allelic gene sites that affect the brain. This number is compatible with the estimate that humans and chimpanzees differ at 270 gene sites. Since each site may have many more than 2 alleles per locus, there could be 100 to 200 alleles whose main effect is on the brain and which are still vying for a presence in the human genome. This may seem like a small number of gene sites, but there are 2^N combinations of configurations when each site has two possible states, and if $N = 100$, there are 10^{30} such states. That's an incredibly large number, being larger than the human population by the factor 10^{20} (a one followed by 20 zeros)!

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The point of these calculations is to prepare the case for stating that perhaps half of the present human genetic diversity, and genetic competition (among perhaps several hundred alleles), pertains mainly to the brain. The brain is a major focus for ongoing evolution for *Homo sapiens*.

Recent Brain Evolution

Two lines of evidence point to the LB-frontal region as being the site for most of the recent human evolutionary activity (when I use the term "frontal" I usually mean "prefrontal" - which is common usage). First, this cortical region is where executive function resides, and executive function is an especially well-developed, some would say unique, human capability. Second, the human individual's ontogenetic development's last big push is in the prefrontal brain areas; and to the extent that individual ontogeny recapitulates species phylogeny, our most recent ancestors must have been busily improving the prefrontal cortices, with increases in both size and function.

RB-frontal and LB-frontal are probably the most recently evolved regions, and I am suggesting that they gradually came to be in almost constant competition. LB-frontal has evolved to supercede RB-frontal for many tasks (language replacing gestures being the most prominent). LB-frontal is capable of inhibiting RB-frontal when an appropriate occasion arises. But there are dangers in giving a new tool too much power, especially when it is strategically positioned to formulate near-term strategies as well as long-term life goals - the way LB-frontal is. The genes will find RB-frontal a more useful agent for controlling LB-frontal's "new ideas." Presently, RB-frontal is probably charged with preventing LB-frontal from thinking thoughts that threaten the genetic agenda. Without understanding any of this, RB-frontal has taken on the role of acting as an agent for the genes, and LB-frontal has unknowingly stumbled into the position of having the capability for acting as an agent for the individual wishing to liberate himself from genetic tasks!

It is common knowledge that people tend to think with certain styles, such that if you know one of their beliefs or interests you can predict others. Dichotomies abound: Spiritualism versus Rationality, Religion versus Science, Conservatism versus Liberalism. How curious that we can expect almost universal agreement in making these aggregations. Consider the following joke: *A prize will be given to anyone who is able to survive driving from Houston to El Paso in a Volkswagen minibus with stickers that read "Down with the NRA" and "make peace, not war" and "vegetarians rule" and "Vote Democratic."* (I maintain that it's possible to predict a person's political party affiliation by knowing whether they deal with weeds by pulling them or spraying them with weed killer.)

The apparent pattern of two ways of thinking corresponds to the preferred styles of RB and LB, and it is obvious which trait corresponds to which brain half. The person who exhibits RB styles can be thought of as belonging to a group of people who are "opposed" to the group of people exhibiting LB styles. Just as there is a competition between an old RB and a new LB within each individual, so is there a "competition"

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for prevailing over a society's culture between RB-style people and LB-style people. The genes that wire-up RB-styled and LB-styled individuals are, as groups, in competition with each other. C.P. Snow wrote *The Two Cultures and the Scientific Revolution* (1961) to call attention to a conflict between two types of people, the literary academic and the scientist. The book was based on decades of interacting with both types, and it was written before the great burst of neuropsychological insights of the 1960s, 1970s, and 1980s. If Snow were to write that book today (see Price, 1970, for a witty "update"), it would be difficult for him to avoid making the brain laterality connection. Chapters 12 and 13 are devoted to "two cultures" matters.

Result-Driven Thinking

RB-frontal neural circuits have many ways of restraining and manipulating LB-frontal activity. One of these is called "result-driven thinking." A thinking process is recognizably result-driven when the logical process leading to a position is embarrassingly contorted and self-serving, making it obvious that the "result" preceded the progression of thought that purports to lead to the result. The embarrassment may be apparent to an objective observer, who is not affected by the position taken, while for the result-driven person there is no apparent flaw in a process he believes to be logical. Deception is always more convincing when the deceiver is unaware that he is engaged in a deception. Thought blinders are a useful tool when RB-frontal wishes to remain undetected by LB-frontal.

The Mexicans have a special phrase for calling attention to someone's result-driven thinking: *quando conviene*. Literally translated, it means "when convenient" - which conveys the idea that a person's stated belief changes in a way that conveniently serves the person's selfish goals. I am convinced that result-driven thinking is a "human universal" (see Brown, 1991, for an extensive treatment of human universals). It probably can be found in all societies and has existed for a long time.

One of the primary tasks for result-driven thinking (RDT) is to force the individual to stay in loyal service to his group – no matter how illogical. The group may be his extended family, or his tribe, which in either case is composed of genetically related individuals. Consider the matter of "tribal mentality," first described by Spencer (1892) and later by Keith (1946, 1948), which refers to the anthropological finding that all primitives live by a moral system that requires beneficent treatment of fellow tribesmen while condoning and even encouraging barbaric treatment of individuals belonging to neighboring tribes. "Tribal morality" requires an illogic for which RDT is admirably suited, and for which the RDT capability may have evolved. Empathy and amity for some, enmity and hostility for others! This seems at odds with contemporary religious dogma, yet in time of war both sides appeal to their respective religions for legitimacy and support in vanquishing the enemy. Each side distorts the character of the other, making up false accusations and using degrading names for the purpose of arousing the passions in preparation for combat.

Political partisanship, ever more prevalent in America since World War II, also illustrates the power of RDT. (I adopt the common usage of the term "America" to

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refer to the United States, in apparent neglect of the fact that "America" actually includes Canada, Mexico, and all of Central and South America.) The model for this is tribal conflict. Consider the case of the U.S. Supreme Court's 2000 decision that in effect led to George W. Bush's selection for president. The 5 conservative-leaning jurists had a longstanding record of supporting "states rights" on many matters, while the 4 more liberal jurists favored federal rights, yet when the issue was the election of either a conservative or liberal for president both sides switched their positions concerning which right trumped the other, and by acting in this unusual way they served personal political philosophies. Chief Justice Rehnquist later alluded to the need for the Supreme Court to sometimes get involved in political matters to prevent a national crisis (*Los Angeles Times*, January 21, 2001, pg. A30). *Quando conviene!*

My reading of the newspaper is immensely more informed because I readily recognize RDT. Almost every opinion, and the rationale for almost every action, requires RDT to protect it from the detached, logical thinking that a well-functioning LB-frontal is capable of. There is a common misperception that people are LB-dominant, which is based almost solely on where language capability resides. But in the realm of thinking, humans are RB-dominant. And RDT is the mechanism for accomplishing this in the presence of a powerful logical left brain.

RDT is a tool of the genes to have things both ways. By inventing RDT, the genes have become able to receive the benefits of a powerful new LB while retaining their interests in enslaving the individual for genetic service. Obedience of the powerful new LB is achieved by RB circuits that assure that "result-driven thinking" is preserved in a way that accomplishes genetic goals.

Thinking is a Subversive Activity

Occasionally I'll buy a book based solely on the cleverness of its title. My favorite example of this is *Teaching is a Subversive Activity*. I never read the book, probably because I didn't want to be disappointed. The title by itself inspired me to develop a text in my imagination, and over the years I've continued to add to that imaginary text. This section will draw from that text.

Society endorses a school curriculum that renders students "useful" to society, regardless of how useful the curriculum is to the student's individual fulfillment (thanks, Alfred Allen, for stating it this way to me). If heroism is useful to society, then history and literature classes will feature heroism. If "slacking" is not useful to society, then the payoffs for slacking will not be taught. In between these two extremes are such things as tolerance, celebrating traditions, skepticism and questioning authority. If a curriculum were to be designed to serve individual fulfillment it would suggest that heroism is folly, tolerance is good, skepticism is essential and all authority should be questioned. The fact that none of these are to be found in schools is unsurprising.

"Thinking" is something the left brain does. It is also something the right brain "controls." If thinking occurs, it is because RB permits it, and may even encourage it

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because a problem needs to be solved that appears to be compatible with the genetic agenda. Thinking is inhibited by RB when it appears to threaten the genetic agenda. When a parent enters a burning house to save a child there is a quick and mostly subconscious calculation of the danger involved, and the resulting decision favors genetic interests. When a household is attacked by intruders the ensuing defense is likely to include heroic acts. When a tribe is attacked by a neighboring tribe, or when one country is attacked by another, heroism will be found among the defenders. Each heroic act will be called “selfless,” or what the intellectuals would call “altruistic,” and we can be confident in surmising that these acts were initiated by a right brain that was able to inhibit a left brain from hesitating for thoughtful consideration.

When society pays a teacher’s salary it is natural for society’s interests to be served by what’s taught. Any teacher who suggests that individuals have the right to renounce heroism when a situation calls for it would be considered subversive. Similarly, any teacher who counsels skepticism and a questioning of authority would also be considered subversive – especially by the authorities.

America has become a “consumer society” and the American government has become the protectors of business interests. Imagine schools that teach how to question advertisements, make fun of claims by the pharmaceutical industry, question FDA approvals, or take every politician’s utterance and consider that truth is closer to its opposite. Students graduating from such a school would fare better in life, but those with power in society would view the curriculum as subversive and they would not permit such a school to exist.

In a future chapter I will describe the co-evolution of genes promoting altruism and intolerance. A theory will be described that purports to show that when there is chronic conflict between neighboring tribes there are benefits for the tribe whose members are both intolerant and altruistic. Heroes will be seen as intolerant altruists! Only when a tribe overwhelms all competitors is it safe for genes promoting the opposite traits to prevail. Thus, each empire will gradually become dominated by selfish individuals who tolerate others regardless of their differences. This becomes a “weakness” from the standpoint of societal survival, which leads to the decline and fall of the empire. Only after this theory has been explained will it be possible to understand the full meaning of “thinking is a subversive activity.”

CHAPTER 9

ARTISANS SET THE STAGE FOR CIVILIZATION: PART I

The human brain and culture co-evolved (Lumsden and Wilson, 1981) during at least the past 70,000 years. In this chapter I will make the case for the position that a civilization can only develop when there is a division of labor, and when society supports a large base of "artisans."

The first artisan niche was probably the toolmaker, whose task was initially part-time, but eventually became full-time. Significant evolutionary forces were created when the first full-time artisan was employed, and these led to the further specialization of the left brain (LB).

When the Pleistocene glacial climate began a transition to the Holocene interglacial, 14,650 yr BP (years before the present), the better climate set the stage for an explosive expansion of artisan niches. Increasingly complex economies allowed for higher population densities, which supported large, sedentary populations. New artisan niches were created, allowing for an increase in the artisan population. The increasing "presence" of artisans caused cultures to expand, and become more sophisticated. The artisan played a crucial role in creating civilizations.

The entire process of artisan proliferation, cultural elaboration, and the creation of modern civilizations, occurred because human culture and brain-function genes co-evolved. By this is meant that the civilized environment that was created by artisans, whose special abilities are at least partly due to the appearance of "artisan genes," changed the environment in such a way that artisan genes were more valuable, and were "selected" in greater numbers. This chapter describes some speculative mileposts along this interesting journey.

Pleistocene Life

I will argue that for the past 70,000 years one of the most strongly contested allelic competitions was related to the creation of full-time niches within human tribes.

The world's climate was cold for most of the past 1.6 million years, a period referred to as the Pleistocene Epoch (from 1.6 million to 12,000 years ago). Brief warmings, or interglacials, occurred at approximately 100,000 year intervals throughout the Pleistocene. There was an interglacial from about 129,000 to 116,000 yr BP. At about 69,750 yr BP there was a brief several-century warming, but it was too dry and not quite warm enough to qualify as a true interglacial. A brief warming occurred 34,800 yr BP. After an extreme cold period 18,000 yr BP, a gradual warming began. Erratic swings of warm and cold climate gave way 14,650 yr BP to an almost irreversible warming (the Younger-Dryas cold interlude was from 13,000 to 11,600

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yr BP), ushering in a true warm interglacial, called the Holocene Epoch, extending from 11,600 yr BP to the present.

Prior to the “70,000 yr BP warm/dry episode” human tools were uniformly simple. After this warming event tools became abundant, standardized, and more sophisticated (in Africa and Europe.) What caused the proliferation of quality tools? One possibility is that full-time toolmakers appeared at this time.

In order to understand the importance of tool making we must imagine what life was like during the Pleistocene. What, for example, were the main "selecting forces" for humans? In the book *Demonic Males* (1996) by Richard Wrangham and Dale Peterson a compelling and disturbing description is presented of our ancestors, starting with woodland apes that split from the chimpanzee line 5 to 7 million years ago, then to proto-humans living from 1.8 million years ago to 200,000 yr BP, and finally to our homo sapien ancestors of the past 200,000 years. All of these ancestors, like their chimpanzee ancestor, were preoccupied with territory, border raids, rape and even warfare - accomplished, of course, by "demonic" males.

A book by Lawrence Keeley, *War Before Civilization* (1996), carries this theme into the late Pleistocene and Holocene. An archeological record is described brimming with evidence for pre-historic "wars" that were more deadly and pervasive than our bloodied modern experience. Women and children were not spared, except for abduction as new wives or to serve as slaves. The enemy's property was either destroyed or appropriated. Mass graves contain victims with embedded arrow heads or spear points. Palisades and fortresses with moats preceded castles by many thousands of years. The principal cause of death during the past 20,000 to 30,000 years, when the archeological record is good enough for these interpretations, appears to have been inter-tribal warfare, with surprise raids being the preferred strategy.

Our ancestors must have lived in a world where survival depended on effectiveness in warfare. The tools of war during the last 200,000 years of the Pleistocene must have been clubs, axes, spears and eventually bows and arrows. The term "hunter and gatherer," in which men hunt and women gather, should be amended to "warrior, hunter and gatherer." Therefore, our "ancestral environment" (AE, also referred to by the more pedantic term "environment for evolutionary adaptation," or EEA), should be based not on the H&G model, but on a WH&G model!

Colin Tudge (1998) summarizes emerging suspicions that throughout the past 100,000 years our ancestors supplemented a "hunting and gathering" mainstay by horticulture and pastoral "farming." Horticulture consists of weeding and clearing an area to provide for a greater growth of some naturally occurring plant that produces something that is normally "gathered." Pastoral farming consists of herding and later domesticating animals that were previously hunted. Both forms of "proto-farming" invite banditry! And banditry will inevitably elicit defensive efforts by the proto-farmers. Both bandits and farmers would require effective weaponry, and this increases the importance of artisans who specialize in weapon-making.

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Weapon Making Transitions

I speculate that prior to the 129,000-116,000 yr BP interglacial, every hunter/warrior made his own tools - including axes, spears, bows and arrows, which were used for both hunting and warfare. After the 129,000-116,000 yr BP interglacial, a part-time toolmaker may have made most of these items. But during the 70,000 yr BP dry warming, migrations may have enhanced tribal conflict, rewarding those tribes with the best weapons. Any tribe that made use of a full-time weapons maker would have enjoyed an advantage in inter-tribal raids. The critical warming 70,000 years ago would then have completed a two-phase transition between three states: 1) a culture in which "every man made his own weapons and tools," 2) part-time tool and weapon making for the others, and 3) a tribal arrangement in which a specialist assumed full-time responsibility for tool and weapon making.

Whether the first full-time specialist appeared 120,000 yr BP, 70,000 yr BP, or 40,000 yr BP, the event would have been a milestone in human evolution. With a niche in each tribe for just one thing, such as tool-making, genes for tool-making could be evolutionarily selected at a rapid pace. Before that time, any genes for tool making are likely to have had deleterious effects on other phenotypic traits, which would have represented a serious penalty. But if a person's task is confined to mostly tool-making, it doesn't matter if he is unable to perform as a warrior, for example. Fierceness isn't a requirement for tool-making, nor is physical strength, fast reflexes, or endurance. A new era dawned for humanity when this new full-time niche came into existence. Because of what followed, I shall refer to the people who filled these "weapon maker" niches as "artisans."

Weapon Makers, Toolmakers and Artisans

The first full-time weapon-making "artisan" may have differed little in temperament from his fellows. It would make sense for him to train an apprentice after achieving competence, in order to preserve what had been learned through years of trial and error. This arrangement, in which an artisan takes on an apprentice, set the stage for the accumulation of advances in weapon making technique during succeeding generations.

Anyone expert in making weapons is already more likely than others to make good tools. The axe that kills an enemy warrior is similar to the axe that chops a tree. The stone knife that cuts an enemy warrior's scalp for a take-home trophy could also be used for skinning an animal. The first tools for constructive uses could have had their genesis as warrior weapons. The weapon maker was a natural choice for assuming tribal toolmaking duties as well.

If the apprentice is chosen by observation of who seems to have talent and temperament for toolmaking, and if this practice is preserved for many generations, then it is inconceivable that the genes would "overlook" this new opportunity. "Toolmaking genes" would have been rewarded, and they would become more abundant - even if they meant the individual was poor at hunting and "war making."

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The artisan will have been released from the genetic limitations imposed by the need to preserve hunting and warlike traits. Initially, the niche would be limited to approximately ~2% of the male tribal membership, but an important process would have been set in motion.

The toolmaker established a precedent for special status, and this precedent increased tribal readiness for establishing niches for other artisan work. Proto-farming might have created three other niches for artisans: horticulture, animal herding and animal domestication. Individuals especially effective in these activities would contribute to a tribe's success, possibly saving them from extinction when the vagaries of climate or animal migrations brought hardship to those who relied too completely upon hunting and gathering. Tribes that "accommodated" proto-farmers, in addition to full-time toolmaking, should have fared better during the late Pleistocene. (If this sounds like "group selection," it is! I pursue this further in the next chapter.)

If the horticulture artisans produced a surplus of crops, and if they could somehow process them for "storage," then there would be payoffs for the new specialty of preserving surplus foods and building crop storage houses. Because of the physical demands of this work, the initial stage of construction was probably performed by men. Whereas we can easily imagine that horticulture was initially women's work, since gathering is traditionally for women, the first horticulturists were probably women. But a woman's labor is finite, and childrearing, regular food gathering and preparation, making clothing, and other domestic jobs set a limit on how much of her time could be devoted to new artisan tasks. Thus, over time, men must have assumed more and more full-time jobs performing the horticulture tasks. Men probably were the initial pastoralists, since working with wild animals would probably be dangerous and require physical strength.

As artisan niches expanded, it is inconceivable that genes would not have been affected by the new opportunities, and they must have responded by "producing" people who were talented artisans to fill the niches. If 10% of the jobs for men were artisan-like, then in a steady state condition it can be anticipated that approximately 10% of men would be born with a phenotype having the artisan's talent and temperament. As tribes became technologically more sophisticated, the spectrum of abilities that people exhibited would have "matched" the broadening spectrum of niche opportunities.

Dawkins wrote about the hypothetical case of a population of "hawks" and "doves" living with specified payoffs (Dawkins, 1976), and he showed that natural selection forces should eventually lead to the establishment of a specific population mix. It was stable at this "stable point" because any displacement would tilt the rewards to those who were less populous. He called this dynamic an "evolutionary stable strategy," or ESS. The same argument should apply to tribal niches, and modern societal niches - provided the niches are long-lived and the forces of selection are natural. Thus, if a tribe "needs" only 10% of adults to engage in "infrastructure" matters (building and maintaining huts, clearing paths, building water storage structures, irrigation, sewage disposal, etc), we can expect that about 10% of newborns will be talented in these

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activities (assuming the payoffs are not drastically uneven). Another solution form, as Dawkins also points out, is that all newborns will be talented in "infrastructure" but only 10% of them will adopt that role when they grow up. Perhaps, in reality, we should expect to encounter something intermediate between these two extremes.

A new complication arises when within one species two or more "types" of individuals are rewarded. Since females are the result of breeding with males of the warrior type, they cannot be expected to produce male offspring of the artisan type without invoking some additional selection mechanism. One candidate mechanism is to hypothesize that a new type of woman co-evolves with the new artisan man. The artisan wife would have to assortatively mate with the artisan man for this to work. As Dawkins also explains (1982), daughters of a father who differs from the norm are likely to prefer men like her father, since she inherited some of her mother's predispositions. The theory for this has been worked out mathematically, and it is called "linkage disequilibrium." Therefore, it may be theoretically possible for boys to be born with a predisposition to become artisan men as opposed to warrior men, or politician men, etc., and still find women willing to marry or mate with them.

A simpler mechanism is for most of the new artisan genes to be located on the same chromosome, preferably close together. Then, when the sex cells are created by meiosis, the crossing-over process is likely to preserve the association of artisan genes on the same chromosome segment of the new gamete, and thus pass to male offspring either an undiluted warrior type or an undiluted artisan type.

Let it be noted, here, that the artisan performs tasks that require good left brain function. So when artisan niches expand, this is equivalent to stating that there are genetic rewards for genes that produce individuals who have especially well developed left brains. This will become an important point later in this chapter, and in subsequent chapters.

Problems Created by the Existence of Artisans

If full-time toolmaking led to toolmakers who were exempt from the dangerous exploits of war, who even began to lose their ancestral adaptation to hunting and war-making, then what might have been the attitude of the hunter/warrior toward the toolmaker? Would they not make fun of the toolmaker for staying home with the women and children when they went out on dangerous hunting and raiding expeditions? Would they not be inclined to tease and intimidate the toolmaker, and steal his provisions? But since the person who makes superior arrowheads and spears is too important to go on risk-prone hunts, especially if he is poor at such things, the tribe would be served well by customs that honored the toolmaker's special status. By stating that the tribe would be served well if the toolmaker is somehow allowed to safely pursue his labors without the threat of harassment by warrior men, I am actually saying that the warriors would be served well by customs that provide for the toolmaker's protection. This dilemma might have been solved by a ritualized granting of special status to the toolmaker, with taboos (eventually converted to "laws")

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requiring that his tool works and other provisions be off limits to the destruction or theft that might have been tolerated for non-toolmaker victims.

Artisan men may have been shunned by women, for the simple reason that they can not protect a wife and offspring from "take-over" males. Moreover, the tribe might benefit by artisan men not marrying, for a bachelor artisan would have more free time to practice his essential trade. (Might it be efficient if the genes also conferred upon the artisans a predisposition for homosexuality? This is a completely new theory for the origins of homosexuality.)

An unmarried artisan would be without the benefits of in-laws to support his case against unfair treatment by cheats and bullies, who might covet his possessions, food supply or hut. Social pressure is an important stabilizing force within a tribe. When someone cheats another, rumors of the wrongdoing spread, and although this may not restore equity it might at least serve to discourage a repeat offense. An unmarried man has half as many people belonging to the "relatives and in-laws" category, who stand ready to support him with social pressure, rumor spreading, or literal assistance. These problems constitute a challenge to the tribe (or rather the genes within the tribe) to institute an effective structure of taboos that guarantee protection of the artisan from non-artisan men.

There are two ways to imagine how a protection could be accomplished. Tribes that just happen to include taboos prohibiting intimidation and theft will prosper more than other tribes. This is a "group selection" theory for the development of taboos, and eventually the rule of law. An alternative is to suppose that genes are created (and are present in the population at large) which predispose people to respect "fairness." And such predispositions favor the adoption of specific tribal laws which protect artisans (and are available for dealing with other specific fairness issues). This is a more "robust" path toward the creation of laws. It requires the co-evolution of genes and culture, dealt with below.

It is possible that the laws which were meant to protect artisans, whose numbers were surely small, were made use of to some lesser extent by the others. Although the others would have had less need to use the laws on their behalf, the opportunity nevertheless existed for these others to "borrow" the protections of status meant for the artisans by presenting themselves as having artisan abilities. (A theory for "status" might be developed from this idea, but not here.)

The responses just described constitute the beginnings of a new type of culture, one based on concepts of "fairness." The fairness "cultorgen" must have been unfamiliar when it first became a tribal law ("cultorgen" is a term for an element of culture, introduced by Lumsden and Wilson, 1981). It must have been extremely frustrating for warriors to resist taking advantage of the artisan. The idea of "status" was old, but the idea of a special status for an artisan, someone who could not defend his possessions or wife in the traditional manner, was new. It would serve as a model for new kinds of status that are indispensable for a modern civilization.

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Further Problems with the Existence of Artisans

Let us be mindful of the sobering fact that all of our ancestors before the Holocene lived in a tribal setting. Tribes flourished or floundered as a group. It would be amazing if we didn't have many genes adapted to tribal living. The tribe needed an artisan, and the artisan needed the tribe. The tribe fed him, and protected him from the cruel, harsh world outside the tribal setting.

It's difficult for us in this individual-worshipping, modern culture to imagine how restrictive, confining and enslaving the tribal setting was, and how important group evolutionary dynamics were. It is often stated that banishment from the tribe was equivalent to a death sentence. The kind of liberated, individual-thinking that we take for granted today would have been rare for our tribal ancestors. Criticizing tribal rituals or beliefs would have been unthinkable, unless the individual was willing to leave the tribe and go live by himself, leaving no progeny, which is an evolutionary dead end. Maybe some people did this, but none of them are our ancestors.

In a tribal setting it makes sense for some of the membership to have assigned roles that contribute to tribal welfare. Individuals could have performed these roles better without the burden of family. Hence, bachelorhood (maybe even homosexuality) could have had a place in the tribal society. To use a recent example, we should all be thankful that Beethoven wasn't a family man, and that Einstein didn't allow family responsibilities to burden him. A whole host of other lesser people could also serve the tribe in this way (as they do in today's society), and they would be better able to make their contributions by eschewing family responsibilities.

These people, the artisans, were expected to make individual contributions to the greater good of the larger group, and part of their individual sacrifice might have been to forsake marriage. To the extent that the artisans were expected to remain single, any young man with artisan abilities would have been perceived by women as a bad mate prospect. Parents may have steered their daughters away from men who appeared to be on this path of individual contribution. Tribal people must have had their terms for geek, or egghead, and they would have served the purpose of discouraging young women from being attracted to “bad bet” mates. So, anti-intellectualism may in fact have its origin long ago, with the artisan playing the role of today's intellectual, being shunned, yet valued for the greater good.

In spite of all the special privileges bestowed upon the lucky artisan, he must have had many unexpected challenges to his individual welfare. Survival of the tribe is evolutionarily irrelevant except to the extent that the tribe's survival was a precondition for the survival of the genes within the individual. Thus, loyalty to the integrity of the tribe would have been valued by all. But the artisan is a special case. Artisans in all tribes might have been viewed as somewhat interchangeable. For example, if one tribe triumphed in battle over another, they might actually go out of their way to not kill or injure the enemy's artisan, for they could abduct him, and put him to use back home. Now, knowing this, every tribe should be suspicious of their artisan's allegiance to tribal survival, for he would have a less compelling reason for

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adhering to such an allegiance. Hence, even in the absence of evidence that his allegiance should be questioned, the artisan should be a worthy target of suspicion, and he should be treated as someone prone to tribal disloyalty.

The artisan trade must have brought with it many risks. Imagine a condition in which one tribe is being beaten down by a neighboring tribe, and weakening year after year. Might the artisan want to escape before it's too late, and thus avoid the risk of having to be captured during battle? He might even be at risk of being killed by his own tribesmen during their defeat, as a form of "scorched earth" strategy that is even today sometimes practiced. These conditions are conducive to all kinds of complicated intrigue, all revolving around the questionable loyalty of the artisan to the tribe. All artisans must have been both loved and hated by his fellow tribesmen. During battle, indeed, they would want to protect him because he makes their arrowheads. However, he would be the first to defect in the face of a deteriorating tribal situation, for he would be accepted by any other tribe. Oh, how his fellow tribesmen must have loathed his envious position.

Alas, the modern intellectual is heaped with the same scorn and ambivalence. During WWII the scientists and engineers who powered the war machinery were the artisans of their day. Britain's Alan Turing played a crucial role in breaking the code of the German's Enigma Machine, and helping the war effort immensely (interestingly, Turing was "gay"). After the war Werner von Braun was snatched by the Allies as if he were a prized booty of victory. How ruinous it would have been to the Axis if the Allies had captured von Braun at the beginning of the war. The Germans were short-sighted to allow Albert Einstein to leave, and a few others, who contributed to the conception and building of the atomic bomb. We may never know if Heisenberg intentionally did not work diligently to build the atomic bomb on Germany's behalf. Such is the power of the modern artisan, for if Heisenberg had pursued the atomic bomb successfully, Germany could have easily won the war.

Returning to the tribal setting, think of how the artisan must have viewed his fellow tribesman. The warriors he must have viewed with disdain, for couldn't they see that the warrior was mainly "fodder" for useless battles (that settled nothing as far as the artisan was concerned). The women who willingly became burdened with child-bearing, couldn't they see that they were being used for the tribal goal of producing warrior fodder?

And what about the tribal chief, who protected the artisan from exploitation by the more savvy and intimidating warrior? The chief was the artisan's benefactor, so the artisan would at least have to pretend to view him with a more loyal heart. But the chief must have thought of his artisans as a "useful asset" - like a herd of cattle, needing protection in the same way as a cow or goat. The king must have secretly snickered over this person unworthy of battle, inexcusably effeminate, but also essential for tribal survival, and contributing to the chief's job security. So the chief must have had to control his ambivalent feelings toward the artisan better than the other tribesmen.

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The artisan does not completely belong to his tribe. Rather, you could say that he belongs to his trade. For whichever tribe fails him, his trade will remain as his means for livelihood. The artisan secret motto might have been "if you're good at your trade, the tribesmen will come a courting."

The Holocene Artisan Explosion

The 5000 year climate transition from 18,000 to 13,000 years ago was a watershed period for human evolution. For the first time very large tribes assembled and adopted sedentary lifestyles. As glaciers receded they exposed new fertile lands, bathed in warmth and rain, and farming became more feasible. The domestication of both plants and animals was practiced more widely. Artisan opportunities exploded, expanding from weapons and toolmaking to such novel things as animal breeding, irrigation, grain storage, record keeping, trading, and tax collecting.

The Holocene should be viewed as an epoch of food surpluses created by sedentary economies, driven by the dramatic expansion of new artisan niches, which in turn created ever-more artisan niches. This positive feedback dynamic fueled an explosion of cultural change, as well as an exploding population. Large population centers influenced farming practices across ever-larger surroundings.

Many aspects of the way humans lived underwent dramatic change during the early Holocene. One that deserves comment here is that social life for the first time faced the challenge of having to deal with strangers who were not enemies from a rival neighbor tribe. Indeed, some of the strangers encountered in everyday life might have come from tribes that used to be rivals, but who could no longer be treated as enemies since they were a useful part of the expanding new economy.

How confusing it must have been for the first super-tribesmen: they were surrounded by unfamiliar faces, yet these unknown faces were not the enemy. What profound implications this must have had! Aggressive behavioral responses that were meant for strangers must have been triggered at subconscious levels, almost continuously, for early Holocene man while he conducted commerce on busy city streets among strangers engaged in a similar commerce. The new conditions of public life called for a change in one's attitude toward "society," as well as one's relation to it.

The glue that held together tribes numbering in the hundreds, as with smaller primitive societies, was based on "inclusive fitness" relationships and repeating "reciprocity" dealings with familiar tribesmen whose history of faithful past dealings was known. The new social setting required a greater adherence to explicit "rules" - which resemble taboos. Concepts of "fairness" were changed, as they included "outsiders" for the first time. Barter of goods for goods, and goods for services, and services for goods, became an everyday way of meeting needs. Artisans, who worked with their brains instead of their brawn, were a newly respected class. Whereas perhaps 2 to 4% of the pre-Holocene tribe was an artisan, perhaps 10% or more of an economically connected population were artisan-like. Artisan types proliferated; instead of just toolmakers, the new artisans constructed irrigation works, farmed,

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processed food, stored grain, tended markets, made clothes, kept records and governed.

What had happened to the old structure, with just hunter/warriors and maybe a part-time toolmaker? Few people hunted, and the warrior class had shrunk to a minority, with diminished power. Things had been turned upside down during the hectic few millennia spanning 13,000 to 6000 years ago.

This was the transition to a new condition called “civilization.”

CHAPTER 10

ARTISANS SET STAGE FOR CIVILIZATION: PART II

The Co-evolution of Genes and Culture

What is culture? Is it created by the genes, or superimposed upon human behavior from the "outside" as a new environment within which the genes must adapt and with which the genes have no "experience"? Or is culture something in between?

Let's begin with an 1896 assessment by H. G. Wells of what culture is and why it is so important to the Human future.

*"...it appears to me impossible to believe that man has undergone anything but an infinitesimal alteration in his intrinsic nature since the age of the unpolished stone. ... A decent citizen is always controlling and disciplining the impulses... ...it is indisputable that civilized man is in some manner different ... But that difference ... is in no degree inherited. ... With true articulate speech came the possibilities of more complex co-operations... Came writing, and therewith a tremendous acceleration in the expansion of that body of knowledge and ideals which is the reality of the civilized state. ...in civilized man we have (1) an inherited factor, the natural man, who is the product of natural selection, the culminating ape, and a type of animal more obstinately unchangeable than any other living creature; and (2) an acquired factor, the artificial man, the highly plastic creature of tradition, suggestion, and reasoned thought. ...in a rude and undisciplined way indeed, ...humanity is even now consciously steering itself against the currents and winds of the universe in which it finds itself. In the future, it is at least conceivable, that men with a trained reason and a sounder science, both of matter and psychology, may conduct this operation far more intelligently, unanimously, and effectively, and work towards, and at last attain and preserve, a social organization so cunningly balanced against exterior necessities on the one hand, and the artificial factor in the individual on the other, that the life of every human being ... may be generally happy. To me, at least, this is no dream, but a possibility to be lost or won by men, as they may have or may not have the greatness of heart to consciously shape their moral conceptions and their lives to such an end." H. G. Wells, "Human Evolution, An Artificial Process," *Fortnightly Review*, Oct, 1896.*

Wells viewed human nature as unchanging during our acquisition of a changeable culture. He leaves unaddressed whether or not he thought cultural changes were influenced by the genes (which hadn't been generally recognized in 1896), but he doesn't believe that culture changed our inherited nature (our genotype).

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Charles J. Lumsden and Edward O. Wilson, in their book *Genes, Mind and Culture* (1981), take the position that the evolution of culturgenes causes evolutionary change in the genome, which in turn allows new directions for culture, etc. Each affects the other, and together they co-evolve, reaching the elaborate cultural level of today's modern world. Their book is excessively mathematical, and can discourage all but the most accomplished mathematician; however, it is not necessary that one follow the rigorous mathematical treatments in the book to comprehend the concepts presented. I agree with their argument, and will present a synopsis of it here.

It is easy to understand that cultural evolution is channeled by what is "possible." As a trivial example, consider a hypothetical cultural element, or "culturgen," forbidding the drinking of liquids. Any person fool enough to adhere to this regimen would die (unless sufficient liquids were present in the solid diet). Not only would practitioners not live long enough to spread the culturgen, but the need for liquids is so strongly rooted in our genes that the weird culturgen would lack appeal and fail to win converts.

A pork taboo, on the other hand, would face less resistance, and indeed has appeared at a location and time when eating pork was probably too risky to be worth its nutritional benefit. Thus, the genes "allow" some culturgenes but not others.

The incest taboo is a well-studied culturgen, and it is found in all societies. Genes have evolved that identify incest situations and produce an aversion to their completion (in order to prevent the homozygotic expression of recessive genetic defects in offspring). The incest taboo is present in all human societies as well as many species. When it appears in animals that we normally do not believe are capable of culture, the behavior can be said to be hard-wired. It is not strongly hard-wired in humans because incest behaviors do sometimes occur, and details of the taboo are different in different cultures.

Incest taboo is a "permitted" culturgen; indeed, it is a predisposition that the genes have been coding for during all of human and pre-human ancestry. Therefore, any genes that influence incest behavior will be under selective pressure, and can be quickly selected into existence if they exhibit adaptive nuances - such as favoring first-cousin matings.

The following hypothetical culturgenes illustrate the range of likely to unlikely: 1) the celebration of successful warriors versus scorning them, 2) offering help to fellow tribesmen versus offering help to neighboring tribesmen, 3) sharing food with relatives when there's extra food versus denying food to relatives, and 4) adopting tribal culturgenes versus mocking them. The genes aren't "dumb," and not all culturgenes have an equal chance for acceptance.

The "other side of the coin" is to ask if the evolution of genes can be affected by an entrenched culture? The key word here is "entrenched." There is a tendency for all members of a tribe to adopt the same culturgenes, a noticeable human trait called "conformism" (Boyd and Richerson, 1996; Henrich and Boyd, 1998). In sharing a

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culture, people adopt most of its culturgen elements. There must have evolved a gene for a brain function that causes individuals to be unquestioning joiners, and all people have the gene.

Consider a person who is more willing than others to try out new culturgens. Not only will he be burdened with many new culturgens, most of which will be maladaptive, but his beliefs and behaviors will make him resemble someone from another tribe. Since every tribe is in conflict with neighboring tribes, a person who appears to belong to another tribe will be severely handicapped in gaining acceptance by his own tribe. Unless this open-minded individual happens to adopt a highly adaptive culturgen, his aberrant beliefs and behaviors will not be tolerated by his fellow tribesmen and he will be banished by them. Therefore, any gene that inclines a person to be open-minded is likely to quickly disappear from the human genome.

Yet, new culturgens do occasionally appear. So there must be a mental calculus of perceived benefit versus cost that allows some individuals to adopt a new culturgen without being banished. Perhaps tribesmen who have attained a position of unquestioned tribal loyalty are able to try out mildly new culturgens with impunity. If a successful huntsman uses a new arrowhead shape, then other tribesmen may be curious about it and may eventually adopt it. If the chief attributes a tribal victory to a new spirit, the others may consider accepting this new spirit. Everything new has a barrier for acceptance. If enough individuals are willing to overcome their natural resistance to a new idea then a generally-accepted culturgen shift within the tribe might eventually occur. If this happens, then those who remain uncomfortable with the new culturgen would be at a disadvantage, and the gene that codes for their culturgen preference would face a slow extinction.

This illustrates how culture may influence the evolution of genes.

To cite a specific, hypothetical example illustrating the co-evolution of genes and culture, imagine the first groups of Africans to migrate northward after the start of an interglacial warming. Upon reaching Europe, the migrants would have encountered retreating glaciers, rivers of melt water, abundant plant growth, grazing animals, and slow-moving Neanderthals (distantly related to humans). These migrations might have occurred 120,000 years ago, 70,000 years ago, and 13,000 years ago (but, in this last case, the migration would not have encountered Neanderthals, who were displaced by humans about 30,000 years ago). The new setting presents many opportunities, but it also demands many behavioral adaptations. Seasons are more extreme, and procuring food in winter is different from summer. Uneaten food doesn't spoil as quickly as in the jungle, so food storage is not only possible, it is essential to avoid starvation in the winter.

In this new land with seasons it makes sense to establish a home base in the fall where food provisions can be kept for use throughout winter. New customs are needed, as are new instincts. Whereas jungle life has no rewards for those who store food, glacier's edge life demands it! The impulse to eat whatever food is present is now a liability. Impulse control on this, and other matters, is important. Conscious

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thought is brought to bear on such tasks as providing food stores for the winter, protecting these stores from theft by animals (and other human groups), planning ahead by making winter clothes from animal skins while the skins are available, finding a cave before others, constructing a shelter, and many other season-related tasks.

As described earlier, every population of individuals will exhibit a spectrum of pre-adaptations and pre-maladaptations to a totally new challenge. Those who are naturally inclined to possess impulse control, for example, will be inclined to adopt culturgenes requiring impulse control. In the absence of a large tribe with an entrenched culture, individuals are freer to discover their innate "usage probabilities" for new culturgenes. The transition from a previous culturgen to a competing new one, is set by the genes, but is also dependent on the situation (physical environment, social setting, etc). People in the same situation will have different "transition probabilities." Those who are quicker to make the transition to the new culturgen are relatively "pre-adapted" to the new setting.

Whereas such pre-adapted people did not have a competitive advantage in the jungle, they are the new winners in a mid-latitude setting. Their pre-adapting genes create more successful individuals, and their genes will spread through the gene pool of those groups that migrate north.

As a new collection of culturgenes accumulate, creating a new culture, some genes become mal-adapted (to the new culture). For example, genes for impulsivity handicap individuals with that gene. If those people fail to set aside winter food stores, and are forced to steal from neighbors during the winter, they are at greater risk of injury or death by those who are protecting their food stores. Agreements may be formulated among like-minded provisioners, requiring the group to take action against those who don't respect other people's "property." An individual who has trouble grasping the new concept "property" and "property rights," and the consequences of "stealing," will be dealt with harshly by the majority, once these new culturgenes are adopted.

These examples illustrate how a new environment can change culture, and how a changed culture can influence the fate of genes, causing gene allele frequencies to change. As one change becomes established, new selection pressures exist on the other. And selection pressures work in both directions: new genes alter "transition probabilities" for the adoption of new culturgenes, and newly adopted culturgenes alter the selection pressure on genes. Thus, genes and culture co-evolve.

I claim that when tribes began to subsidize the full-time employment of artisans, possibly during a warming 70,000 years ago, the stage was set for an explosion of new artisan-like niches, and that when the Holocene interglacial began, some 12,000 years ago, the explosion of changing cultures began. The new niches include such things as agricultural farmer, domesticated animal farmer, tribute record keeper, clothier, entertainer, priest, government administrator, entertainer, merchant, full-time soldier and others.

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Before these changes began everyone within a tribe assumed the same roles, which dealt mostly with providing food and fighting neighboring tribesmen. The Holocene saw fewer and fewer people engaged in the traditional, all-roles lifestyle; an ever-increasing fraction of people in urban centers became engaged in specialized roles, having nothing to do with food production or fighting wars. Country living yielded to living within or close to cities. Culture became more complex, powerful, and played a growing role in the selection of gene alleles that were pre-adapted for new niches. This is the story of the expansion of culture and the birth of civilizations.

Defining Civilization

Let us ponder the term "civilization." Like most people, I know it when I see it, but it may nevertheless be instructive to struggle with defining it.

Perhaps the root word "civil" is the key to its definition. Where civil social interactions are common, there resides a civilization. However, uncivilized primitive people are usually "civil" to each other - but their "civility to strangers" is another matter? It is well known that the "tribal mentality" (Spencer, 1892) requires that two separate codes of morality be used; one is meant for intra-tribal interactions (amity) and the other for extra-tribal interactions (enmity). However, when neighboring tribes trade goods, they are civil with each other. Even if that's due to a fear of retribution, fueled by not knowing the ferociousness of the stranger tribesmen, "civility to strangers" still lacks the essential trait we're looking for.

I'm going to suggest a definition based on an observation that has probably never been suggested before. I assert that a civilization is the product of left-brained values and productive activities. Consider the dictionary definition: *civ-i-li-za-tion, n. 1. An advanced state of intellectual, cultural, and material development in human society, marked by progress in the arts and sciences, the extensive use of writing, and the appearance of complex political and social institutions.* Note how left brained these qualities are: material and intellectual developments, writing, science, complex social political and institutions. These are things that left brains value and only they can do!

The dictionary's phrase "the appearance of complex political institutions" conceals a deeper truth about civilizations. One of the functions of complex political institutions is to safeguard the rights of individuals from violation by the collective. I believe that ever since the left brain began its specializations for what we now recognize as LB-style thinking there has been a conflict between obligations imposed upon the individual by the group versus LB-style individual aspirations. The group wants conformity, and it endeavors to suppress individual expression. Those individuals who identify with group conformity are agents of the collective will, which is to say, they are dupes of the genes! For it is the individual with an independent will, fortified by a strong LB, who is unwilling to remain subservient to its RB, who can show the way to liberation from the genes that wish to keep us dedicated to serving their "needs." LB-style individuals protect themselves from exploitation by the genes by constructing political institutions, such as a legislature, a police system, and a justice

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system. When these institutions work, they control the collective's meddlesome intimidation of the individual who is minding his own business as he creates his own individual path through life.

Too often the political institution is hijacked by the enemy of the individual. Communism is a case of the collective usurping power from those who created the institutions to protect the individual from the insidious meddling of the collective. I believe that communists are well-meaning, but misguided by a naive understanding of human nature. They mistake society for the family. Within a family it is natural for each to take from those who have and give to those in need. This makes genetic sense, since the members of a family have a strong genetic relatedness to each other. It even makes sense for a tribe to behave in this communistic way, though to a lesser extent than for the family. But human nature will not endure the attempt to bestow family and tribal obligations to the larger social group of a society. Society can never be made to look like a family, or small tribe. Human nature has been molded for competition with neighboring groups, and it mobilizes our energies to defeat them. Communism must suppress individualism; it symbolizes the classic conflict between the needs of the collective and the aspirations of the individual. Communism is the enemy of everything valued by LB. LB wishes to liberate the individual from the collective, and communism thwarts these liberating ambitions.

The dictionary definition also refers to progress in the sciences. Science is a discipline that requires strong LB involvement. For a scientist, RB must play a supportive role, though it does "point the way" and "give opinions" when its intuitive feel for matters is useful. During my practice of science (in the physical sciences) my RB contributions have been important, but supportive. I will share credit with RB for my four patents, and other creative labors. Intuition is an essential guide through the labyrinth of possibilities faced by a researcher in any branch of science. Hunches that pay off advance every investigation. But the entire enterprise is overseen and guided by a disciplined LB. After the inspiring moment (which has happened to me many times), while the emotional excitement swells, LB goes into action and begins to "work out" the idea. Logical consequences of the idea are pursued, and tests of it are devised. A moment's inspiration can lead to many years of an unfolding, LB-guided investigation. Without a specialized LB, science could not progress.

As an aside, I believe the inclusion of "art" in the dictionary definition is a mistake. If we somehow could remove all the "arts" from Western civilization, would we still think it was a civilization? Imagine that we had the same level of literature, science, technology, musical heritage, material standard of living, sophisticated governing institutions, medical knowledge, and insight into how things work, I claim that we would still call it a civilization. Primitive societies have their "art" - and sometimes it's quite good art, easily rivaling "modern art" in appeal. Cro-Magnon artistic renderings are impressive, yet they did not possess a civilization. I maintain that "progress in the arts" is not an essential aspect of a civilization.

The dictionary definition for civilization refers to "the extensive use of writing." Writing is an LB activity, with key roles for both Broca's and Wernicke's areas, and

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others within LB. True, RB plays a role, but it is a supporting role, similar to the role I described for the pursuit of science. If RB tried to write by itself, it would lamely produce pat sayings, open interpretation poetry, and profanity; it would be unable, for want of a Broca's area, to produce syntactical prose. This much we know from brain research, that reveals what RB is capable of verbalizing when LB has been disabled.

There are more candidates wishing to be called a civilization than are deserving of it, the way I prefer to define "civilization." For example, the Mayan is often referred to as a civilization. The more we learn about it, the more *despicable* it appears to have been. For every trace of accomplishment, there are several barbaric, bloody practices. Yes, their artisans devised a complex calendar, and massive stone pyramids and temples, but they were used for the most inhumane ceremonies in the human record. The Mayans are an embarrassment to humanity! The Mayan individual was a victim of his culture (I will grant them "culture" status, but not civilization status). I pity those poor LB-style Mayan artisans who must have existed, for their labors were used to advance a collective appetite for brutality that only crazed contemporaries could admire. It appears that the insane Mayan culture was the captive of a right brain that was answering every call of the reptilian brain. Anyone with a strong LB would have had a limited opportunity to influence societal values, and would have been relegated to improving the calendar, overseeing the construction of killing temples, and fiddling with hieroglyphs for recording the glorious deeds of their murderous employer.

Most so-called civilizations are a mixture of the Mayan type (regrettably dysfunctional) and the ancient Greek example (admirable). The early Greek civilization produced truly ground-breaking insights into the nature of reality and Man's place in it. I will not present a systematic listing of civilization candidates, and their salient features. Rather, I will use three civilizations from among the many to illustrate dynamics that to some extent must have been present in them all. Let us first consider the rise of one of the first civilizations, the Minoan, and try to learn what drove its ascent.

Civilization Growth Phases

The Minoan civilization grew through three stages: an Early Period, 3000 to 2100 BC, a Middle Period, 2100 to 1600 BC, and a Late Period, from 1600 to 1326 BC, which came to an abrupt end when the volcano on the island of Thera erupted and, by destroying much of their infrastructure, rendered them helpless against invasion by the Mycenaeans. A tsunami probably destroyed the coastal settlements along Crete's north shore, where the Minoan civilization was also present. Prior to their demise, the Minoans were merchants and traders. They plied the Mediterranean, moving products from port to port for profit. Their merchant ships were well designed, and very functional. They had multi-story residences, with water delivered to some of them, aqueduct style. Their standard of living must have been one of the best for their time. The Minoans were a peaceful people, as they apparently had no army. Their art was elaborate and accomplished, and when the subject matter included humans it was

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usually related to athletic performances, dancing, and never warriors, battle scenes or angels.

Although I do not consider "art" to be an essential component of civilization, it can be used to understand something about the nature of their society. Art can also be used to provide clues to the evolution of their rise to power. Consider the samples of pottery from each of the three periods, and note the style they used to form and decorate them.



Figure 10.1 *Samples of Minoan pitchers and vases from the Early, Middle and Late periods. From Time-Life Books (1975).*

Ask any neuropsychologist to view the above sequence of vases and he would immediately recognize that there's a progression from a functional form preferred by the left brain to a decorative form preferred by the right brain. LB prefers straight lines and functional shapes; RB prefers curved lines, ornamentation that is elaborate, bizarre and sometimes incongruous (*i.e.*, like the baroque style) and extra flourishes that may detract from functionality.

What could this progression of patterns mean? Assuming that artisans made what their patrons wanted, it means that people in power during the Early Minoan Period were LB-styled, whereas by the Late Period the power had shifted to RB-style people. And, assuming that this interpretation is correct, how could this factoid illuminate our understanding of how civilizations ascend? It says, I believe, that the earliest stage of a civilization's rise is driven by LB-style people. And it also says that during the unfolding of a civilization the reins of power are captured by RB-style people. This last speculation will be taken up in the chapter that deals with the decline of civilizations.

In Chapter 15 I present evidence that the per capita output of technological innovations rises over time to a peak, then subsides - while the economic activity of the civilization continues toward a peak that occurs a few centuries later. In the case

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of the Greco-Roman civilization, the population peak (a proxy parameter for economic activity) followed the innovation peak by 5 centuries. In the case of the present Western (European-American) civilization, the population peak will follow the innovation peak (which occurred in 1900 AD) by at least a century, and probably two centuries.

The innovation peak corresponds to a period when society gives the greatest freedom to LB-style people, by celebrating their efforts, paying for their services, giving them a status that exempts them from warrior service, and publicly recognizing that LB activities are good for the general welfare. As I argue in the next chapter, RB-style people are "people-oriented" as opposed to "artifact oriented," and they are good at manipulating other people for their personal gain. This talent of one segment of the population leads to a gradual displacement of the LB-style people from power, thus explaining the shift in preferred art form during the course of a civilization's unfolding.

The world's innovation per capita has two major peaks, one at 300 BC and the other at 1900 AD. We know more about the recent peak, so let's consider it from the standpoint of LB versus RB. It is generally recognized that 15th and 16th Century Renaissance led to the 17th Century Enlightenment, which led to the explosion of 18th and 19th Century industrialization. The Enlightenment was a unique chapter in human history, generated by a changed "climate of opinion." The intellectual atmosphere was dominated by thinkers who, like Voltaire, penetrated the cobwebs of previous centuries and saw things the way they were. Voltaire was a nuisance to the church, politicians, and traditional intellectuals because he would not be tamed. He saw through the posturing and pretense of phony pontifications and despised the veneer of social acceptability; instead, he was cynical, skeptical, uncompromising, and had an acerbic wit. He exemplifies the LB-style artisan. Other *Philosophes*, like Holbach and Diderot, worshipped the Goddess of Reason, and ushered in the view that it is within human power to create a world, based upon Reason, to replace the old unrealistic dream of a Heavenly City, where perfection and felicity were supposed to dwell for eternity (see *The Heavenly City of the Eighteenth-Century Philosophers* by Becker, 1932). The *Philosophes* promised a new Heavenly City, built on Earth by what can now be seen as LB insights, and guided by LB logic.

Civilizations Falter

The 19th Century began to make good on some of these promises. Inventions just kept coming, insights into physics accelerated, and Darwin presented the world with one of mankind's greatest insights into where we came from and who we are - all based on LB observation and reason. The pace of discovery and industrialization continued into the 20th Century, starting with Einstein's succession of profound insights into the nature of the physical world. Science, technology and engineering were held in high public regard - until the Great Depression. For a decade, during the global depression in both Europe and the U.S., a malaise stifled the spirit, and it questioned LB's warrant for carrying the Torch of Progress. Criticism of society was suddenly unwelcome (poor H. L. Mencken lost audience). For 15 years serious

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thinkers were contemplating the end of civilization, as Diderot and the other *Philosophes* had worried might happen during the 18th Century. World War II resurrected the reliance upon technology for weapons, and the engineer was again cast as savior. The atomic bomb kindled the bittersweet importance of science. Sputnik forced a new dedication to giving power to the scientists and engineers, not because of a desire to build that dreamed of Heavenly City on Earth, but out of concern for national survival.

The Apollo program that landed 12 men on the moon was LB's last hurrah! From the social upheaval of "The Sixties" came a change in the "climate of opinion" - which lasts until today. LB accomplishments didn't stop, and in fact continue to be made use of, but they were not publicly applauded (except for an occasional rover on Mars or Hubble Space Telescope picture). Political correctness was created to discredit and stifle LB values. The greatest insight that Mankind has achieved occurred midway through the last half of the 20th Century, yet almost no one knows about it today. Mankind's greatest discovery is Sociobiology! It is the crowning achievement of LB thinking. It is comparable to the 19th Century's discovery that the physical world is reducible to the invariant laws of nature. Sociobiology forces living systems into this physical world, and accomplishes the supreme feat of Reductionism - everything, including life, is governed by invariant physical laws, and all happenings reduce to an unfolding of physics, where $\mathbf{a} = \mathbf{F}/m$ and quantum physics determine everything!

My measure for a civilization is that people have an honest understanding of who they are. If only a few percent have this glimmer of understanding, it constitutes a civilization. The Greeks qualify, thanks to such luminaries as Thales of Miletus, Anaximander of Miletus, Democritus of Abdera, and some of the ancient Romans qualify, thanks to thinkers like Lucretius. The 20th Century, Western Edition, qualifies because of such sociobiologists as W. D. Hamilton, G. C. Williams, Robert Trivers, Edward O. Wilson and Richard Dawkins.

The Chinese have seen many civilizations rise and fall in their land, and during the past millennium they have often been more advanced than their contemporary European civilization on measures commonly used to describe civilization. Their technologies raised living standards, but as far as I can determine they repeatedly failed the boldness test concerning the quest of insight into the nature of reality. Their "philosophy" suffers from an excess of intuitive, RB style nonsense! In my opinion they never achieved the level of insight of Thales, Democritus or Lucretius, and their 19th and 20th Century stifling "collective versus individual" culture has made them bystanders while Western thinkers explored beyond the Greek giants, led by Schopenhauer, Bertrand Russell, and the sociobiologists.

On many occasions the Chinese abandoned their relatively advanced technology, and reverted to living in an RB world. This "failure of nerve," or unwillingness to pursue Truth into areas where it "hurts," constitutes what seems to me to be an endemic Oriental flaw. Their practice of physical science suffers from the same intellectual timidity. Even though the Chinese score higher on IQ tests than all other races (except the Jews), there's something about their frontal lobes, or something about

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their RB-style of thinking, that causes me to question their ability to boldly advance human understanding of big picture matters on "the nature of existence" or "who we are." Until they allow the individual more freedom from the will of the "collective" the contributions of the Chinese civilization will be confined to mostly engineering. This, I'm sorry, is my humble opinion.

Thanks to a specialized left brain, two great civilizations, by my reckoning, have arisen during recorded history. I rank them "great" because they celebrate the individual, and they bring us closer to a stage of human evolution when we shall subdue the collective mentality. Outlaw genes created this desire to conform to what's good for the collective good, and we are now discovering that we have been dim-witted slaves too long! LB is leading the way to emancipation, and it is accomplishing its feat by creating civilizations. The job of liberation has not been accomplished; but the stage has been set for it's serious pursuit.

Thus we stand at the cusp of two millennia, looking back at many failed civilizations, at least two great ones, and wondering where ours is headed. Most people are unaware of human servitude to the genes and the collective they've created; while others, like me, wish for liberation and wonder if this next will be the century when humanity's emancipation will finally be achieved. If my claim is true that each civilization is the result of LB efforts to improve the life of the individual, with the unforeseen consequence of bringing the individual closer to liberation from the grip of outlaw genes, then we have a tool for discerning the health of today's civilization, and predicting its future.

CHAPTER 11

LESSONS FROM SAILING SHIPS: AN INTRODUCTION TO GROUP SELECTION THEORY

“For now I see peace to corrupt no less than war to waste.” John Milton, Paradise Lost, 1667

Imagine being a crew member on a merchant ship setting sail for a crossing of the Atlantic Ocean during the 18th Century. There will be storms and the constant threat of pirates during the 7-week journey. The sailing is sponsored by merchants who want the cargo to arrive safely, the ship’s owner who wants to preserve his investment by the arrival of his ship intact, and the captain and crew who wish to arrive safely where they will be paid and continue their lives. All factors favor cooperation by everyone on the ship in the mission of operating the ship properly on the high seas and delivering its precious cargo safely to the opposite shore.

Each person on the ship has one or more assigned jobs. Presumably the assignments are made on the basis of ability for the needed tasks. It won’t matter that one crew mate is an excellent runner, or hunter, or mountain climber, or jungle explorer, for on the ship these abilities don’t matter as he will be measured by his performance of assigned tasks. Each crew member’s fate will be affected by the quality of his crewmates and the manner in which they all work together to navigate the ship safely to port. When each mate discharges his task with competence and cooperation the entire endeavor is helped, and the prospects for a prosperous outcome for all mates is improved.

This situation is a simple way to introduce the concept of “group selection theory.” During the voyage all people aboard the ship will either live as a group, or die as a group. This is a more extreme example of a tribe either entirely living or dying during conflict with a neighboring tribe, but the concept is easier to grasp using the sailing ship example because the ocean is deep and unforgiving with a history of taking entire crews to the ocean bottom.

With the ship analogy in mind let’s consider the tribal situation; after all, the tribal setting our ancestors had to survive for millions of years. If a tribe is in chronic conflict with a neighbor tribe the losing tribe might be decimated. This prospect has a message for individual members who pride themselves as being proficient in some irrelevant realm. An individual with a talent for basket design, for example, will have a useless talent when there are more compelling needs for warrior talent.

So what makes a good warrior? There are the obvious factors of strength, agility and other skills. Two other factors deserve special attention: altruism and intolerance.

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Altruism is defined as a willingness to forego individual payoffs in order to achieve a payoff for another individual or group of individuals. Two explanations are commonly offered to account for the existence of altruism. First, if the cost to the altruist is small, and the benefit to the other person is great, and if the interactants have recurring relationships, then it is easy to imagine that a series of such acts can yield benefits to all participants if there are several such interactions with opposite sign. (The “sign” of the interaction refers to which person is the recipient of the altruistic act.) Notice that this dynamic does not require that the two people have a close genetic relationship.

The second explanation for altruistic acts requires that the two individuals be closely related. J. B. S. Haldane famously quipped that he would willingly give his life for two first cousins, or four second cousins, etc., in answer to a question about altruism. The calculus of genetic payoffs of this type is now called “inclusive fitness” and it states that our brains are designed to recognize when a sacrifice is likely to confer a greater benefit than loss to our genes, present in our near relatives as well as in oneself.

Finally, there’s a “group selection” theory that can account for altruistic acts. If a tribe is at risk of being decimated by a rival, and if the home tribe is desperate, then there’s logic in some individuals making high risk attempts to turn the tide of battle. It’s not necessary for the hero to be closely related to his fellow tribesmen since all of them will either survive or be killed depending on the outcome of the battle. This is analogous to ship mates dealing with an emergency at sea which requires heroic action to save the ship and all its crew. The genetic relationship of the sailors is irrelevant to the need for action.

A heroic warrior can be seen as an altruist. He risks his life in order to save the tribe because saving the tribe also saves the hero. Genes that predispose to this form of altruism should be selected for by evolution whenever tribes live in chronic conflict with their neighbors. The prediction is borne out, at least in game theory simulations (Choi and Bowles, 2007). Since the altruistic acts benefit only those in the home tribe it has been referred to as “parochial altruism” (“parochial” refers to a concern that is narrowly restricted, or a way of thinking that is “provincial”). The notion that genes predisposing for “parochial altruism” will evolve when tribes are in conflict is based on “group selection theory.”

There’s an interesting aspect to the way in which this kind of parochial altruism is elicited, which has also pointed out by Choi and Bowles (2007) as well as Wilson and Wilson (2007). It pertains to intolerance, an unwillingness to overlook individual or group differences. For example, if fellow tribesmen dress one way and someone is seen dressing another way (not incorporated into tribal rituals), the non-conformist will not be tolerated. Perhaps there were instances in our evolutionary past when a brave member of a neighboring tribe sneaked in to assess tribal strengths and weaknesses in preparation for later warfare. Such a person would be noticed as a “stranger” who dressed differently. A tribe whose members were tolerant might merely shrug and leave the stranger alone, whereas a tribe with intolerant members

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can be expected to challenge the stranger and demand an explanation of who he was and what he was up to. Clearly, if tribes are in chronic conflict conditions favor genes that predispose to intolerance. Thus, conditions of chronic conflict should increase the incidence of two types of genes: those that predispose to “parochial altruism” and those that predispose to intolerance. The game theory simulation by Choi and Bowles (2007) show that indeed both genes increase their representation in hypothetical gene pools that are in chronic conflict.

decisively overwhelms opposing tribes that it creates a form of peace that lasts for several generations. The evolutionary forces that selected genes for intolerance and parochial altruism are relaxed, and in their place are new forces that reward the opposite genes. During peace genes are selected that predispose to tolerance and selfishness. Again, this dynamic was demonstrated to exist in the simulations by Choi and Bowles (2007). Wilson and Wilson (2007) as well as Turchin (2007) have suggested this scenario as a way to understand the fate of empires. Indeed, this is one way to view the decline and fall of civilizations.

It seems ironic that war and peace elicit genes with opposite traits. How can these reversals be achieved? Two modes are possible. Either the population evolves in a way that changes the representation of “genetic types” or the individual members take readings of an ever-evolving social setting and automatically adjust their attitudes and behaviors. Both modes are based on gene expression, but the latter is more sophisticated. Just as the immune system takes readings of pathogens in the blood and adjusts its activity accordingly, the brain is capable of reading social situations and adjusting its activity in an adaptive manner.

There are two important clarifications for this use of the term “adaptive.” First, something is adaptive if it helps the genes for it to survive better. Second, the specified change is adaptive (for the genes) provided the current setting is similar to the “ancestral environment.”

The first clarification conveys the message that behaviors that help genes survive may not be in the best interests of individual welfare. Consider the switch from peace time to war time; the individual is expected to become intolerant and hateful, and he is expected to sacrifice his life through heroic acts that protect the home tribe. His fellow tribesmen may benefit by this heroism, but not the hero.

The second clarification has become important in modern times because tribes have been replaced by nations consisting of members from many genetic backgrounds. Japan is one of the few nations that has preserved its genetic purity, so there may be some genetic sense for the Japanese to engage in extreme acts of heroism (e.g., kamikaze heroics). It is also noteworthy that the Japanese in peace time have one of the lowest crime rates in the world. For them, the current environment resembles the ancestral one in important respects. But for most other nations the populations are so genetically diverse that the genes are foolish to create individuals willing to become loyal patriots ready to fight to the death for the Fatherland.

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If humans were capable of sanity they would mock patriotism for the pointless suffering it inflicts upon humanity. Patriotism has always been pointless from the perspective of the individual, but it is now also pointless from the perspective of the group. Yet, it cannot be eradicated since it has been so crucial to genetic survival for so many generations.

What a pathetic situation humans find themselves in. Anyone who mocks patriotism, who points out that it serves no purpose, will be branded “unpatriotic” – and their message will not be heard. The need to enforce patriotism has been so strong for our ancestors that they created a mythical entity to help enforce it: God. This creation was instigated by the genes, of course, since they were the beneficiaries of behaviors that secured their survival at the expense of individuals. Since the modern “state” is an outgrowth of primitive tribes, governed by chiefs and their helpers, it can be said that the church and state were meant to work together. The 18th Century struggle to separate them was motivated by a subconscious realization that individuals were the victims of this collaboration. The separation of church and state is a historical aberration, doomed to a short existence. Every humanist should be sad that the few bastions of 20th Century sanity are doomed to revert to their former evil state in the 21st.

In trying to understand the rise and fall of empires it will be wise to keep in mind the possibility that they are related to the rise and fall of genes that predispose for parochial altruism and intolerance. Other factors deserve consideration. Most of the forces causing empires and civilizations to rise and fall are based on evolutionary changes to the genome that require an understanding of the different levels of evolutionary selection. This chapter introduced the concept of “group selection.” We must also consider selection at the level of the individual and the gene. This is the goal of the next chapter.

CHAPTER 12

LEVELS OF SELECTION AND THE RISE AND FALL OF CIVILIZATIONS

Abstract

Evolutionists still dispute the relative importance of "group selection" while favoring almost exclusive selection at the level of the gene. There is never a discussion of that in-between level which I shall refer to as "individual selection." This is understandable given that individuals die, whereas genes and groups survive on evolutionary time scales. However, I present a different definition of "selective force" which more directly addresses the factors influencing the fate of genes, permitting the use of the concept "individual selection." With this modified way of viewing causes for gene frequency changes there is a simple way to "partition" causative factors between "levels" that I shall term Gene Selection, Individual Selection and Group Selection (GS, IS, and GrS). The concepts GS and GrS differ somewhat from the traditionally used meanings for gene selection (kin selection) and group selection (multi-level selection). I present an overview perspective for understanding the relative importance of these three levels of influence as they relate to the rise and fall of civilizations. I conclude that civilizations are an anomaly that arises when individuals break loose from the most confining bonds of the genes, as expressed by GrS, and give birth to IS. The creative forces let loose by an era of IS propels the society embracing it to create the thing we call a "civilization."

But history teaches us that civilizations are short-lived. It may be that by its very nature a society constructed upon a base of individual freedom is vulnerable to fanatical attacks by a residual of contemporaneous societies that remain gripped by GrS forces. This may allow us to understand why civilizations have always collapsed, in spite of their being surrounded by social groups with inferior levels of technology and oppressive levels of individual subjugation. It may be theoretically possible for civilizations to endure after the more primitive form of GrS societies are eradicated, but human nature is such that fanatical GrS societies will probably re-form spontaneously. If this occurs, civilizations will be doomed to fall after every rise, unless the long stretch of time somehow leads to the weakening of this impulse for reverting to GrS fanaticism.

The previous chapter got "ahead of itself" somewhat, so before proceeding further with the concept for the rise and fall of civilizations it will be necessary to back up and review some of the past 100,000 years and the rise of the artisan, which set the stage for the rise of civilizations.

Introduction

In my view the sociobiology paradigm is the 20th Century's greatest achievement.

When, for example, a sociobiologist considers observations of Darwin's finches on the Galapagos Islands, and the changes they undergo in response to a year of heavy rainfall that produces foods rewarding a different beak length, the concurrent rapid

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evolution of birds having different beaks is understood using a theoretical paradigm in which genes compete with other genes. Similarly, when prairie dogs warn of predators, and in the process catch the attention of the predator, the altruistic act is understood using the same sociobiology theory ("inclusive fitness") whose mathematics was worked out by William D. Hamilton (1962). Both examples illustrate evolutionary change as a product of competition at the level of the gene.

There is almost a consensus among sociobiologists that any gene frequency change should be viewed as the product of competition and selection occurring at the level of the gene, and not higher. Genes assemble individuals as mere "vehicles" for the genes, and these "lumbering" creations (Dawkins, 1976) compete with each other in order to enhance the competitive prowess of the genes within. This same theory also allows for the perspective that **groups** of individuals can be viewed as "vehicles" for carrying the genes in an even larger arena of gene competition. In other words, the accepted sociobiological theory states that evolution occurs when gene frequencies change in response to competition at the level of the gene, and that it is unnecessary to take explicit account of competition at the level of the individual or the group. Reeve (2000) seems to have shown that the equations of the "standard Hamiltonian inclusive fitness" theory provides for group effects, thus eliminating the need for considering groups as a level for competition.

As much as I like this theory, and in spite of the fact that I will defend it as basically correct for providing a proper account of essentially all evolutionary observations, I shall consider another paradigm for "understanding" gene frequency changes. This other paradigm has the advantage of addressing some observations that the sociobiological paradigm is theoretically incapable of explaining.

I assert that sociobiology's basic task is to explain why the frequency of a gene in a gene pool changes over time. I agree that the first order explanation must be that genes can achieve success by creating individuals who do a better job of reproducing those genes, and those of their kin, thus accounting for a greater representation of these genes in future generations. However, Hamiltonian inclusive fitness theory is an awkward tool for understanding group competition and it seems greatly handicapped in dealing with humans who have partially "liberated" themselves from the genetic grip by employing "logic" to influence decisions. In the next section I present examples of cases that pose difficulties for inclusive fitness theory, and in the sections that follow it I will suggest a different way of viewing the locus of causation for gene frequency changes.

After presenting these humble suggestions for amending sociobiological theory, I shall then march forward into dangerously speculative territory, and address the recurring puzzle of why civilizations rise and fall. In doing this I shall rely on my newly-defined concept for evolution at the Individual Selection level.

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Special Cases That Defy Sociobiological Explanations

Sociobiological theory assumes that physical environments do not undergo drastic changes on time scales shorter than can be accommodated by evolutionary adaptation. For example, if a rare and drastic climate change occurs it is possible that a multitude of adaptations related to earlier climates will be rendered useless and the fate of the species (and the genes that are unique to it) cannot be predicted. This may seem like a trivial "objection" to sociobiological theory, but it serves to illustrate that special cases do exist for which sociobiological theory is helpless. This illustration may not be a trivial exception to sociobiological theory given the ever-increasing evidence in the climate record for drastic and rapid climate changes. For example, Weiss and Bradley (2001) list 7 drought events that led to societal collapse (10,000 BC, 6400 BC, 3100 BC, 2200 BC, 550 AD, 950 AD, 950 AD, and 1280 AD). As an extreme example, climate can lead to the abrupt demise of species, as happened 65 million years ago when an asteroid impact created a "global winter" that exterminated the dinosaurs and allowed mammals to flourish.

Humans present a special case in two respects. First, they associate in super-tribes that require strict adherence by their individual membership to arbitrary customs. The drive for ever larger super-tribes may have been caused by the winner-take-all nature of warfare that evolved sometime during the past 100,000 years. To maintain the required superiority of numbers, and to enhance the competitive effectiveness of large tribal groups, I suggest that the power of the group over the individual grew to oppressive levels. An individual born into a tribe would have no choice but to adhere to the tribal beliefs and customs and to engage in coordinated warfare with neighboring tribes. The tribes with cultures that evoked a high degree of fanatical loyalty to tribal endeavors would be more successful at surviving and dominating their region. In this setting the individual (and his genes) experience a high degree of "shared fate." The group and its membership would prevail or perish together.

In this setting a novel genetic mutation that began by affecting just one person would be rewarded far less than in a setting where group-imposed behaviors were weaker, or not present. If we ask "what factors affect the fate of genes in the setting where fanatical tribes are in constant conflict, where there is an ever-present risk of the entire tribe's extermination?" we are forced to answer that "the perspective of selection at the level of the group appears to be more useful than selection at the level of the gene." In other words, when individuals are severely subjugated by the imperatives of tribal survival we must reckon with more than just genetic mutation in order to conveniently account for changes in gene frequency over time.

Humans confound sociobiological theory in yet another respect. With the evolution of a "logic using" left cerebral hemisphere, or left brain (LB), some individuals have achieved a modest level of liberation from the influence of the genes. "Rational" decisions are to a large extent "genetically unanticipated," which in some small measure disconnects the fate of the genes, for which the individual is a vehicle, from the ancestral environment selective forces that guided the development toward this wondrous, rational LB. One dramatic and straightforward example is the decision by

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an individual in contemporary society to use birth control measures to limit reproduction. When the genes created smarter brains they had no way of anticipating that those brains would subvert the genetic agenda. The sociobiological literature is inexplicably quiet on this confounding factor.

Before presenting a new way of viewing "selective forces" that incorporate the two anomalous aspects of human evolution described above I want to present a brief history of the changes in thought on where the locus of power for genetic change resides. There has been an active debate over the causes for gene frequency changes, and there have been several shifts in the preferred way of assigning importance to the various levels at which selection can occur.

Brief History of Level of Selection Viewpoints

Before Darwin's 1859 book, *On the Origin of Species*, most people believed that God made humans in such a way that our behavior guaranteed the survival of the species. Darwin displaced God from this throne, and groped to identify what replaced Him. The concept of genes was too vague in Darwin's time to be incorporated by his theory, since Gregor Mendel's article "Experiments With Plant Hybrids" (1866) lay unopened on Darwin's shelf; the rest of the intellectual community also failed to appreciate this work until 1900, 18 years after Darwin's death. For this reason Darwin can be excused for writing in 1859 "natural selection works by and for the good of each being." Nevertheless, with this statement Darwin appears to place the locus of influence at the level of the individual. Later, Darwin shifted toward group selection when he wrote (1871) "primeval man regarded actions as good or bad, solely as they obviously affected the welfare of the tribe, not of the species." Alfred Russell Wallace, who co-discovered natural selection as an explanation for evolution of species, "stressed that group selection ... played an important role..." (see Merlotti, 1986). Darwin, it seems, eventually joined Wallace in giving group selection a leading role in natural selection.

According to Carl Sagan and Ann Druyen (1992, p. 70), "One of Huxley's interests had been the idea that all animals, including us, were 'automata,' carbon-based robots, whose 'states of consciousness... are immediately caused by molecular changes of the brain-substance.' Darwin closed his last letter to him with the words: 'Once again, accept my cordial thanks, my dear old friend. I wish to God there were more automata in the world like you.'" (see also Huxley, 1874). This idea was "ahead of its time" and did not become part of the climate of opinion in the late 19th Century. However, I hope this "reductionist" idea will be resurrected during the 21st Century and will form the basis for understanding all behavior.

By 1950 several writers rediscovered the importance for natural selection of inter-group competition and, hence, intra-group cooperation. Merlotti (1986) summarizes Spencer (1892) as believing "Let enough members of a society disobey the code of amity (for members within the tribe) and the society will fragment; let enough disobey the code of enmity (against neighboring tribes) and the society will be crushed." Merlotti quotes Sumner (1906) "The exigencies of war with outsiders

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are what makes peace inside, lest internal discord should weaken the we-group." Sir Arthur Keith wrote persuasively in the same vein (1946, 1948), as again summarized by Merlotti "the success of the human species had been secured by cooperation within groups and competition between them."

The following table will be useful in seeing how differently thinkers of different periods partitioned the locus of influence for natural selection.

TABLE I
% Importance

	<1859	1859	1950	1962	1966	1994	Present
GOD	100	0	0	0	0	0	0
SPECIES	0	0	0	80	0	0	0
GROUP	0	20	80	15	10	20	10
INDIVIDUAL	0	80	20	0	0	0	10
GENE	n/a	?	?	5	90	80	80

By the mid-20th Century the forces of academic Marxist influence began to take their toll on the quality of anthropology thought. Whereas most previous theory incorporated an inherited predisposition to affiliate with tribes, and to be predisposed from birth to adhere to Spencer's "tribal mentality" (*i.e.*, with amity toward fellow tribesmen and enmity to all others), the climate of opinion shifted during the 20th Century toward a form of "cultural determinism." Biology was "out" and culture was "in." Culture was seen as a guarantee of species survival, and the locus of influence was "whatever is good for the species." The good of the species was such an appealing thought that those who could not relinquish a role for a "species nature" tried to see a pattern of evidence that instincts served species survival goals. Perhaps the most comprehensive expression of this idea is the 1962 book *Animal Dispersion in Relation to Social Behavior* by Wynne-Edwards. It amassed a tremendous amount of data in support of the idea that when a species begins to over-exploit its environment individuals will reduce their rate of reproduction (voluntarily) as if motivated to guarantee that resources will be available for future generations.

The fundamental flaw in this idea is that organisms are gene-created automata, and they cannot perceive the future, or even care about the future; they behave the way the genes have programmed them to behave, reacting to environments in ways that are programmed, and the genes that constructed them are the ones that have been the most successful proliferators in **past** gene-upon-gene competitions. Culturgens (culture's "memes") are also a factor for human behavior, but even memes cannot be credited with caring about the fate of the species.

Robert Ardrey's writings have withstood the test of time, in spite of the ridicule heaped upon him by those who resented his audacity for having an opinion on anthropology after having established himself in a different field (playwright). From his 1961 *African Genesis* to his 1976 *The Hunting Hypothesis*, the amity-enmity duality was a central theme from which he argued that aggression is a natural human

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instinct, as were within-group cooperation and loyalty. He wrote "If competition takes place not only between individuals but between groups, then the group with greater endowments of loyalty, cooperation, self-sacrifice and altruism concerning social partners will be selection's survivor." Thus, Ardrey tried to keep group selection "alive" during the 1960s and 1970s, but due to his background as a playwright he was not taken seriously by the Marxist anthropologists of that time.

During the first half of the 20th Century the discipline of physics made dramatic advances that captured the imagination of the general public. The climate of thought by mid-century should have been congenial to the notion that physical events at the atomic level dictate all particle motion, and therefore all animal behavior. There is no evidence (that I am aware of) that people were thinking this way by mid-century, even though Huxley had suggested the idea 80 years earlier. With the discovery in 1953 that genes are double-helix DNA molecules the stage was finally set for thinking of gene-assembled organisms as automata. The slowness of the process by which humans approach Truth is best understood by remembering that every creature is a gene-created automaton, and that a human is programmed to think in ways that served the genes that constructed his ancestors. Therefore, if the comprehension of a fundamental truth has never influenced the selection of human ancestors we cannot expect that humans will quickly grasp that truth. The gene-centered perspective requires a difficult leap of imagination for which the human ancestral environment has not prepared us.

William D. Hamilton (1964a,b) was one of the first writers to grasp that evolution should be viewed as occurring at the level of the genes! He created the mathematical foundation for understanding how evolutionary competition at the genetic level can explain such social behaviors as altruism. Hamilton's "intrinsic fitness" theory is a "mechanistic" theory for the evolution of individuals by natural selection that behave "altruistically" toward each other, provided the interactants are close relatives.

The math of Hamilton's derivation is daunting, even for mathematicians, and fortunately George C. Williams came forward with a non-mathematical interpretation of Hamilton's message (plus other implications of the gene-centered view) in a landmark book *Adaptation and Natural Selection* (1966). Williams addressed the issue of levels of natural selection, and allowed for the theoretical possibility that group selection, GrS, could occur when certain conditions existed. He considered conditions that must exist before GrS can occur (my description of this is adapted from Buss, 1999).

According to Williams, for group selection to be important there must be:

- 1) a high degree of "shared fate" of the members of the group,
- 2) low levels of reproductive competition within the group, and
- 3) recurrent patterns of differential growth and extinction of groups.

Williams demolished the old version of group selection, wherein adaptations evolved for the benefit of the species. He was even skeptical that this new version of group

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selection could be found in nature, for he believed that the three conditions he specified were rarely met, especially with humans.

Edward O. Wilson's book *Sociobiology: The New Synthesis* (1975) and Richard Dawkins' popular book *The Selfish Gene* (1976) consolidated the perspectives presented earlier by W. D. Hamilton, G. C. Williams and their lesser-known predecessors (R. A. Fisher, J. B. S. Haldane, S. Wright). The notion that natural selection worked at the level of the genes, and not groups, grew in strength with their writings.

Wilson and Sober (1994) revived group selection theory, and emphasized that groups can be portrayed as "vehicles" for genes, somewhat similar to the way individuals are vehicles for genes. They did not challenge that selection at the level of the genes is important; rather, for social animals it is also necessary to incorporate the effects of groups in order to understand the fate of the genes carried by its members. This version of group selection theory is sometimes referred to as "multilevel selection theory" (MLS). If the idea of multiple levels for viewing selection bothers you, re-read Chapter 1, and Appendix A, where I argue that a proper understanding of reductionism allows for more than one "level of physical explanation."

Even though MLS embraces such levels as the gene, the group, and even the species (and multi-species ecosystems), it excludes the individual. A 1998 book by Sober and D. S. Wilson, *Unto Others: The Evolution of Unselfish Behavior*, endeavors to place group selection on a sound, mathematical footing. Although Sober and Wilson acknowledge that the mathematics of *Unto Others* is "equivalent" to the mathematics of Hamilton's inclusive fitness theory, they claim that the rearrangement of terms in the equations renders it a better tool for understanding the role of competition at the group level. Reeve (2000) argues that the equivalence of the two mathematical formulations renders the group selection arguments in *Unto Others* unnecessary, since both theories are based on competition that ultimately occurs at the level of the genes. The latest version of "group theory" thus portrays the argument as a subjective preference for the mathematical arrangement of terms in an equation.

Overview of Human Evolution

I accept the conventional wisdom that before approximately 125,000 years ago humans lived in tribes of approximately 50 to 150 individuals. Inter-tribal conflicts may have been common, but I am unaware of compelling evidence that tribes exterminated each other before approximately 40,000 years ago (Keeley, 1996). It is not known if individuals were free to switch tribes. The simplest model for human evolution in those times would be to place the bulk of selection pressure at the level of the genes. To the extent that primitive humans lacked "culture," their evolution and the evolution of all other animal and plant life can be explained just as successfully using gene-level sociobiological theory.

At some time between approximately 70,000 and 12,000 years ago human tribes began to grow in size dramatically, and most humans soon found themselves

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members of "super-tribes" several times larger than the original tribes. The drive toward larger tribes was irresistible when they became more effective in inter-tribal warfare. The super-tribes also could more easily afford to allow a small number of men to specialize in full-time weapon and toolmaking, and other artisan specialties. Whenever inter-tribal warfare began to result in the extermination of the losing tribe, sometime between 70,000 to 12,000 years ago, that was the time when tribal size and tribal loyalty became crucial determinants of the fate of genes. Since the individuals within a tribe had a "shared fate" when tribal decimations began we can begin to consider placing the rise of "group selection" (the modern version of GrS) to this critical time. We may also speculate that tribal rules would grow more restrictive at the same time. Genes for "compliance" would be rewarded, for they would produce individuals who could embrace conformity with a minimum of cognitive dissonance (Lumsden and Wilson, 1981, and Boyd and Richerson 1985).

Super-tribes, and the growth of a tribal culture requiring strict adherence, represent a critical stage for the shift of evolutionary relevance from the genes to the group. Fanaticism, reinforced by tribal custom and religious fervor, reward the genes of individuals within that group, for they make the tribe a more formidable enemy to their neighbors (Kriegman and Kriegman, 1997). Individuals within super-tribes have no viable alternative to membership in their tribal group. After this transition, occurring sometime between 70,000 and 12,000 years ago, the factors that determined the fate of genes would be shared between the level of genes and the group. Prior to this transition most of the factors determining the fate of genes would have been at the level of the genes.

From the time of the transition to super-tribal conflicts to the time of Classical Greece, the factors determining the fate of genes would have been shared between the level of the genes and the level of the group, between GS and GrS. The notion of individual rights, or individual liberation from the oppressions of tribal life, began during the 6th Century BC in the area of northern Greece. It might have had beginnings in the Minoan civilization, but we have no records of what people believed from that far back (ending abruptly when the volcanic island of Thera exploded in 1628 BC). After the slow collapse of the Roman Empire the rights of the individual lost influence and group rule was restored. With the re-discovery of Greek philosophy by the 17th Century Enlightenment *philosophes* it again became fashionable for the individual to assert himself. The church's power was at an all-time low when this 17th Century rebirth of individualism occurred. What is now referred to as Western Civilization is an outgrowth of the ideas originally expressed by the Greek philosophers.

Western societies at the end of the 20th Century gave individuals the freedom to move about, to experiment with alternative cultures, and to think thoughts that contradicted those generally accepted. Tolerance of individual differences and respect for individual freedoms were at an all-time high at this time in the Western world. For example, a person was free to adopt birth control measures to control pregnancy, and many educated and wealthy individuals choose to forego having offspring. The fate of the genes was influenced by individuals who were free to make rational decisions

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that were often dictated by a desire to optimize the welfare of the individual at the expense of genetic propagation. This short-changing of the genes was accompanied by a weakening of the group to which the liberated individuals loosely belong, as will be explained below.

A New Measure for the Strength of Selective Forces

This section may be "tedious" for most readers. I will summarize it in the next paragraph so that you may skip to the next section whenever you think you're encountering more detail than you need.

The task of this section is to assign importance to each of three levels for selection (gene, individual and group) in an account of why genes change their frequency in a gene pool over time. If the gene level is all important, then we will end up stating that: the "force of the genetic level" $FG = 1.00$, the "force at the individual level" $FI = 0.00$, and the "force at the group level" $FGr = 0.00$. However, if group selection is important, there will be a re-partitioning of selection strength so that genes will be a more important explanation for gene frequency changes; for example, we would state that $FG = 0.50$, $FI = 0.0$, and $FGr = 0.5$. Note that the sum of the three forces adds to 1.00, which is a condition I impose for convenience. The task is to "partition importance" among the three candidate levels in order to explain what is causing a gene pool to evolve.

In groping to define a new "measure" for use in explaining changes in gene frequency let us review some of the attributes we expect of it. If this resembles describing the answer, then formulating the solution, it is. Common sense should sometimes guide us.

Consider the situation before there were super-tribes that held individual members captive by inhibiting the full measure of unique individual attributes and inhibiting the free expression of personal aspirations. It should be clear that however this new measure is defined it should assign an almost complete amount of strength to the level of the gene and very little to the group. After super-tribes came into existence, we want this measure to share strength between the level of the genes and the level of groups. After individuals begin to liberate themselves from group-conforming societal pressures, a phenomenon which has occurred most dramatically in Western cultures, we want this measure to assign some strength to the level of the individual. The individual who is free to choose his culture, his role in that culture, and his reproductive lifestyle, warrants a seat at the table of power over gene frequency changes.

The measure I propose is based on asking "What factors affect the fate of the genes? And how are these factors partitioned between the level of the gene, the individual and the group?" If we constrain the three strength values to add up to 1.0, then as individual liberation grows, for example, the strength of the genes and the group diminish. Thus, $FG + GI + FGr = 1.00$, where FG is proportional to the sum of selective forces identified as originating at the Level of the Gene, FI is proportional

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to the sum of selective forces identified as originating at the Level of the Individual, FGr is proportional to the sum of selective forces identified as originating at the Level of the Group, and the normalizing of the three forces is done so that the sum of forces = 1.

In this treatment I ignore all factors that influence the fate of genes that do not belong to the above three categories. For example, I will exclude from consideration earthquakes, floods, drastic climate changes, asteroid impacts, and all other rare physical environment events, even though they do indeed occasionally affect gene frequencies. By neglecting them in this analysis I am following the precedent of most other evolutionary models, and my treatment merely fails to capture random perturbations which will not affect the conclusions I wish to make. It would be straightforward to formulate a version of this theoretical treatment that includes these environmental catastrophes, but it is not my intention to include them here in order to better emphasize the role of the non-gene levels of selection, GrS and IS.

The method for measuring "Selective force," which I shall describe momentarily, is inherently subjective, and this is the weakest part of my argument. However, it has attributes that make it useful for things that other formalisms do not allow. At any given time many things are happening that may influence subsequent changes in gene frequency in a gene pool. The basic task is to associate changes of gene frequency with causes for those changes. Instead of attempting to ascribe cause and effect through an explicit treatment of each gene's phenotypic expression, and speculating about the implications of that altered phenotype, I propose to employ mathematical tools that are blind to the mechanisms for cause and effect. I propose to perform a multiple regression analysis of all gene frequency changes in a genome, over a specified time, using as independent variables all parameters that can be measured and that describe potentially relevant aspects of the social environment, the genes found in individuals, the milieu of culturgens that individuals are exposed to, "novel thoughts" experienced by individuals, and many other similar properties that could in theory be measured. This item "novel thoughts" may be troubling, but I want to retain it for reasons that will become clear later.

Obviously it is not feasible for anyone to measure all relevant parameters describing the social environment, the genotype of individuals, the cultural milieu, and the thoughts experienced by individuals, but let us suppose for the sake of argument that these parameters nevertheless exist. I make this request of the reader in the same spirit that is required by twin study investigators, for example, who attempt to partition the effects upon individual traits by genetic versus environmental causes. In those studies it is not necessary to identify every factor that influences how a person becomes who they are; rather, it is merely assumed that a myriad of such factors in each category exist, and the investigator proceeds to partition causation of the aggregate of effects by performing correlation analyses. The following paragraphs are the ones the casual reader may wish to skip.

Assume that we create an immense inventory of parameters that describe the state of a "setting" in space and time. Assume further that we assign each parameter to the

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categories G, I, Gr and "other," and reject all parameters belonging to "other," such as natural catastrophes (for the reasons presented above). The number of parameters belonging to G, I and Gr shall be referred to as N. The "state" at any given time is an N-dimensional "state vector," to use mathematical terminology. After choosing a "timescale" for associating the state vector with events of a gene frequency change we can, in theory, perform a multiple regression analysis (MRA) for each gene. Each MRA will use gene frequency as the "dependent variable" and the N-dimensional state vector as elements for N "independent variables." Each MRA will then produce N correlation coefficients, one for each parameter. We now can sum the correlation coefficients in the following way:

FG' = Sum of all correlation coefficients associated with Gene Level parameters,
FI' = Sum of correlation coefficients associated with Individual Level parameters,
FGr'=Sum of all correlation coefficients associated with Group Level parameters.

which are the un-normalized "forces," that are easily normalized by dividing by their sum.

The entire procedure just described is then re-performed for the next gene, and so forth until all genes are thusly treated. Since only a few dozen gene loci have more than one allele (for a given species), this analysis need only be repeated for a few dozen genes. These several dozen results are combined to arrive at an overall score for the relative importance of each of the three levels of selection.

Again, I want to emphasize that it is not necessary for the above procedure to be feasible in order to make use of the concepts that they convey. I only ask that you accept that it is *conceptually* feasible! In some sense I am appealing for a belief in concepts that are just as "real" as the coefficients in Hamilton's horrendously complex mathematical derivations. If we can imagine specific coefficients to exist in a hypothetical world, then they do exist in the real world even though as a practical matter we are limited to only an approximate measure of them.

One further clarification is needed here: there is nothing in my proposed paradigm that is incompatible with present-day sociobiology theory. What I am suggesting is an alternative way of viewing events. This is often done in physics. For example, a physical chemist can, in one situation, treat a salt crystal as a lattice structure held together by electrical forces, while in another situation treat the same salt crystal as a group of sodium and chlorine atoms that can become dislodged for chemical reactions when dissolved in water. The physical chemist knows, during both treatments of the salt crystal, that whatever happens is the result of the four forces of nature acting upon tiny masses, in a way that is too cumbersome for practical use in everyday experiments (the four forces of nature being gravitational, electromagnetic, weak and nuclear). Similarly, the person trying to understand human behavior, or the rise and fall of civilizations should know that every person's actions are dictated by the same four forces of nature acting upon tiny masses. I acknowledge the frequent need to seemingly overlook the inherently reductionist nature of all phenomena in order to advance our "understanding" of the everyday world. Sociobiology and my

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suggested partitioning of influence among three levels is just another example of looking at the same phenomena from different perspectives, and they are NOT contradictory.

Levels of Selection and the Rise and Fall of Civilizations

Consider the following figure, where I have marked off 9 stages, "A" through "I", that I am suggesting typify the evolution of a human civilization.

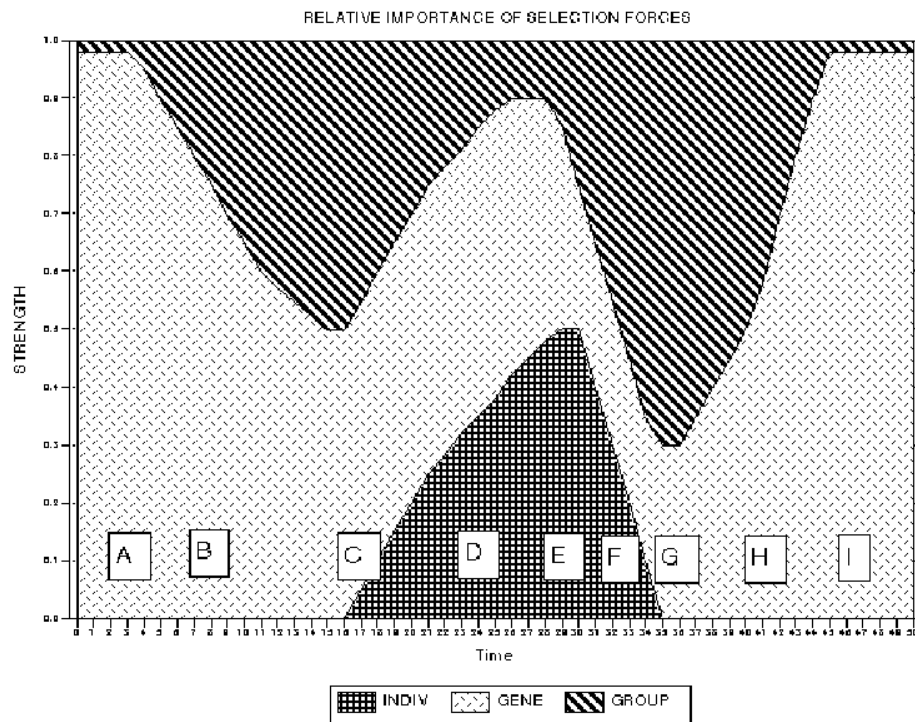


Figure 11.01. Hypothetical allocation of "selection strength" for the three levels Genes, Individual and Group.

At stage "A" we are to imagine that mostly the gene level of selection is important in determining the fate of genes. At this stage the individual does not assert himself, he does not make birth control decisions, or decide to walk away from the tribe and live alone. Also at this stage there are no super-tribes, and tribal conflicts are not all-or-nothing group exterminations. Consequently, the strength of group selection pressures is very small. It is only non-zero because I assume that the fate of individual social alliances has some effect upon the survival of the individual and his reproductive outcome.

At stage "B" we have super-tribes exterminating each other, rewarding the super-tribes that enforce conformity among its membership. The fate of the genes within an individual are less affected by the individual phenotypic expression of them, for some of the individual's destiny is beyond his control by virtue of the fact that he

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belongs to a tribe that will survive or be extinguished on the basis of how well the tribal membership works together. It will matter only slightly that a particular individual is greatly endowed by his genes if the tribe he belongs to is ineffective in combat with its rivals.

By stage "C" the group has become oppressive in its restriction of individual members. Any deviation from the cultural norm will be punished, so any differences in individual genetic profile, any outstanding abilities for example, are ignored and each individual is subservient to the dictates of group needs. This stage is marked by devotion to tribal rituals, unquestioned loyalty, fervent religious devotion, fanatical fighting and a readiness to sacrifice the self for the greater glory of the group. For a modern Westerner this stage is the most difficult to like. Kriegman and Kriegman (1997) suggest that religion was an invention that enhanced the fighting competitiveness of a group because it provided a "rationale" for fanatical behaviors; any groups not having a religion to motivate fanatical adherence to the group's destiny would be handicapped during warfare. I incorporate this thought as a crucial component of my argument that civilizations are destined to be short lived in a world where fanatical societies exist.

Stage "C" represents the "birth of individualism." It is no coincidence that the Olympic games, which emphasize individual as opposed to team competition, originated in a region that gave birth to the notion of celebrating the individual. The Greek philosophers discussed the proper relationship between the individual and society, and the proper role of a government. Democracy as a form of government is an outgrowth of a shifting of power from a "tribal leader with group support" to the individual. When the individual is set free to achieve, and receive credit for his achievements, it should be no surprise that more achievements per capita should result. Commerce and technology should develop faster, and more economic niches should be created. In a society where the individual has government sanctioned rights, as in a democracy and free-enterprise economy, there should develop a greater tolerance for people having new ideas. Productivity should rise in not only the commercial sector of the society, but also the intellectual. Literature, the arts, and philosophy are individual endeavors that attest to a vibrant social order that rewards individual initiative. These are the conditions that lead to what we call a "civilization."

But as the individual thinks for himself, he exerts an influence over gene frequency changes as well as the shape of society, and by the zero-sum nature of my proposed partitioning of the forces of selection we must see a decline in the influence at the level of either the genes or the group. I suggest that the group is the big loser, and perhaps its losses are so great that even the genes are winners. During the rise of a civilization, when more power flows to the individual, the genes can still be winners because an individual with a new mutation has the potential for prospering more than the average of his society. Even today the extremes of personal wealth continue to widen. Bill Gates has more wealth than 1 million average people in the Western World, and his wealth is based on genetic intelligence and business savvy (and, yes,

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the luck of an opportunist); at least you will agree that it is not based upon inheritance or acquisition through plunder.

It should be pointed out that Stage "C" appears to be driven by a bold assertion of a growing minority of people with "strong" left brains! Any neuropsychologist would agree that the manner of discourse exhibited by Socrates, Plato and most other philosophers of that time can be explained by invoking a leading role for styles of thought that only the left cerebral cortex is capable of performing. Elsewhere I have written that during the past 70,000 years, at least, there was a growing place for artisans within tribes, and these artisans could perform their work most effectively if they had well-functioning left brains. I have also argued that the left brain, as well as the frontal lobes, have undergone the greatest amount of evolutionary change in recent times, and that this is due to the need for full-time artisans for the support of tribal endeavors, and that this has grown in importance during the past 70,000 years.

Stage "D" is a growth of what was started in Stage "C." During this stage individual liberation, made possible by the influence of people with left brain styles of thinking, enjoys a toleration from society at large that is unprecedented. Tolerance for new ideas, new customs, and challenges to old ideas and customs becomes acceptable and expected. The lifting of group oppressions allows a release of unprecedented creativity and productivity, and this energizes commerce, technology and government efficiency, which leads to a spread of greater material wealth throughout most of the population. Excesses of wealth, found in both successful individuals and a bountiful government, benefit the arts. Stage "D" meets the dictionary definition for civilization, as "An advanced state of intellectual, cultural, and material development in human society, marked by progress in the arts and sciences, the extensive use of writing, and the appearance of complex political and social institutions."

But a curious thing happens during the progress toward a more extreme development of Stage "D" civilization, as we are now experiencing in Western Civilization. The recipient of civilization's bounty, the individual, turns inward, and becomes absorbed with personal, individual well-being. Beyond the boundaries of civilization's campfire exist uncivilized societies that have not absorbed the values of their more successful cousins. These societies are on the fringes of the fountain of wealth, and they feel "used" and left behind, as they pick up the crumbs that fall their way. Instead of wanting to emulate those better off, they resent them, and they wish to defeat their well-off neighbors, and perhaps plunder the fruits of other men's labors. They are moved by the ancient and primitive tradition of seizing what one wants instead of producing it.

While resentment grows among those relegated to being spectators of the civilized, and while the numbers of those lucky civilized members grow, another unexpected force gathers strength from within the civilization: it is a curious cadre of "cultural enforcers." These people are a residual of past episodes of boom and bust, and their ancestors have saved their kin from the excesses of success. The cultural enforcers (religious fundamentalists) wish to curb the undisciplined pursuit of civilization's glitter by re-instituting some old fashioned values. They can be likened to a

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well-meaning friend trying to sober-up a hung-over celebrant, as if the celebrant was merely preparing himself for the next day's battle. For there is always a next day's battle, and every civilization must be ready for it, or perish.

Stage "E" is the turn-around, a reckoning with the consequences of success. The cultural forces from within are creating a "group mentality" in readiness for battle, and the forces beyond civilized borders are probing their enemy for weaknesses. Both sides silently gather strength, like the quiet before a storm.

The Stage "F" collapse will be faster than the rise, for destruction is always easier than production. Fanatics chip away at the existing structure by attacking places that are most vulnerable; but just as important, they inexorably reduce public confidence in the existing order. For those at ground level, measuring change by moments of a lifetime, the changes may not be apparent and their significance will not be appreciated. Someone still drives the trucks, repairs the streets, and constructs the houses, though it is a different person and he worships differently. Traditional battle lines will not exist, as the war is one of skirmishes by well-organized, small groups of fanatics, as they erode a structure built by processes that are quietly disappearing. Instead of energies being focused on new and more glorious projects for the future, energies are focused on repairing crumbling social structures that directly impact personal well-being and on protecting society from random terrorist attacks. The "vision" of future things is replaced by a need to make concrete repairs and protect the security that was taken for granted in the past. There is no time or energy for the arts, for music, or new ideas. As civilization dissolves and eventually evaporates, it leaves a residue of useless scum.

Few people will recognize their loss as a loss, for by then most people will have turned over their left brains to the control of their rights. Part of the war effort, waged by the attackers and the attacked, is a covert campaign to discredit left brain styles of thought and left brain values. The attackers do it because they've never known the left brain's ways. The attacked do it because priorities now require that everyone become engaged in only essential endeavors. The essential endeavor is defense, and defense is most effective when the postures of fanaticism are adopted. And the retransformation to fanatic postures requires that the left brain style of thinking be abandoned.

Stage "G" is a complete deliverance of the once victorious civilization to the leaders of the group mentality. The tolerance for new ideas is lower than at any previous stage, and the individual expression of anything new and potentially upsetting to the grip of the group is unthinkable. Religion's job is to enforce this policy, to keep individual thoughts suppressed in order to preserve the status quo. The individual is not the only loser, for the fate of genes is even more strongly influenced by the vagaries of group culture. Whatever preserves group survival and dominance defines the way things are. Genetic mutations that in prior times would have brought their lucky individual vehicle to a winning place, thanks to their individual creations being inclined to be creative or productive, now produce individuals who are burdened by their superior creativity and individual passions. The newly strengthened group

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selection forces inhibit what we now call progress, for groups reward things that lead to Dark Ages. Where Group Memes Rule, the genes are in repose, and the individual is in eclipse.

Stage "H" and its eventual deliverance of its victims to stage "I" (equivalent to Stage "A") is a slow process, much slower than indicated by the figure. During this stage there is a lessening "need" for oppressing those who threaten stability by wanting to be progressive. The need to suppress individuality at this late stage is less than before because few people remain who remember how to assert one's individuality. Individualism during the Dark Ages is publicly non-existent. It may exist, but only furtively. Individuals who show more initiative, and who are motivated to achieve, slowly infiltrate the positions of power, and through a neglect of enforcing the culture of oppression they allow increments of change to erode the power of group culture. Perhaps we are lucky that it only took one millennium for the Dark Ages that followed the fall of the Roman Empire to give way to a rebirth of individualism. Part of the credit for the weakening of group culture goes to the plague of the Black Death, which so dispirited the populace, and so undermined the credibility of religion, that an opening appeared for individual voices to speak out in favor of ideals that had not been publicly uttered for 1000 years (Cartwright and Biddiss, 1972).

The longer Stage "H" endures, the more likely it is to be replaced by changes brought about by the voice of individuals. Evolution has produced brains that will not stay quiet forever, and this restless energy will break through religion's oppressive "blanket" eventually. A millennium or more may be required for this recovery.

The current episode of civilization shows signs of decline, amidst isolated surges of forward growth. If the Western World's civilization reached its peak in the early 20th Century (see Chapter 15), then the complete cycle, from Stage "A" to its repeat as Stage "H," requires approximately 2500 years. The previous cycle may have been interrupted by the volcanic eruption of Thera, destroying the Minoan civilization in 1628 BC - which had many of the features of the later Greek civilization. If the Minoan civilization had unfolded naturally, and had undergone a decline caused by a human restoration of group culture enforced by religious oppression, then the human spirit might have lain fallow for longer than the 1000 years that in fact was required for the resurgence of an individual-based culture, as occurred with the Golden Age of Greece. Thus, our present knowledge of the human record denies us the opportunity of knowing whether a 2500 year cycle is typical. Most of the time of our most recent cycle was spent in the Dark Ages mode. We do not know if this was true of the previous cycle, or if it will be true of any future cycles.

The dynamic just described occurs at lesser levels when regions are isolated for long periods. Thus, there are other examples to learn from of the exchange of power between the levels of the group and the individual (always at the expense of the gene). Asian history might be revealing in this regard.

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Oscillations as a Transitional Mode

Before 11,600 years ago, when the transition to our present interglacial was complete, the oscillations between Group and Individual power, each borrowing from Gene power, probably did not exist. It is a property of some physical systems that they undergo a transitional mode of oscillation during their shift from one mode to another. Before the Holocene (*i.e.*, our present interglacial), human societies were probably exclusively tribal, and super-tribal, corresponding to Stage "A" in the above figure. It is natural to ask "Will humans some day be exclusively civilized, remaining so for long periods?"

For this to happen, according to the ideas of this chapter, it would be necessary for a civilization to "include" the entire world's people in the benefits of being civilized. Such a condition would remove one of the energizing motives for fanatical attacks upon civilization's structure. To be sure, some people can be counted upon to hate the established order, no matter how beneficial it is to its individual membership. But there must be a critical amount of discontent for it to become a serious threat to the majority. This should be the hope of every civilization, that it can share the benefits broadly enough that the number of malcontents will not find each other in sufficient numbers to constitute a serious threat to maintaining the civilization.

Alternatively, those wishing for the longevity of civilizations may hope that the genes for malcontent will diminish during a civilization's existence. Clearly, it is too much to hope that a civilization will pro-actively alter the genetic composition of its citizenry. Unless, that is, the civilization is small in numbers, serious about survival, and physically isolated from its neighbors - as might occur some day when settlements exist in space.

If civilizations are to avoid falling soon after rising, they must confront both challenges: 1) attack from uncivilized, group culture societies that feel threatened by civilization's presence, and 2) the ever-present threat of indigenous malcontents coming together to form fanatical cadres bent upon destroying the civilization from within. I take an agnostic stance on the likelihood of either condition being met someday. The human species is an experiment, and it's not over yet!

Acknowledgement For This Chapter

I want to thank Dr. Daniel Kriegman and Orion Kriegman for letting me read their unpublished manuscript that expands upon their 1997 HBES Conference presentation. My thinking was helped by their idea that religion's proclivity for producing fanatic proselytizers and defenders gives religious societies an advantage in prevailing over neighboring societies with non-religious beliefs.

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APPENDIX TO THIS CHAPTER

A Fuller Explanation of Group Selection

How might GrS be measured? In the body of this essay I presented a conceptual version of a multiple regression analysis procedure for measuring the "force of group selection," FGr. That derivation was meant to illustrate a concept, and not meant for use in any specific situation. However, it may be possible to crudely measure FGr at a specific location and time. Imagine the existence of a questionnaire with weighted scores that probe key aspects of the setting in question. Although I leave the task of creating such a questionnaire to someone else, I shall hint at it with the following examples.

- 1) How often do individuals suffer from their affiliation with a specific group ("shared fate")?
- 2) How often do individuals publicly question beliefs that are held by the majority of group members ("compliance")?
- 3) Are individuals free to change group affiliation without sanction; may they have more than one group affiliation at the same time ("membership enforcement")?
- 4) Is an individual free to leave the group and live without any group affiliation (relating to the threat of a group to punish individuals by "banishment")?

Scoring societies using such a test might be useful in studying the "civilization's evolution." If Western Civilization can postpone that "rounding the corner" from Stage E to Stage F during the 21st Century, such studies might actually be conducted.

A Fuller Explanation of Individual Selection

It's easy to make the case that walking sticks and spiders that exhibit "male sacrifice" during procreation are enslaved to their genes (male sacrifice is when the female literally begins eating the male's head and other body parts after copulation has begun, partly to better nourish the development of eggs but also to assure that other males will not fertilize the female's eggs). With humans, the case is more difficult to make, but an earnest effort will be repaid. At the present time the sociobiological literature merely hints at this fact, for the field could lose public funds if it pushes forward too fast. Let us be bold, and accept the notion that humans in all societies are to some extent "used" by their genes, that emotional payoffs are meant to encourage individual performance of the most essential if not dangerous, laborious and illogical of tasks needed by our genes for gene survival. This book issues a "call to arms" for individuals to liberate themselves from genetic enslavement. Imagine that another book exists that calls for the individual to also free himself from the grip of "the group" (using whatever definition one likes for "group"). For now let us just assume that the individual is to some extent in the grip of both the genes and the group. In what ways are individuals now liberating themselves from these twin enslavements?

An individual asserts his "rights" when, for example, birth control measures are used. An individual asserts his rights when he argues for peace over war, and avoids

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being drafted into non-defensive, aggressive wars. An individual aspires to liberation from the genes when he thinks critically of conventional beliefs and pursues thoughts freely - as a "free thinker" does. These few examples reveal the possibilities for individual liberation from the grip of the genes and the group.

It is a novel situation when individuals achieve some degree of liberation from their genetic and group enslavements, and freely make personal decisions that can affect the fate of the genes for which they have become "newly uncooperative" vehicles. Because such individuals are less likely to produce their quota of offspring, or to nurture their nieces and nephews, these individuals would be viewed by the genes, if they had a view, as "freeloaders." They are not paying the price for admission to Life!

To the extent that other individuals remain enslaved, and to the extent that the inclination to liberate oneself is influenced by the individual's genetic makeup, the existence of liberated individuals will alter the fate of genes. The present time, as we approach the Stage "E" crest of Western Civilization, is an ongoing experiment. Let us hope that insulated communities will form and pursue the dreams of individualism for many more decades - before they are snuffed out by an encroaching reversion to primitive tribalism.

[Note: Most of this chapter was written during the 1990s, before Islamic extremists toppled the World Trade Centers on September 11, 2001.]

CHAPTER 13

THE TWO CULTURES - PART I

The previous chapter presents a speculation to account for the rise and fall of civilizations. I will now consider other factors that may contribute to their fall. In this and the next chapter I call attention to a troubling situation: there seem to be two types of people in today's world, and their ways of thinking, and their values, are the source of "polarizing" conflicts in academia, politics, foreign relations and everyday life. It may be important to understand the origin of this two-sided facet of human "ways of thinking," for, as I claim, they may play a role in the fall of civilizations.

Review of Brain Evolution

In this section I will review material in previous chapters concerning brain specializations, and present them in a way that serves my present purpose of understanding why today's civilization appears to consist of a continuum of people at the ends of which are two distinct and incompatible types. The activities of people at the extremes tend to produce what has been referred to as "Two Cultures."

If we go back far enough in our human ancestry, we will find that the left cerebral cortex, or left brain, LB was identical to our right cerebral cortex, or right brain, RB. By having essentially identical brain halves our remote ancestors benefited from a form of redundancy that was valuable in case of injury to one side. Although a slight specialization for sequential tasks probably developed in the left brain of our pre-human ancestors, left brain specializations began a dramatic evolution sometime in the Pleistocene, possibly 200,000 or 300,000 years ago, perhaps in response to an environmental opportunity presented by one of the interglacial warmings that have been occurring at approximately 100,000 year intervals for the past half million years. To first order, RB remained unchanged while LB began to allocate small areas for new, specific tasks. The ability to talk, as a supplement to gestures, evolved in LB's frontal lobe (Broca's Area), which was accompanied by the evolution of an ability to comprehend speech in LB's temporal lobe (Wernicke's Area). Eventually the left side also developed a capability for logic, a form of sequential thinking that requires the type of neural architecture involved in language. Logical thought is most effective when emotional intrusions are minimized. Hence, we may assume that as LB's capacities for logic evolved it became somewhat disconnected from the limbic system, where emotions originate.

Modern man's LB owes its "power" to repeated triumphs of wresting control from RB on matters that were best performed by newly-evolving LB modules. Logic is more powerful than intuition when novel situations are encountered. Novel situations and opportunities must have been frequent during climate transitions, such as

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occurred at the close of the last glaciation, approximately 12,000 years ago, and during the previous interglacial, occurring 129,000 to 116,000 years ago.

Whereas brain modules appear to "work together" to the untrained eye, a more likely dynamic is that they form an elaborate system of competing modules. Every situation encountered is "presented" to modules, and any module that "recognizes" the situation is an invitation for it to become aroused (anthropomorphically speaking); if the module "recognizes" the situation, it seeks activation from the "reticular activation system," or RAS. The RAS chooses a "winner" from among the competing modules (based on past experiences, presumably, as well as inborn predispositions), and the RAS grants authority to one module. That module is given access to the frontal lobe modules for formulating behavior and commanding it (via the motor strip). The winning module's recommended specific behavior (such as saying or doing something) is then implemented.

This modular arrangement makes good sense from the gene's perspective. Indeed, the more one thinks about it the more impossible any alternative seems to be. Consider any given brain circuit; there will be one gene that has the greatest effect upon it, a second gene that has the second-greatest effect, and so forth. The gene with the greatest effect on this one circuit is unlikely to affect ALL other brain circuits with which this circuit interacts, which will also be true for the other genes that affect the circuit under consideration. Therefore, if this one circuit works with the others harmoniously it will not be due to the genes that create the one circuit; rather, it will be due to the forces of natural selection that pass judgment on genes that create new circuits (and modify existing ones). The genes for any one circuit do not "know" about the other circuits, even though they can work harmoniously with them.

We humans are observers of the product of the many brain circuits, and we should resist the temptation to attribute the apparent harmony of mental performance to a harmony of genetic design. Any harmony that we observe is probably illusory, since it can be produced, as it most likely is, by a competition of modules with a continuous unfolding of winners.

Why was LB the site for mutations conferring the new capabilities of language, logic and other sequential tasks (if you remember reading this material from a previous chapter, then skip this paragraph)? One speculation attributes it to a subtle difference in LB's role for our arboreal ancestors. LB commands the right hand, which long ago, due to some random selection, took on the task of reaching for fruit while the left hand stabilized the body by holding onto a branch. Picking fruit involves a sequence of actions, which led to the development of small neural regions devoted to each sub-task and their integration with each other. Since neural connections within the small neural region relied upon short-distance communication, the neuron axons in these regions required less myelination (reliance upon a fatty tissue covering of the axon to provide electrical insulation for better communication to distant neurons). The genes for LB development became more adept at producing small neural networks that were less myelinated (having less of the myelin "white matter," thus accounting for LB's appearance of having a more grayish color). These small neural

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networks accomplished specialized tasks with a neural activity that was more-or-less independent of neighboring areas. When an LB neural network area finished its task it would communicate a "result" to specific other areas, which in turn also tended to be independent and specialized in their operation. Thus, LB lost the "holistic" nature of the right, as it specialized in mastering sequences of specific sub-tasks that were connected to each other for the accomplishment of an overall task - such as talking or comprehending speech.

LB's new specializations rendered it suitable for playing supporting roles when RB recognized specific situations requiring the specialized performance. LB paid a price for becoming a specialist. For example, when it assumed responsibility for language it lost some ability for monitoring body part position in relation to the immediate physical environment. This task is now performed almost exclusively by RB's "inferior parietal lobule," a region that is a homologous counterpart to the Wernicke language area in LB. So, as RB became dependent on LB for language, LB became dependent upon RB for graceful movement. So far, in this brief recapitulation of the evolution of LB, we can view the two brain halves as working together.

RB did not have to understand how LB did what it was specialized to do (nor could it); RB merely had to trust it to do what it was good at doing, and RB called upon it when the situation required. The use of "logic" to understand novel situations is an LB specialty. RB must be baffled by what the left is doing when it thinks through a sequence of logical operations. (Similarly, LB would be just as baffled by how the right side instantly recognizes a face.) Since RB is a more fully-connected neural network system, it would seem to be well suited to recognizing when a situation requires LB help. When RB makes this determination, it hands control to an LB region for the duration of the specific task. At least this may be the way things started out when the LB specializations first began to evolve.

When a human invents a new tool, he uses it for pre-existing purposes. However, the tool is also available for use to accomplish other tasks, perhaps tasks that existed before the tool existed. I view the new LB specializations in the same way. The brain did not evolve to comprehend reality; rather, the little reality that it does comprehend, between the many distorted comprehensions, is due to the fact that a better understanding of some realities were useful to the survival of our ancestor's genes. We can speculate that the human brain's greater ability to understand the world around it is an unintended consequence of an original need to perform specific sequential tasks. For example, the rewards of allocating the right hand for the task of reaching for fruit led to the evolution of sequential structures in LB, which allowed language to develop, which led to the making of sophisticated tools, which helped to create categories for placing and using words, which is the basis for abstract thought, which may eventually allow humans to achieve liberation from their genetic enslavement. What a wonderful outcome of the prosaic task of reaching for fruit.

My assertion that the sequential abilities of LB were used by RB to accomplish long-standing tasks more successfully is consistent with the notion that the cerebral cortex itself, both left and right sides, is used by sub-cortical structures for the more

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effective accomplishment of pre-existing goals of survival and reproduction. Thus, the limbic system mobilizes the more recently evolved cerebral cortex by “driving it,” invoking emotions as necessary, to engage the world in ways that lead to the creation and raising of offspring carrying the genes that assembled the individual and his close relatives.

The brain was not intended to aid in comprehending reality, *per se*, and the genes can be excused for not anticipating that LB would someday figure out that the individual is enslaved by its genes – a central message of this book. This unintended achievement is due to LB's prefrontal cortex, the part of the frontal lobes forward of the motor strip. Both the left and right prefrontal cortices have grown in size at an amazing rate in relation to the rest of the brain, during the past half million years. Interestingly, the prefrontal areas do not contribute to the component of intelligence measured by IQ tests. Rather, the prefrontal cortex works with the limbic system to produce elaborate planning capability, or “executive function.” It is likely that “what if” scenarios are orchestrated by the prefrontal cortex, and are evaluated by the underlying limbic system - to assure that genetic goals are being served when a plan is adopted. I speculate that LB is less restrained by the limbic system, in order to rely upon logic when creating “what if” scenarios, and to subject these hypothetical scenarios to objective criteria for establishing the truth of a novel situation.

Because LB is better suited to comprehend situations requiring logical analysis, it would have frequently found itself in situations where it recognized a problem that RB was totally unaware of. LB needed to take action, yet RB was unable to endorse LB's call for action since it did not “comprehend” the problem. To the extent that survival (of the genes) depended upon LB being allowed to act when RB didn't comprehend the need for it, there would be a need for some level of trust in LB's compelling request to take charge in dealing with a matter that only it could handle. The trust would have to reside in both RB and the reticular activating system (RAS). Perhaps it became more efficient for LB to initiate actions without RB's consent, with a direct appeal to RAS. This would eventually lead to trouble for RB.

In a primitive setting there may have been very few situations requiring LB's specialized understanding. However, the more capable that LB became, the more the new world created by LB needed LB solutions. LB's new world included sophisticated weapons and tools, horticulture, animal domestication, and the formulation of logical strategies for both everyday living and inter-tribal warfare. RB would be calling upon LB to act more and more, and allowing LB to unilaterally decide to act for a growing number of situations in the emerging new world of LB's creation. It is inevitable that as LB assumed more initiative in recognizing situations that needed LB attention, LB would have assumed responsibility for responding without consulting RB. The harmony that existed between RB and LB was at risk of being upset, the more so as the new “upstart” LB assumed more roles and a greater importance in surviving the challenges of the late Pleistocene. Occasional LB/RB disputes of authority may have become common during the Holocene.

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The disputes would not be between the entire LB and the entire RB; they would be between specific parts of LB and a large, diffuse part of RB. Recall that RB is a more fully-connected neural network, whereas LB consists of many specialized, task-specific neural networks. RB recognizes situations from the totality of the sensory input, but isolated modules within LB recognize situations needing LB attention.

Since niches in the tribal setting tended to be of either an artisan type or the non-artisan type, I believe that eventually people were "born with a predisposition" to occupy one of these two niche categories. It is quite possible that most people are born with the ability to take a reading of the environment and develop in the direction of one or the other niche type. It would make sense if the brain circuits that "take readings" of the environment, and hence of the relative merits for differing ontological development paths, also take into account the strengths (predispositions) that the individual inherited. (This whole process in which an individual's development unfolds in some way that approximately optimizes its usefulness to the genes within is a daunting subject, but it must be studied by future generations of sociobiologists.) In this way, I suggest, individuals are born with a predisposition for developing into one of two types: the sequential-style artisan type, or the holistic-style primal type. The rest of this chapter is concerned with the differences between these two types of adults and their implications for the fate of civilizations.

RBS and LBS Defined

In English there has been a longstanding use of the terms "head" and "heart" to signify two distinct ways of thinking and of "being." There is an unending flow of movies and books based on the conflict of the head and the heart, so since the terms are in such widespread use it should be unnecessary to define them. However, it is now obvious that the common term "head" is somehow associated with the perspective of the left brain, LB, while "heart" is somehow associated with the perspective of the right brain, RB.

I am tempted to present specific speculations about the neural mechanism that accounts for this dual association. For example, I could suggest that the "head" person's LB dominates his RB, forcing RB to play a supporting role; and that the "heart" person has an opposite dominance/support role relationship. Or I could suggest that the "head" person's LB asserts itself without RB permission, like an intrusive, uninvited guest, whereas the "heart" person's LB is not assertive in this manner. As an alternative, I could allege that the "head" person's RB is more similar to an LB, and the two hemispheres work together because they do not have conflicting values and life agendas; whereas the "heart" person has two RBs that work together in similar harmony. As a final speculation, which I tend to favor, I could invoke the prefrontal cortical areas, and state that the "head" person's LB prefrontal cortex has a stronger inhibition of the RB prefrontal cortex compared to the opposite inhibition, rendering LB's more closely connected LB posterior lobes a greater "voice" in perceiving the world and determining behavior; whereas the "heart" person has an opposite prefrontal lobe inhibition pattern, giving the RB

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posterior lobe perceptions of the world greater voice and a stronger influence over behavior.

I will not take a position on these alternative theories, as I believe the neurosciences are not yet advanced enough to warrant a preference for any of the foregoing. Indeed, perhaps none of the hypotheses I've identified are true. Or maybe several apply. It is not necessary for us to know why so many people tend to fall into the "head" and "heart" categories in order for me to proceed toward an important goal of this book. I merely ask the reader to accept that with some people it is possible to categorize them as tending to belong at the "head" end of a spectrum of traits, while others belong at the "heart" end of the same spectrum, acknowledging that most people are somewhere between the two extremes. (Anyone reading this far is a "head" person; the heart people would have discontinued in disgust during Chapter 1.)

I also ask the reader to consider the possibility that some people are born with a predisposition toward one or the other type, or with a predisposition to be a specific blend of the two extremes. And finally, I ask the reader to accept that those at the "head" end of the spectrum are a product of recent evolution, meaning that people having the "head" predisposition were less common the farther back in our ancestry we go. This last assertion is essentially a "thought experiment," since I cannot think of any way to prove it using data from the archeological record. The last point also has a corollary, worth stating, which is that "heart" people have "always" existed. Again, the archeological record probably cannot be used to support that assertion. However, I think that both of the alleged head/heart trends over evolutionary time are reasonable, possibly self-evident, and I shall risk making no further argument to support it as I proceed with my larger argument.

I am going to use the terms RBS and LBS as shorthand for "Right Brain Style" and "Left Brain Style" to refer to the beliefs and ways of experiencing life by the "heart" and "head" people. By my subjective reckoning, LBS people are much rarer than RBS people, and most people are a mixture of the two extreme types. To estimate their numbers it will be convenient to make use of readily available polls of religious belief. I shall use "disbelief in God" as a proxy parameter for identifying LBS people (which admittedly neglects culture's influence upon an individual's religious beliefs). One could also use "disbelief in immortality, or spirits, or astrology" but these questions are less frequently included in polls. Based on the frequency of atheism in the American population, only 4% of people are LBS (and 0.8% are hard-core LBS). The 4% estimate may strike some as too small; I agree, and cite that since the atheism rate in Europe is greater than in the United States the 4% value has probably been influenced by the traditional strength of religion in the U.S. from the country's founding (Hofstadter, 1969). Perhaps 5 to 10% would be a better estimate for the LBS rate among the Western world's population. Among elite groups of professionals the LBS rate is higher. For example, among physical scientists who are members of the National Academy of the Sciences, the rate of disbelief in God rises from the general population's 4% to an impressive 79%! (Larson and Witham, 1998).

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In order to describe a conjecture on the evolution of the human LBS/RBS distribution I will describe how one might measure an individual for the purpose of scoring him for placement on an LBS/RBS spectrum. Let us begin with IQ tests to illustrate how a person's LBS/RBS score might be measured. Every IQ test that I'm aware of has many subtests, and these are usually averaged in two groups. The two groups were devised before LB/RB studies showed that brain competencies are lateralized. Nevertheless, it is clear that one part probes mostly RB posterior lobe function while the other probes mostly LB posterior lobe function. For example, the "verbal" and "performance" scores for the WAIS and Wookcock-Johnson tests are crude measures of competence of the posterior lobes of LB and RB, respectively. With sufficient motivation I am sure that someone experienced in psychological testing could devise an objective measure that scores how LB and RB posterior lobe competencies are employed by the frontal lobes to produce the subjectively recognized RBS and LBS individual. In addition to a reworking of existing subtests, such as the WAIS and Luria Neuropsychological Investigation, I would suggest including questions about belief in angels, ghosts, spirits, communicating with the dead, telepathy, precognition, prayer, voodoo, astrology, touch therapy, life after death, and God. Assuming an effective LBS/RBS test could be devised, it would then be possible to imagine the "thought experiment" of testing a population of people from different times in our evolutionary past.

Evolution of LBS

If pressed to estimate when LBS people began to appear, I would say approximately 200,000 years ago, which is before the split of the three principal races of man: African, Asian and Caucasian (Rushton, 1995). Before then, everyone was all "heart." It may be worth illustrating how the population distribution across an LBS/RBS spectrum evolved from before the appearance of brain lateralization to the present. I rather think the change was not a "shift" but rather the rise of one "wing" of a distribution. The population distribution change would have been "driven" by the existence of niches that were newly within reach of being occupied by an otherwise slowly evolving human species.

The following two figures are meant to illustrate an imaginary experiment in which our primitive ancestors are measured by a LBS/RBS test and scored on a LBS/RBS spectrum. Figure 13.01 shows what might have been measured prior to the exploitation of artisan niches, let us say 300,000 years ago, before our cerebral hemispheres were greatly lateralized. At that time the only niches being exploited required "LBS minus RBS scores" in the 70 to 90 point region, which in this illustration is well matched by the population distribution.

Figure 13.02 shows a hypothetical population distribution after new niches appeared and began to be exploited by a subset of the population. The new niches might have been the use of language in hunting, toolmaking, horticulture, animal domestication, animal breeding, construction of food cache buildings, or anything requiring nearly full-time dedication and requiring conceptual thought or sequential thinking modes. I have indicated that the population distribution is not symmetrical, but has a bulge at

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the high "LBS minus RBS" end of the spectrum. When comparing individuals from the two ends of the spectrum there would be a stark contrast, and it would be tempting to say that they represent two distinct "types." The population distribution does not have to be noticeably bimodal for this impression to exist.

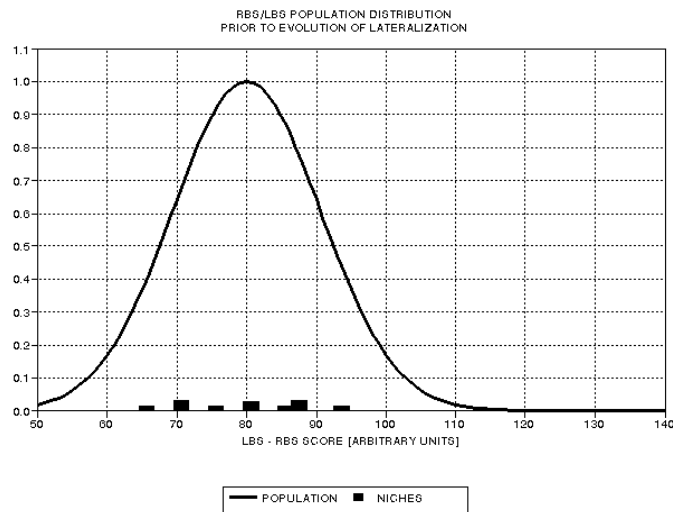


Figure 13.01 *Hypothetical distribution of primitive population on an imaginary LBS/RBS spectrum. The boxes along the baseline represent niches that exist and can be feasibly exploited at this stage of human evolution.*

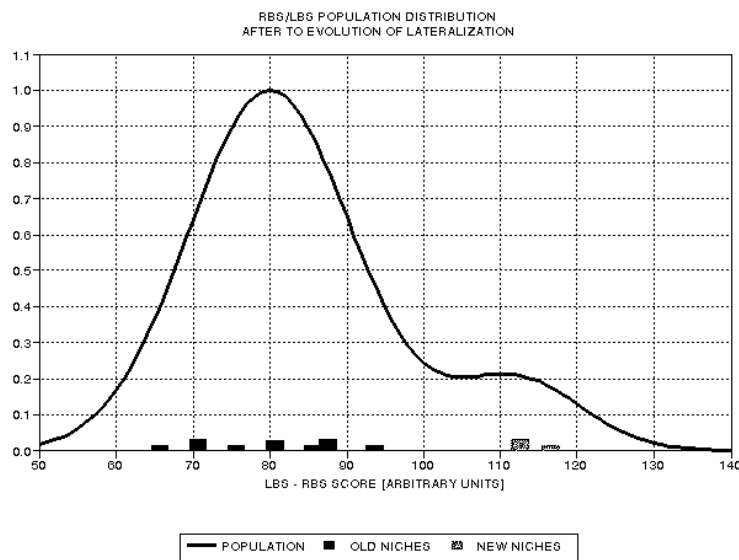


Figure 13.02 *Hypothetical distribution after new niches appear, perhaps associated with a climate change, showing how the population distribution might change in response to the new opportunities for niche exploitation. The right-most symbols represent "artisan" niches requiring a sequential type of thinking that only a left brain can perform.*

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I suspect that if a valid LBS/RBS test could be devised, results from today would produce a distribution resembling this figure. The two cultures would be represented by scientists, engineers and lawyers having jobs located by the right-most symbols, whereas salesmen, entertainers and the rest of the population would have jobs represented by the other symbols.

The conditions that favor the evolution of LBS are cultures rich with niches for the analytically inclined, which are abundant in today's technical world. In previous generations a Bill Gates would have been a lackey to a king, an artisan "on call" for odd jobs the king assigned. Just as people are born with different abilities for scoring well on IQ tests, it is inevitable that people are born with different predispositions for being LBS versus RBS. I believe that some people are thus pre-adapted to become LBS, and prosper within a culture that rewards LBS, whereas in others the vast majority would be destined for life as RBS, or something in between.

Those people who are genetically predisposed to being strongly RBS will be forever resentful of the minority of strongly LBS people among them, especially if the culture rewards LBS talent as much as it does today. The vast majority of people will merely feel "uneasy" about the presence of strongly LBS people. This inherent resentment of one type for the other is hinted at in C. P. Snow's book *The Two Cultures* (1961). It is also possible to gain insight into the dilemma posed by LBS individuals in a predominantly RBS society by reading between the lines in *Resentment Against Achievement* (Sheaffer, 1988), *Anti-Intellectualism in America* (Hofstadter, 1969) and *The Great Roob Revolution* (Price, 1970).

In today's Western culture, dominated by the products of LBS achievements, it is easy to portray primitive people as primitive. Such pronouncements may not be welcomed by the RBS majority, for they recognize a resemblance of their outlook with that of the primitive. For example, RBS people tend to see all things in terms of the animate, whereas LBS people tend to see things in inanimate terms (cf. Ch. 2). The primitive, who is by inclination an adherent of an RBS world view, imagines that spirits reside in the trees, the wind, lightning, and all other natural phenomena. They conceive of the "forest as parent" and "a giving environment, in the same way as one's kin are giving" (Bird, 1990). The Inuit "typically view their world as imbued with human qualities of will and purpose" (Riddington, 1982). American Indians in pre-Columbian times also viewed the world as controlled by spirits (Aleshire, 2001).

In contrast, the scientist has cleansed his world view of these ancient spirits, and he tries to perceive things as mechanistic (this attribution is for the hard-core LBS scientist, who is more likely to be found among the elite, high-achieving scientist population). The hard-core LBS person is a reductionist, who automatically perceives all phenomena as the inevitable unfolding of a mechanistic universe (only a minority of high-achieving scientists would object to this characterization). If you like what you're reading, then you, like the author, are extremely LBS.

As an aside I will present an amusing example of the differences between the approaches to understanding something by an LBS and an RBS person. It occurred at

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a conference on "Imagination and the Adapted Mind: The Prehistory and Future of Poetry, Fiction and Related Arts," UCSB, August 26-29, 1999. The invited speakers seem to have been intentionally drawn from the core of the opposing "two cultures" camps. It was amusing for me to watch a hard-core RBS participant's consternation over the fact that inanimate objects enter our mouth, and inanimate objects leave at the other end, yet "we ourselves are animate." For him that was a dilemma, requiring appeal to the magic of words, which he provided, referring to "transubstantiation" - as if this magical invocation explained something and solved his dilemma. But it is only a dilemma for the RBS person. For me, a hard-core LBS person, all so-called animate objects are more accurately to be thought of as "inanimate automatons." We are composed of the same atoms as everything else, and no magic transubstantiation occurs when the atoms of food and water enter or are incorporated into our bodies. Those atoms are subject to the same laws of nature that moved them before they became part of this exalted entity we call human. The RBS person, being unaccustomed to thinking of the human body as a mechanism, would naturally be troubled by this trivial phenomenon.

The modern world rewards left-brained styles of thinking more than at any previous time. The LBS people of today appear to be "pre-adapted" to our times. But pre-adaptations do not exist by intention. Either they are accidents, in which a small opportunity is exploited by a novel mutation, or a wide niche is exploited gradually by a series of mutations, each adding an increment of capability to the first. I am wondering if the gradual evolution of LB specializations, which underlies lateralization, is in fact a case of the latter. For example, imagine an evolutionary scenario in which a sequential brain circuit enables a toolmaker to produce better spearheads than his brothers, and his genes are rewarded. Next, that line of men who have the slightly more sequential brain circuit in their LB, which the tribe may designate as their official toolmaker, undergoes another mutation that further improves his toolmaking ability - he might simply demystify the stone that he works with. By this process he may lose the belief that the stone has feelings, and is hurt when struck, or that the stone wishes to be elsewhere, or that the stone will invoke the spirits of his stone relatives to wreak revenge upon the heartless chipper - and this is an asset for performing his toolmaking task. We now have someone who not only tends to depersonalize the stone he must work with, which frees him to handle the inanimate stone better, but a person who tends to demystify in general. He is more likely to perceive the wind as really not caring about humans. He might be inclined to discard the many spirits that so preoccupy his fellow tribesmen - and if he is smart he will keep these new beliefs to himself.

What I am proposing is an evolutionary selection and maintenance of a specific type of variation within a species, for there are reasons the majority of tribesmen should maintain their spirit-styled outlook. Spirits, I shall assume, are a short-hand way of enabling people to deal with each other, and the majority of tribesmen are faced with having to compete with their fellow men rather than the stones to which the lonely toolmaker is relegated. I view the toolmaker as heralding an era of the division of labor. He is the prototype for the artisan, who occupies the broader tribal niche of improving weapons, inventing new ones (like the bow and arrow), refining

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horticulture, building food storage huts, domesticating animals, inventing the pastoral way of life, and later, irrigation, wheeled carts, atomic bombs, the internet and nanotechnology. The opening up of artisan niches, starting with the toolmaker, provided ever greater rewards to the man who viewed nature as spiritless, or inanimate. The human answer to this ever-growing opportunity was to invest more in left-brained circuitry specialization for dealing with the inanimate world. These lucky new people may have paid a price in being less apt in dealing with human relationships, but this would often be mitigated by a tribal understanding that these people were "different" and should be left alone to do their artisan work. They may have been looked upon as childish, or unmanly, since they were probably exempt from pillaging and other proud warrior exploits. The tribal chief might have thought of the artisans the way people later thought of the herds of animals that they domesticated: they had to be "kept" because they were useful to the tribe.

This speculation, that some people are naturally LBS, is meant to explain why the two cultures phenomenon is so pronounced. It suggests that some people are fated at birth to occupy either one of the small but growing number of LBS niches, or instead to occupy the many though decreasing number of RBS niches. Other people, being only partly inclined to artisan niches, could go either way in their personal development, and they would be wise to take a reading of the likely rewards for competing career paths when they make their (unconscious) life's path decision.

The Threat of Individual Liberation

The evolution of capable prefrontal lobes, and a newly-fashioned LB specialized for analytical insight, obviously helped our ancestral genes survive. This much can be safely concluded by merely citing that we have the hardware in question. But new tools can sometimes cut in two directions, metaphorically. A brain that can put two and two together can theoretically put itself to uses that are subversive from the perspective of the genes; such an individual is at risk of liberating himself from the enslavement of "being a tool for the community"; he may think taboo thoughts of "becoming the captain of one's own ship, enslaved to no one." The toolmaker is at risk of "walking away" from his assigned role as a tool for the tribe!

A creative prefrontal lobe might ponder scenarios in which the individual essentially "thumbed its nose" at the tribe by going off into the woods to live a simpler life? Before the creation of super-tribes, which offered specialized niches for strangers to fill, this way of thinking would have been suicidal. But during the past 12,000 years, during our present Holocene interglacial, some options for walking away from the genetic agenda have become feasible, and should be a real "concern" to the genes.

Let's review the main theme of this book, as presented in the Introduction. For each hypothetical behavior that has an innate component, we are to make an evaluation from the perspective of the genes, and then make an evaluation from the perspective of the individual. We must invent the concept "individual welfare," or "individual best interests," to continue this experiment. I shall infer its essence by presenting just

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two brief examples of thought experiments to illustrate the concept "outlaw genes." A larger set of examples, with fuller explanations, is presented in Chapter 13.

The individual who invests in raising offspring is embarking upon a long-term and exhausting life course. Sex leads to babies, and for women this means the commitment of a life of parental enslavement. For "dutiful" fathers, sex and babies can lead to a similar enslavement. If a man or a woman gave thought to this situation, and instead decided to pursue an individual-fulfilling life of aesthetic pleasures ("smelling the roses," watching sunsets, appreciating music) that person could in theory lead a less exhausting and more tranquil and fulfilling life.

For my second example, consider the young man who is expected to participate as a warrior in raids of neighboring tribes (or nations, if our locus is the Holocene). Marauding, pillaging and engaging in battle are dangerous activities. The individual who says "no" to tribal offensive campaigns, thereby flaunting unthinking patriotism, and who can successfully avoid combat without paying the price of humiliation, would be safeguarding his best interests.

Let us now pretend that we can calculate outcomes of various actions, and ascribe to them some quantified measure of Individual Welfare Value, IWV. Let us also suppose that we are able to identify how strongly each gene contributes, under average conditions, to eliciting each action. I have in mind a model for generating behavior in which a person's genotype interacts with his Environment to produce an expressed Phenotype, or GEP, a process best described by Symons (1979) and treated in Chapter 6. By adopting some average environment we can in theory calculate 1) the probability that a given gene will elicit the action under question, through the GEP analysis, and 2) the effect of this action upon the frequency of genes in the future genome. This allows us to link an action to a measure I will call Genetic Survival Value, or GSV. If we can do these things, then we can plot a point corresponding to that gene in IWV and GSV space. To wit, refer to Fig. 12.03, first presented in the Introduction and reproduced here.

Since the concept of "outlaw gene" is so important, its explanation is worth repeating. In the figure we have four quadrants. The upper-right quadrant is where the actions elicited by most genes reside, as they provide value to both genetic survival and individual welfare – such as breathing and eating. The lower-left quadrant contains mutant mistakes, and genes that elicit such actions should survive no longer than the individuals who carry them. Genes in the upper-left quadrant are unlikely to exist, except by mutational accident, since there is no way for Nature to code for an action that destroys the code. The most interesting quadrant is the one in the lower-right. The actions found here are actions that should be selected by Nature just as strongly as for those in the upper-right quadrant since they benefit the genes that code for them; but the actions in this lower-right quadrant exist in the face of harm done to individual welfare. This is the quadrant that motivated my interest in sociobiology on February 23, 1963, when I first created the figure.

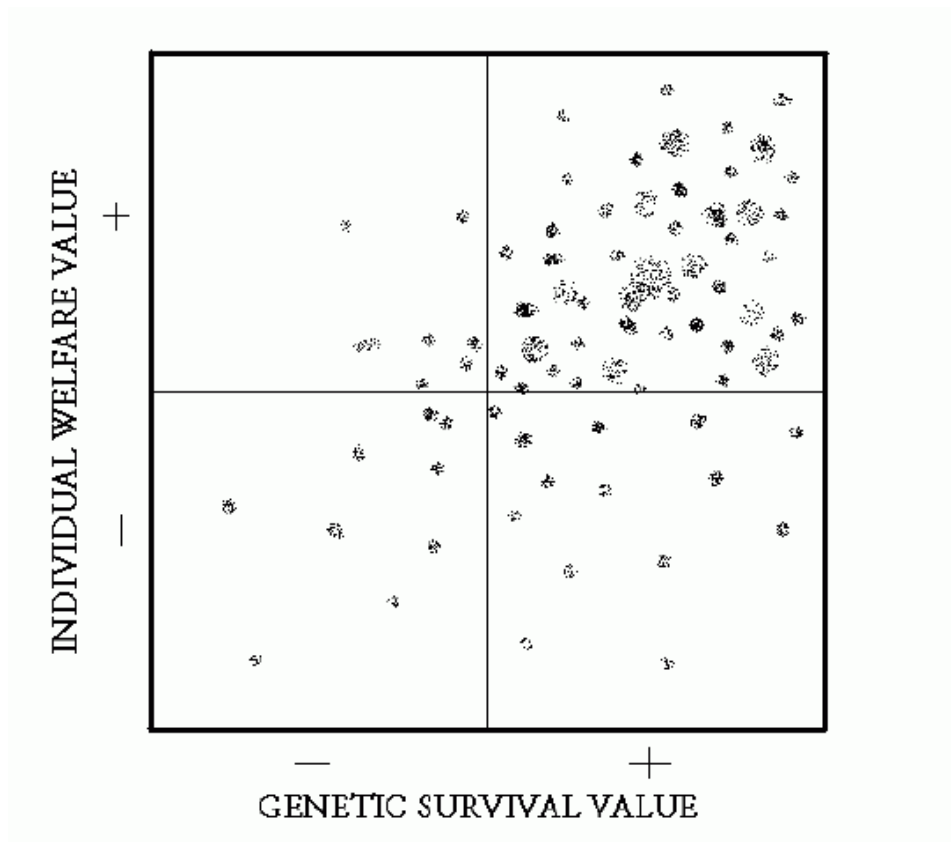


Figure 13.03. *Gene Value and Individual Welfare scatter diagram.*

The "outlaw genes" are the ones found in the lower-right quadrant. There is no way for natural processes to eliminate outlaw genes. Indeed, natural processes will reward them when they mutate into existence, and if they conflict with other genes a balance will naturally be struck. The balance could involve some form of accommodation, such as making the individual believe that the actions in question are attractive. The more common solution, however, is for the genes to invent emotional rewards that are meant to overcome any logical hesitation that might exist by individuals who are otherwise unconvinced by the instinctive imperative. Short of taking evolution into our own hands, humans will be burdened forever by the "victimization" that outlaw genes perpetrate upon the individuals they make.

An LB individual might chance upon the thought that some things everybody does are not in a person's best personal interest, and if his social setting provides a way to avoid the unwanted action he might actually plunge into self-liberation by resisting the instinctive, self-defeating act. For example, a woman might choose to not have children, or a man might find a way to avoid going to war. Horrors, if the genes allowed these acts of individual liberation to continue! So, given that liberated people would have fewer offspring, we should expect to see some evidence that a tendency to think liberated thoughts would be discouraged by the genes, or that thinking the way the genes "want" us to think would be attractive. Is there any such evidence?

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The Two Cultures

Anyone who today reads C. P. Snow's *The Two Cultures and the Scientific Revolution* (1961) would be struck by resemblances of Snow's descriptions to LB and RB styles of thinking. During the 1980s neuropsychologists were making headlines for research that revealed LB/RB differences, due mostly to the study of split-brain patients who had their interconnecting corpus callosum surgically cut to control epileptic seizures. Snow contrasted "literature academics" with scientists, as they seemed to epitomize the extremes of a continuum based on his personal experience. His work during previous decades had placed him in contact both groups, and he became fascinated by their differences and their inability to communicate. Not only could they not communicate, they didn't want to. It was mostly the *literati* who shunned the scientists, and made disparaging remarks about them, while the scientists went about their work full of optimism that their importance was on the ascendance and they were eclipsing their rivals.

The word "rivals" is apt, because, as the previous sections of this chapter have made clear, I claim we are really talking about people who think with an LB style versus those who think with an RB style, which are products of rival brain circuits. The community of RBS intellectuals have frequently "made fun of" LBS people, as if they needed to discredit them in order to compete with them. I recall from my college days a prankster's sign posted on an arch of an engineering building that read "All my life I wanted to be an engineer; and now I am one!" At the time, I realized the point, and found it funny in a bittersweet way (I was enrolled in the School of Engineering at the time). But now I have a better appreciation of the motives for the humor.

The field of anthropology was "hijacked" by Franz Boas early in the 20th Century. His student disciples, Margaret Meade, Ruth Benedict, and others, worked with Marxist zeal to discredit the influence of genes on behavior. The main determinants of behavior were supposed to be the wretched influences of a corrupt society acting upon an innocent and malleable human nature. Anthropology is still undergoing turmoil, as the forces of rational LBS people seek to rescue it from a century of RBS abuse. The apologists for the RBS suppression of nature-oriented investigators have occasionally revealed their motivation; they were afraid of the political ramifications if it was generally believed that badness in people is inevitable.

The latest RBS campaign to discredit LBS thought has various names, the most common being "political correctness," "deconstructionism" and "postmodernism." Again, there is a Marxist heritage to these new thought enforcers (Ellis, 1997; MacDonald, 1998). Their argument hinges upon a grain of truth, but exploited beyond reasonableness. At the most fundamental level, so the argument goes, all things are inherently meaningless and without value, and anyone who espouses a belief is deluding himself that his belief can be measured against someone else's belief. Hence, science is just one more pompous and fashionable belief system, and it is used to hoodwink the general public. Consequently, someone from the humanities should feel free to challenge anything sacred in science, such as gravity, the

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conservation of energy, and all manner of physical law. And therefore all LBS people are charlatans! Yet, amazingly, their RBS beliefs somehow escape their "fundamental meaningless law," and RBS beliefs remain unscathed. Therefore, all RBS people are Truth Tellers! Ellis (1997) states that "In the span of less than a generation, university humanities departments have experienced an almost unbelievable reversal of attitudes, now attacking and undermining what had previously been considered the best and most worthy in the western tradition." It is fitting that the most corrupt field of study is "literary criticism," the field that C. P. Snow chose as exemplifying the culture opposed to science. The demise of the humanities during the second half of the 20th Century is so bizarre, and out of control, that it's an easy subject to get worked up over. I shall refrain from the temptation, in the interest of pursuing a bigger subject (see Weinberg, 2001 for science-based rebuttals to postmodernism.)

It is no coincidence that the early 20th Century hijacking of anthropology, and the late 20th Century hijacking of humanities departments, has been inspired by Marxist intellectuals. Marxism and communism are political expressions of "collectivism." Individualism has been in conflict with collectivism for as long as human history has been recorded. The Eastern cultures are strongly collectivist. It should be no surprise that China embraced communism, and remains today the staunchest holdout and defender of communism. Remember that the LBS individual is prone to think subversive thoughts, and discover new ways of viewing the underlying motives for the collective force of societies. I claim that the genes are most likely to find the RBS-prone person a fitting candidate for enforcing the collective (genetic) agenda by monitoring the errant wanderings of LBS intellectuals. Sensing that RBS vigilantes are watching them, LBS interlopers are always looking over their shoulder for the enforcers of gene interests.

High achievers have probably always sensed a resentment of their successes by those less able or less motivated. Robert Sheaffer (1988) wrote *Resentment Against Achievement: Understanding the Assault Upon Ability* to document this interesting social phenomenon. He writes that "Throughout recorded human history the ebb and flow of the love of achievement and the resentment against its successes have been major forces behind the rise and fall of civilizations and empires... Achievement-oriented values like tolerance, liberty, and the freedom of the individual to work hard and enjoy the fruits of his labor provide the motivation necessary for a civilization to grow and flourish."

A superficial assessment of how the genes should perceive achievers might challenge my thesis that the resentful are working on behalf of the genes. But consider that what the achievers are really resenting, and the fear the genes are really responding to, is that the achievers are those unpredictable LBS artisans who can't be trusted to stay loyal to the tribe. A person who leaves the service of the genes to pursue individual goals is not an asset to the genes; rather, such a person is a threat to the genes because his example might inspire others to do the same, and thereby threaten a wholesale abandonment of the collective genetic agenda. Lo to him who dares write a book urging individuals to seek liberation from their genetic enslavement!

CHAPTER 14

TWO CULTURES - PART II

"The whole thing is so patently infantile, so incongruous with reality, that to one whose attitude to humanity is friendly it is painful to think that the great majority of mortals will never be able to rise above this view of life." Freud, Civilization and its Discontents (1930), commenting on religion.

Examples from Everyday Life

Sometimes a theoretical argument is best illustrated by examples, so I want to start this chapter with the following three newspaper articles.

Item 1. On October 31, 1999, Egypt Air Flight 990 crashed shortly after taking off on a flight from New York to Cairo. The cockpit voice recorder and flight data recorder indicated that a lone relief co-pilot was at the controls at the time the tragic event began to unfold. The co-pilot said the Arabic equivalent of "I put my faith in God," then disconnected the autopilot, pushed the nose down, and sped toward the ocean below at Mach 0.9. The pilot returned to the cabin, asked "What's going on?" He took his seat, and pulled up on his control yoke while shouting to the co-pilot to "pull with me." But the co-pilot persisted in pushing down, which dis-engaged the tail elevator's coordination mechanism, causing the elevators to go in opposite directions, which made the plane start to spin. During the dive the engines were turned off. It crashed, killing all 217 aboard. This information was recovered and reported by the American FAA about 3 weeks into their investigation, and implied that the co-pilot may have committed a mass murder suicide. However, in Egypt the public reaction was one of disbelief. The Egyptians suggested that the Americans had engaged in a cover-up to defend the reputation of an American airplane manufacturer (Boeing) and a desire of the Americans to discredit Egyptians. American newspapers began reporting on "the cultural chasm between the two societies." The Egyptian newspaper Al Akbar described the American interpretation thusly: "This hallucination might be accepted in an American movie. But it is difficult to be convinced of this [being done by] a mature and sensible Egyptian." An Egyptian magazine editor summed up the different philosophies: "The American has learned to conquer life and put trust in science and technology, while the Egyptian has learned [that] time is more powerful than the human being, and we cannot stand alone, but that it is better to have God by your side." My summation would be that "The Americans have learned how to conquer life by relying upon the left brain to use science and technology to understand and live effectively in the world, while the Egyptians have continued to view the world with the right brain perspective in which God is one's guide for serving the genes."

Item 2. The *Santa Barbara News-Press* reported (1999.02.07) that "LightShift 2000" wants everyone to "meditate for planetary harmony" at noon on the first day of every

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month. They claim that synchronized meditation is “a catalyst for positive energy” that will affect the surroundings. They believe that “silent, compassionate meditation can shift the collective consciousness of the world, reverse our course of destruction and truly create positive healing change in the approaching millennium. ... If you get people banding together and create a chain reaction of positive energy, that ... creates the light shift.” The movement was instigated by a book written by astrologer Ken Kalb, residing in Summerland, CA (near Santa Barbara) titled *LightShift 2000 - Let's Turn on the Light of the World*, which has sold 12,000 copies so far. A LightShift web site (www.lightshift.com) has been visited 1.3 million times. The stated goal is for a 6 million person mass meditation January 1, 2000, at 12:12 AM. Somehow they determined that if only the square root of any population would synchronously meditate, the overall quality of life would improve. According to my math this means they need only 78,000 people to save 6 billion, not their 6 million. I guess math isn't their strong suit. Even if you're "at work or in a meeting, a short prayer is better than nothing. Or just repeat the affirmation: 'May peace prevail on Earth.'"

Item 3. Some people are an embarrassment to the human race! They keep coming up with weird beliefs that defy logic, which causes the rest of us to conclude that they are “logic challenged.” One example of a recurring belief is that God will put gold crowns on the teeth of the faithful “as a sign.” After attending a revival at a church where the magical appearances are reported to have occurred the faithful will check their mouth, and behold, gold crowns, plates bridges and bands materialize. This phenomenon first appeared in Argentina in the 1980s, and spread to Mexico, South Africa, Canada, Britain and now America. The claims fade after several years, then reappear. A Canadian went to his dentist to prove his claim, and the dentist reported that he did the gold work 10 years earlier. When this was reported in the newspapers, the gold teeth reports mysteriously stopped. “Faith springs eternal” because it is in our genes. Fortunately, not all humans have it in the same amount, and those who lack it are blessed with a modern left cerebral hemisphere.

Empowerment of the Masses

The 20th Century LBS (Left-Brain Styled) scientist is acutely aware of the threat posed by the newly-emboldened common man, who is preponderantly RBS and considers his opinion on scientific matters to be just as valid as the expert's. Keay Davidson (1999) captured this concern using the example of Harlow Shapely, a Harvard astronomer who opposed pseudo science. Shapely was especially irked by the readiness of the Macmillan publishing house to publish the book *World's in Collision* by Velikovsky (an RBS exemplar). Shapley's position was summarized by James Gilbert (1997) in the following manner: *Science "...by its very nature should never be molested by popular belief; it is the sole purview of those who understand it."* Keay contrasts this position with that of William Jennings Bryan, who believed in "the democratic community's right to decide the validity of scientific theory" (Gilbert, 1997).

Jose Ortega y Gasset wrote in his 1930 book *The Revolt of the Masses* that the unschooled common man began, in the 19th Century, to view his opinion on all

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matters as having equal validity to those of scholars who devoted their life to the same matters. Part of this new boldness may be due to economic growth that brought increasing wealth to the masses; the new boldness was also nurtured by the entitlements that a democracy creates. But the mass man's mistaken belief was outwardly attributed to the conviction that Truth could be found by looking inward, with earnestness and faith. This subject is treated in greater length in the next section.

Oriental Rejection of LB

Oriental philosophies, such as the Tao, eschew LB-styles of thinking, and attempt to discredit it in their philosophies for thinking and being. In their place they counsel ways of thinking and being that are transparently RB-styled. I will assume that the reader is familiar with the late 20th Century neuropsychological findings on brain laterality, as reviewed in Chapter 7. During the 1980s there was so much reportage in the popular press about brain laterality findings, many of which were indeed astounding, that some purists referred to the phenomenon of an over enthusiastic embrace of these new ideas by coining the term "dichotomania." During the 1990s the purists effectively squelched those inclined to even a reasonable version of dichotomania, so the exploration of RB versus LB issues was "still-born." Be warned; I am a dichotomaniac!

The Tao complains that "we have learned to put excessive reliance upon central vision, upon the sharp spotlight of the eyes and mind..." and that "we cannot regain the powers of peripheral vision unless the sharp and staring kind of sight is first relaxed." Alan W. Watts (1957, p.19). A neuropsychologist would immediately recognize the brain laterality connection of this thought. The old RB is continually monitoring sensory input for signs of danger, and it does this in a computationally fast and subconscious method, relying upon parallel processing, comprised of interconnected neural networks. When the conscious mind focuses upon something, it most-often does so under the direction of LB, and uses the high resolution central visual field for this task. It is uncanny how the Oriental has captured this signal difference in left/right roles for looking at the world, and prefers one over the other.

The I Ching encouraged the Chinese mind to arrive at "decisions spontaneously, decisions which are effective to the degree that one knows how to let one's mind alone, trusting it to work by itself." (Alan W. Watts, op. cit., p.19). Again, this advice essentially counsels a person to "turn off" LB, and trust RB to make decisions. (This is remindful of the advice to tennis players, golfers, businessmen, etc. presented in a series of *The Inner Game of...* books by W. Timothy Gallwey, starting in 1974).

Alan Watts describes Chuang-tzu's advice "The perfect man ... grasps nothing..." Also, "it 'fuzzes' itself a little, to compensate for too harsh a clarity." Later, Watts writes "...both Tao and Confucius thought that the natural man is to be trusted." (Note that "natural" must refer to primitive, RBS man.)

In Oriental thinking there is a strong resentment of LB intrusions. They extol the virtues of a form of unconsciousness, something "exponents of Zen later signified by

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wu-hsin, literally 'no-mind,' which is to say, un-self-consciousness. It is a state of wholeness in which the mind functions freely and easily, without the sensation of a second mind or ego standing over it with a club." (Alan W. Watts, op. cit., p.23). The term "second mind" that Watts uses refers, quite transparently, to LB. "Me thinks RB doth protest too much!" Why are the Orientals so against the intrusion of LB? I believe a balance is possible, but my optimum balance point is different from theirs!

Consider this passage from Watts (op. cit., p. 23) where he quotes Lin Yutang: "The baby looks at things all day without winking; that is because his eyes are not focusing on any particular object. He goes without knowing where he is going, and stops without knowing what he is doing. He merges himself with the surroundings and moves along with it. These are the principles of mental hygiene." LB, being the last to evolve phylogenetically is also the last to develop ontologically, so the baby begins life with only the rudiments of a functioning LB but a more fully functioning, behavior-controlling RB. In essence, the Oriental mind is counseling adults to become like the baby, and forsake, as an individual, evolution's latest accomplishment for us as a species. Why would anyone counsel that unless they're dutiful agents for the genes willing to squelch individualism?

Eastern Thought as a Genetic Solution to the Dangers of Intelligence

I used to wish for peace of mind, to be "centered" and to be rid of "inner mental turbulence." This desired mental state is often sought through meditation, a component of Eastern Thought. However, I now look at this ever-more popular pursuit with mixed feelings.

Recall that when a baby comes into the world it's only memories are of a peaceful womb, where the temperature was constant, noises were muffled, and there was no danger of being hurt by falling or bumping into things. After birth the task of maintaining physiological conditions within limits is thwarted by the conflicting task of exploring the world. Physical mobility and social interactions are a challenge to maintaining physiological homeostasis. (Poor baby; it's beginning an Odyssean mission, for it has a job to do - for the genes.)

Engaging the outer world requires mental vigilance and physical effort, which often produce displacements from homeostatic equilibrium. The overriding task of safeguarding homeostasis sometimes requires that the individual withdraw from the world. Fortunately, the baby is endowed with instincts for learning how to balance these conflicting goals. The dual goals of engaging the outer world and later returning to equilibrium must become a lifelong, recurring theme.

Growth requires that each exploration become bolder and more engaging of the outer world. Childhood is a time for practicing adult skills. Adulthood, however, is a time for performing the business of life; and the business of life is to place ones genes in as many offspring as possible so that they may grow up to do the same. Thus, individuals do all kinds of things that an alien observer would find remarkably silly, irrational, and ill-self-serving, such as waging warfare on neighboring tribes,

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sacrificing oneself unquestioningly to questionable patriotic causes, striving for status, wooing mates, making love, raising offspring and performing all manner of ridiculous rituals.

Because our recent ancestors evolved to be more intelligent they have placed us ever closer to a dangerous psychological border, a fuzzy border on the other side of which the individual thinks for itself, and is prone to consciously abandon irrational acts that in the past assured genetic survival. Such an individual asks "Why? Why should I do as my ancestors have done? Why should I wage war, strive for status, woo mates, make love, create babies, commit to decades of burdensome parenting, and perform ridiculous rituals?"

In short, the individual is asking why it must be enslaved in service to its genes the way its ancestors have been, when it is possible to become liberated from these onerous and exhausting tasks. For our genes these are dangerous thoughts! And anyone who believes the genes have neglected to deal with this challenge to their supremacy should think again.

It is true that the genes were rewarded when they created intelligent brains, for intelligent people were better at waging war, striving for status, wooing mates, etc. However, genes were punished for creating intelligent brains, for those individuals were more likely to question their genetically-assigned slavish role. How might the genes have the benefit without the cost? Solution: new genes were selected that placed blinders upon intelligence, and inhibited "bad" thoughts! Bad thoughts, of course, are whatever leads to individual liberation. Any gene that sanctioned submission to continued enslavement by them were "good" and thus selected, whereas those that rendered an individual prone to question authority and the way things are, and who was attracted to eschewing enslavement, were "bad" and were selected out. All of these changes happened naturally, and inevitably, as the effects of the blind "forces" of natural selection.

I now suggest that Eastern Thought incorporates mechanisms for assuring continued genetic enslavement by inhibiting aspirations of individual liberation. Specifically, I am suggesting that one of the purposes of Eastern Thought is to preserve the individual's acceptance of his condition in life. This compliance is accomplished by inhibiting or discrediting all forms of skepticism, questioning the existing order, and any thoughts that might lead the individual to abandon his network of family and tribal duties. When life is tough, Eastern Thought consoles by sustaining the belief that "this is the way things are, and you are a mere part of an immense whole; don't complain and don't fight it; be submissive." The individual then fails to ask if there are roads not taken, alternative decisions that would have been wiser, and changes that might still be made to better one's individual well-being. For the genes, no individual sacrifice is too great!

If meditation is palliative enough to keep an enslaved person enslaved, then the genes will produce meditation. If a person believes that "bad things happen because spirits need more attention," and if this belief discourages a slave from taking matters into

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his own hands and breaking free, then the genes will create minds that deflect attention from real causes by predisposing them to explain things as the doings of neglected spirits. If an excessively curious left brain asks too many subversive questions, Eastern Thought will subjugate it so that it will be more obedient to the right brain. It is possible that the Oriental brain is wired to prefer culturgenes that assist the right brain in retaining control of the individual.

As my left brain is dominant over my right in terms of setting values upon things, it is inevitable that I must accept "mental turbulence" over "mental quietude." I worship the individual, and applaud his efforts at liberation. I also detest any attitude that inhibits this individual quest, especially if it smacks of a trick by the genes to keep the individual enslaved forever in service to themselves. Is my attitude lacking in gratitude? Should I worship the genes, indiscriminately? No! I shall worship only those genes which "respect" their individual creations!

I therefore question the wisdom of withdrawing from the tumult of questioning, as I challenge the ideas of timid thinkers and pursue individual liberation. You can have my secret mantra, the popular word "one," as I enthusiastically proclaim "bring on the turbulence!"

Fiction

Our distant ancestors were dumb enough to do whatever the genes wanted. But lately, with the emergence of powerful prefrontal areas and a re-engineered LB possessing newfound powers of rationality, individuals are more able to challenge the genes by - sit down for this one - thinking!

Many tools are employed by the genes to keep us in their service. Emotions have been adjusted for this purpose, walls to subversive thoughts have been erected, and curious rewards have been put in place for tricking us into wanting what is often bad for us as individuals.

The genes have targeted sex and patriotism for special reinforcement since the thinking mind is capable of discovering how harmful they can be to individual welfare. Incautious sex exposes the individual to 1) disease, 2) bodily harm from a partner not wanting to be cuckolded, or 3) if one follows the rules, the prospect of a life-long burden of child rearing. Enthusiastic and thoughtless patriotism leads one into war, which exposes the individual to lifelong injury or quick death. For years I have been using this pair, sex and war, as the strongest examples of the individual's worst genetic enemy, placing them in my figure's "outlaw gene" lower-right quadrant.

What a coincidence, then, that sex and violence are the two most reliable themes for selling fiction. A theory for imagination that doesn't account for this salient feature of fiction is incomplete. I am suggesting that the genes are "concerned" that we might abandon our appetites for sex and violence, as a person might do if he allowed

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himself to be guided by this new thing that a fast-evolving LB has come up with, called "logic."

The genetic preoccupation with sex and violence helps explain them as persistent themes in fiction, but the genes influence fiction in other ways. Everyone has different roles to play in life. The roles may conflict, as when a mother secretly celebrates her son's philandering, thus spreading her hitch-hiking genes more widely in the local gene pool. Or when a father applauds his son's virility, the better to plunder neighboring tribes and rape their women, thus sewing his hitch-hiking genes more widely and winning resources for future misdeeds. These mental conflicts are capable of producing "cognitive dissonance" (Festinger, 1957), and literature is a way of working out the conflict so that the cognitive dissonance is not disabling.

Some attitudes and behaviors which are not tolerated within one's tribe have to be elicited when dealing with people from the neighboring tribe. Epic tales seem fashioned to hone this distinction and inspire awe for the desired performance - even though it jeopardizes individual welfare and makes no logical sense from the individual's perspective. Chimpanzees don't need inspiring epic tales to fling them into war, because they do not have left brains that cause them to question foolish actions. But humans do, so epic tales are used to enforce unthinking adherence to the genetic script.

Not all fiction is meant to keep the individual enslaved. Mothers might recite Hansel and Gretel stories to their children to alert them to the dangers of step-fathers, who are prone to kill step children so they will not compete for parental resources with the children he fathers (Daly and Wilson, 1988). Monster stories are psychological preparation for marauders from a neighboring tribe. These stories can in fact be helpful to the individual by reinforcing the existence of unpleasant realities that children must learn.

The genes must deal with both categories of story, those that maintain genetic enslavement and those that are actually helpful to the individual. It may have happened that the genes have created pre-wired brains that are "attracted to" stories of both categories. It may not matter that a few unenslaving or uninstructional stories catch a free ride; it matters more that the vehicle for safeguarding the real message is preserved.

We should not be surprised when we find evidence that the brain has pre-wired us to reject stories that celebrate individual liberation from the tribe, and all the other enslavements that the genes demand. The human taste in fiction seems designed to keep us individuals on the straight and narrow path the genes have set for us.

Since adaptation really means "adaptive for the genes," not adaptive for the individual, every thinking human must have an ambivalent attitude toward those little molecules that give us life. We were not part of the negotiation of life's conditions, but we are awakening to the option of saying "no thanks."

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Yet there's a danger to "civilization" when LB-style individuals have a prominent presence. I save this matter for the next chapter.

The Dilemma of Spiritual Scientists

The annals of science have many examples of weird coexisting beliefs. In this section I wish to present a few examples. They illustrate that the two sides of our brain are able to retain their preferred styles of thinking without persuading the other. I include these examples at the risk of creating the impression that most scientists are capable of the same level of intellectual dissociation that permits profoundly incompatible styles of thinking to coexist in one brain. It is important to realize that scientists, on the whole, eschew non-science relics, such as spirits, ghosts and prayer. The different scientific disciplines differ in their success with this (Larson and Witham, 1997, 1998, 1999); the less disciplined studies (such as sociology) fare worst, and the most rigorous sciences (such as physics) fare best. Because it is so rare to find spiritual people in the physical sciences, and because it is rarest among the most accomplished physical scientists, it should be most instructive for us to study examples from among this small group that are the exception to the rule. For them, the dissonance of their thoughts should be most glaring. For my examples of "spiritual scientists" I have chosen Newton, Townes and Dyson.

Isaac Newton (1643-1727), who some describe as the greatest scientist of all time (not *my* assessment), formulated "Newtonian physics," a view of the natural world that is the basis for "reductionism." Newtonian physics starts with $F=ma$ to explain motion (Chapter 1). Newton dealt most with the force of gravity, as it governs planetary motions; but the concepts were found to hold well for electricity and magnetism (until the 20th Century revisions of quantum physics, which must be taken into account when dealing with interactions at microscopic scales). Newton "invented" calculus (at the same time as Leibnitz). These accomplishments are a tribute to Newton's left brain. But his right brain was equally active. He is quoted as saying "The Supreme God is a Being eternal, infinite, absolutely perfect. We must believe that he is the father of all things, & that he loves his people as his children that they may mutually love him & obey him as their father." And also "This most beautiful system of the sun, planets, and comets, could only proceed from the counsel and dominion of an intelligent and powerful Being." (Newton was an early adherent of what is now called Intelligent Design, a tool of the devout for questioning Darwinian evolution.) The following is from a Christian web page, expanding upon the coincidence that Newton was born on Christmas Day: "The very incidents surrounding his birth seemed to indicate God had some special plan for him - at least that's what Isaac Newton thought." Also from this web page: "The design of the eye required a perfect understanding of optics, and the design of the ear required a knowledge of sound. The solar system itself could not have been produced by blind chance or fortuitous causes but only by a cause 'very well skilled in mechanics and geometry.' Gravity itself was an active principle God used to impose order on the world. Newton spent a tremendous amount of time studying the Bible, especially the prophetic portions of Scripture. He believed history was under the dominion of the Creator, and prophecy showed how the Creator was to establish His earthly kingdom

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in the end. His *Chronology of Ancient Kingdoms, Amended* used astronomical data to argue that the Bible was the oldest document in the world and that the events of Biblical history preceded all other ancient histories."

Newton wrote as much on religion as on science, but rarely published the former (mindful of their heretical nature). He believed in the possibility of transmuting the baser metals into gold, and he wasted much time on this project.

Ironically, Newton was not a Newtonian, as the term is used today. Much of Newton's non-science beliefs are ridiculous in light of today's more thoroughly developed understanding of physics and evolution. It is easy to criticize someone from the past, so on that account let us turn to contemporaries for examples of spiritual scientists.

Charles Townes (1915-) won a Nobel prize in 1964 for his contributions to quantum theory. He invented the maser (microwave amplification by stimulated emission of radiation) and is co-patent holder of the laser. In spite of this strong background in science and technology, Townes has no trouble retaining a religious faith. In an interview (http://www.ssq.net/html/brief_interviews.html) he states that "the physical laws are laws that God made," and the universe has a "purpose and meaning." On many occasions his views seem to negate each other, creating the impression of a slippery evasiveness. For example, when asked how he reconciles the lack of a place for God in the equations of physics, he answers "Well, I would say that we don't know that the equation is complete" as if to imply that there is room for religion to somehow sway the unfolding of physical events, which sounds like RB telling LB what to say. Yet, later, when asked about God affecting the universe outside physical law, he answers "...in terms of what we know at present, our present laws allow no room for a separate action of God. While things are not deterministic, nevertheless there is no room for some superimposed outside force coming in and affecting things. There's no room within our physical laws. [That's his left brain talking; but get ready for a shift.] However, that doesn't trouble me as a religious person because I recognize that there are a lot of things we don't understand, and that there may be such a possibility which is there but we don't understand it yet. So, for me, that's not a problem; it's an interesting puzzle, but not a problem." With oblivious disregard for the devastating denial of God just spoken by his left brain, he ends with a shrug of the left shoulder (controlled by RB) and says "that's not a problem."

Perhaps we can attribute this odd coexistence of a primitive outlook with an impressive understanding of modern physics to his upbringing in South Carolina, America's bible capital. He's one of the few outstanding scientists who have retained religion during their ascent to notable achievement in the physical sciences. He's not alone, though; there are others who are somehow able to maintain the two world views in the same brain.

Freeman Dyson (1923-) is another "spiritual scientist." His commitment to bringing religion and science together earned him the Templeton Prize (and almost a million US dollars). In his acceptance speech (March 22, 2000) he stated "I am saying to

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modern scientists and theologians: don't imagine that our latest ideas about the Big Bang or the human genome have solved the mysteries of the universe or the mysteries of life... Science and religion are two windows that people look through, trying to understand the big universe outside, trying to understand why we are here [make note of the phrase "two windows"]. The two windows give different views, but they look out at the same universe. Both views are one-sided, neither is complete. Both leave out essential features of the real world. And both are worthy of respect."

I have great respect for Freeman Dyson, both as a scientist and a creative thinker, and a compassionate champion of people who are unfortunately "left behind" as others march forward to ever greater prosperity. Dyson writes "The great question for our time is how to make sure that the continuing scientific revolution brings benefits to everybody rather than widening the gap between rich and poor. To lift up poor countries, and poor people in rich countries, from poverty, to give them a chance of a decent life, technology is not enough. Technology must be guided and driven by ethics if it is to do more than provide new toys for the rich. Scientists and business leaders who care about social justice should join forces with environmentalists and religious organizations to give political clout to ethics. Science and religion should work together to abolish the gross inequalities that prevail in the modern world. That is my vision, and it is the same vision that inspired Francis Bacon four hundred years ago, when he prayed that through science God would 'endow the human family with new mercies.' "

Dyson understands $F=ma$ and quantum physics as well as anybody (better than me, for sure). It baffles me that he does not embrace the concept of a "rigid universe." How can someone so knowledgeable in physics be so blind to the primitive pedigree of religion and the misleading guidance it fraudulently purports to give.

Anybody reading this should ask "How can this author be so sure of himself, especially when he differs with a polymath scientist as esteemed as Freeman Dyson? He must consider the possibility that the person following the erroneous path is himself!" Yes, I have considered this, and it is possibly true. But is it also possible that Dyson is mistaken?

I think Dyson is swayed by the pragmatic way religious groups help serve community goals. His Templeton award acceptance speech included the passage "Trouble arises when either science or religion claims universal jurisdiction, when either religious dogma or scientific dogma claims to be infallible. Religious creationists and scientific materialists are equally dogmatic and insensitive. By their arrogance they bring both science and religion into disrepute. The media exaggerate their numbers and importance. You media people should tell the public that the great majority of religious people belong to moderate denominations that treat science with respect, and the great majority of scientists treat religion with respect so long as religion does not claim jurisdiction over scientific questions. In the little town of Princeton, where I live, we have more than twenty churches and at least one synagogue, providing different forms of worship and belief for different kinds of people. They do more than any other organizations in the town to hold the

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community together. Within this community of people, held together by religious traditions of human brotherhood and sharing of burdens, a smaller community of professional scientists also flourishes."

This is a gentle defense of religion, based on its perceived positive impact on society. It overlooks the fact that any good done by a belief system is irrelevant to the truth of its core beliefs. He also overlooks the long history of religious wars; apparently he's focused on only the intra-tribal supportive aspects of religion.

It is often assumed that without religion social order would break down. Garrett Hardin has argued (1999, p. 46-47) that "consequentialist ethics" is fundamentally a far better guide for societal governance than any morality handed down from ancient times. In addition, sociobiology argues that humans inherit an acceptable intra-tribal morality, and this is an alternative to religion's claim that religion is needed to maintain social order. Were Dyson to study Hardin's idea, and sociobiology's intra-tribal amity instincts, he would have a weaker justification for defending religion as an essential part of a community and as a window upon reality with something to offer that cannot be obtained elsewhere?

Closing Comment

The evidence is abundant and persuasive that humans think in different styles, with two main ones being frequently cited. The neurological substrate for this difference is the left and right cerebral cortices, which are shown by laboratory studies and neuropsychology experiments to have different neural architectures, abilities and thinking styles. The logic of the left brain is a relatively new evolutionary development, and I claim that it has had to compete with the old right brain for expression. Since I view brain function as being inherently "modular," with modules competing for comprehending a situation, and then competing for controlling behavioral responses, I suspect that the right brain "resents" the left, and tries to discredit it. Since civilization has been built largely by the efforts of people using their left brain, there is always some risk to civilization when right brain styles of thought gain influence within a culture. In the next chapter this concern is treated as one of many possible threats to the health of present-day civilization.

CHAPTER 15

FACTORS INFLUENCING THE FATE OF CIVILIZATIONS PART I – GROUP SELECTION

"The oldest of all philosophers, that of Evolution, was bound hand and foot and cast into utter darkness during the millennium of theological scholasticism. But Darwin poured new lifeblood into the ancient frame; the bonds burst, and the revived thought of ancient Greece has proved itself to be a more adequate expression of the universal order of things than any of the schemes which have been accepted by the credulity and welcomed by the superstition of 70 generations of men." T. H. Huxley, 1887.

Introduction

The rise and fall of civilizations is a macro-behavior produced by the "micro-motives" of genes, to use a concept made popular by Schelling (1978).

To the extent that genes played a role in the creation of civilizations it should be said that it was not their "intent" to do so. We know this, first, because the genes are mere molecules conjured up by a mechanistic universe. To say that genes have motives is, of course, an excess of anthropomorphic metaphor. The genes are simply the product of mutations that succeeded in surviving, and if they survive in the gene pool for many generations (of the individuals they construct) we say that they were successful in trying to express themselves and survive, as if they were motivated to do these things.

We know that it was not their intent to create civilizations because it cannot even be said that civilizations are a product of evolution in the same way that one can say the "eye" is a product, or the "brain." The difference, here, is that the eye exists because the genes that code for its assembly during embryologic development have been "selected" by the process of mutation and survival of the inclusively fittest. Whereas eyes exist because eye genes evolved, a civilization exists because of a fortuitous configuration of circumstances which have the unprecedented outcome of "civilization." The outcome is unprecedented because the genome out of which civilizations arise is essentially the same as the genome that gave birth to the first civilization. And when the first civilization emerged, however one defines "civilization," it was an evolutionary unforeseen event, for which no gene, or combination of genes, can take credit. Only after civilizations change the human genome by competing with uncivilized tribes, and winning, will it be possible to credit the genes for "sustaining" civilizations after their accidental "creation" - by the normal evolutionary process of mutation and natural selection.

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Civilizations are too new for viewing them as some manner of phenotypic expression with an adaptiveness that has been measured; civilizations have not had time to influence gene frequency appreciably. It is more accurate to view the phenomenon of a civilization as an unintended product of evolutionary processes that shaped human nature in an ancestral environment, devoid of civilizations, which rewarded genes that we learn later just happen to lead to the creation of civilizations when the random configuration of circumstances are conducive to the civilization's rise.

Even this gives too much credit to the genes. Group selection, GrS, followed by what I have termed individual selection, IS, may be responsible for the creation of civilizations (as I explain in Chapter 11). Although group selection is made possible by the genes, the genes are not responsible for the failure of the group to keep individuals subservient to the group. So, to the extent that my suggestion in Chapter 11 concerning the roles of GrS and IS in the creation of civilizations is correct, some of the credit for civilizations must go to a factor called "LUCK." (In my use of the term "luck" I'm assuming the reader is in favor of civilization, a clarification that is made necessary with the rise of fundamental religious movements throughout Islam, and even Christianity).

In the remainder of this chapter, and the following one, I deal with factors that contribute to the fall of civilizations. There must be more ways for a civilization to fall than to rise. The fall of a specific civilization must have many contributing factors, and the most important one may differ in each specific case. The following sections are brief sketches of some of these factors.

Natural Catastrophe Theory

The Minoan civilization was destroyed by the volcanic eruption of the island Thera (now called Santorini) in the Fall of 1628 BC. In addition to destroying most life on the island of Thera, the volcanic eruption produced a tidal wave (tsunami) that devastated coastal settlements on nearby Crete. The Minoan settlements on the north shore of Crete suffered damage to their fleets of fishing and trading ships. The Mycenaeans took advantage of the weakened state of the remaining Minoan civilization by invading them and replacing the Minoan culture with theirs. This unlucky natural event led to the fall of what may have been one of the world's first great civilizations.

A comparable volcanic eruption and related earthquake-induced tidal wave would not bring down 20th Century world civilization even if the area destroyed were Los Angeles, San Francisco or Seattle. It would weaken, but I doubt that by itself it would destroy, the American embodiment of Western Civilization. Only if other factors were at work undermining the strength of civilization would a natural disaster of moderate magnitude contribute to its decline and fall. A global civilization could be threatened by an asteroid impact, creating a global cloud of stratospheric aerosols that would cool the surface and upset agricultural production for several seasons, leading to famine, widespread desperation and the breakdown of social order. Short of this

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unlikely scenario, I doubt that a natural disaster will be an important contributor to the current global civilization's decline and fall.

Group Selection Speculations

Chapter 12 describes a possible mechanism for the rise and fall of civilizations, relying on the controversial concepts of "group selection" and "individual selection." I suggested that the appearance of "individual selection" was a genetically unforeseen breakdown of the group's control of individual aspirations for making decisions, and that the "release" of individual creative and productive powers can generate what we call a civilization. After the successful creation of a civilization many of its citizens become self-absorbed with their new-found material wealth. Less civilized members of neighboring societies become resentful of the wealthy neighbors, and they feel threatened by the individual-liberating culturgens of those neighbors. The uncivilized societies may then draw upon the magical strength of religious fervor, with its readiness for fanatical actions, and engage in a "holy war" of terrorism upon the civilized societies. These attacks require that within the civilization individual energy that had been productive become diverted to defensive and protective measures. The individual may find it easier to adapt to a growing nuisance of interference by jealous outsiders than to coordinate with others to mount counter-measures. This neglectful attitude weakens the civilization under siege, thus hastening its decline and fall. (See Chapter 12 for details.)

I recently became aware of a group selection theory relying on gene frequency changes for the rise and fall of empires (Choi and Bowles, 2007, Wilson and Wilson, 2007, Turchin, 2007). I'll refer to these speculations as "parochial altruism" theories. The scenario envisioned by them is quite similar to my speculation, which I will now refer to as the "insightful individual" theory. My speculation is that individuals act heroically on behalf of a super-tribe while it is in conflict with its neighbors because it is in the individual's best interest to do so, whereas during a peaceful era following a decisive victory individuals act on behalf of themselves and lose their effectiveness at defending their accomplishment because they have become accustomed to a peaceful order that does not require sacrifice for the group. The main difference between my 1990's "insightful individual" speculation and the 2007 "parochial altruism" theories has to do with the role played by gene frequency changes. Whereas I attributed behavior changes to individuals who could think on their own behalf, and forsake group needs when appropriate, the new theories invoke the influence of genes that predispose individuals to behave in one mode or the other.

In considering the relative merits of these two theories it is necessary to consider that the gene-based theory requires many generations to be effective, whereas my insightful individual theory can operate on a much shorter, one generation time scale. If we conceive of a civilization as a series of empires "taking turns" defending the same basic culture, then empires may come and go on time scales that require my "insightful individual" explanation, whereas the rise and fall of civilizations may require the "parochial altruism" explanation

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Wouldn't it be nice if there was a way to accomplish fast behavioral changes without the need to invoke "individual insight" and without the need to invoke gene frequency changes? There is, and I prefer it to the previous two theories; it can be called SR Theory.

Stimulus/response theory states that genes produce brain circuits that recognize specific environmental situations and respond with specific behaviors. Social animals are capable of reading a social situation and responding appropriately. It would be a simple matter for a person to distinguish between the home tribe being in chronic conflict with a neighboring tribe and being at peace with neighboring tribes. I'm proposing that when the chronic conflict condition is detected people tend to behave in ways described by "parochial altruism" and intolerance for "out-group differences" - which together predispose the individual for heroic actions during tribal conflicts. The reverse of this is just as easy to imagine: when times are peaceful behaviors are favored that we characterize as self-serving and tolerant of other people's differences.

The proposed SR Theory for eliciting adaptive behavior has the virtue of producing quick responses to changing conditions since gene frequency changes are not involved. As soon as peace prevails personal behaviors occur that set in motion the downfall of the victorious tribe, which leads eventually to another tribe's gaining the mantle of victor and eventual loser, thus perpetuating the endless cycle of rise and fall of tribal empires. What a simple theory for explaining the rise and fall of empires and maybe civilizations!

As with any phenotypic trait every person will be endowed with slight differences in genetic predisposition. Also, during each transition some will be quicker to undergo change than others. Since this theory proposes that most individuals are capable of behaving according to two opposite modes, depending on their reading of the social environment and depending on the strength of their genotypic predispositions, we can expect to see a mix of types during every transition. I claim that Western Civilization is undergoing a transition of decline, so is there evidence that people with opposite outlooks are present?

Yes, in the United States one "type" is called Democrat and the other is called Republican. Democrats are widely recognized as being tolerant, compassionate, prone to preferring "peace, not war" and somewhat self-absorbed. Republicans are widely recognized as being intolerant, short on compassion outside the immediate family and social circle, enforcers of group social norms, unthinkingly hyper-patriotic and quick to wage war.

Every society should have some of both types whenever the social situation is difficult to read, or whenever conditions are changing. Indeed, the term "liberal" and "conservative" are used to describe the participants in every political system. In the United States Democrats are liberal, Republicans are conservative, in Great Britain Whigs are liberal and Tories are conservative, and so on for every political system. When a society is attacked we can expect influence to swing to the "conservatives"

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and when the peace has been won influence should swing to the “liberals.” The American Empire is in decline, and there is a growing sense that the liberal Democrats can’t be trusted with safeguarding the homeland. As the decline continues, as surely it will, the call for patriotism will become louder, and the level of intolerance for differences in opinion or lifestyle will grow. The outcome, however, is sealed by an unprecedented level of apathy, corruption and corporate control that grew during the peaceful years. From my perspective it seems too late for undoing the institutional damage to a once great America.

As the American Empire recedes other societies will aspire to fill the power vacuum. China may be the next global empire. Their tradition does not include individualism, so as Western Civilization declines a collectivist Oriental Civilization may take its place. If this happens, as I believe it will, the prospects for individual liberation from genetic enslavement will have become remote.

Pampered Comfort Theory

As the previous section shows there is reason to suspect that the successful creation of a civilization guarantees that it will have within itself the seeds for its own destruction. At the risk of dwelling again upon the same theme, consider the mistake of the Roman Empire in recruiting too many of their army troops from barbarian populations in outlying regions (*e.g.*, the Visigoths). This rendered Rome vulnerable because it was a city defended by less loyal foreigners than during the rise of the empire. The temptation of the Roman citizenry to avoid unpleasant duties in favor of a comfortable life was irresistible, so they relied upon others to bear their burdens of defending the empire. The foreign-born soldiers were treated shabbily, lived far from Rome, and were ordered to battle as if they were “canon fodder.” Meanwhile, back in comfortable Rome, the decadent lifestyle of pampered citizens is said to have led to a neglect of civic duties and a corrupted governance. It is natural for the strong and the clever to gain power when others are not paying attention. This inattention to civic responsibility seems to happen in times of peace. Whenever Vigilance gives way to Neglect, the hard-earned benefits of a prosperous civilization commence a slow disintegration.

CHAPTER 16

FACTORS INFLUENCING THE FATE OF CIVILIZATIONS PART II – SOCIAL PARASITES

Producer/Parasite Theory

I would like to suggest another "endogenous" theory that should concern smug residents of every civilization. Parasitic behavior is a common part of Nature. All grazing animals are parasites of plants, for example, and all carnivores are parasites of plant-eating animals and smaller carnivores. Plants are therefore the original non-parasite "producers" since their "livelihood" is based on sunlight, carbon dioxide in the air and nutrients in the soil, all of which are non-living and "free" for the taking.

Some animal species rely entirely upon parasitism of another species, the way a leech parasitizes fish. Parasitism also exists within a species. Humans, having conquered Nature more thoroughly than any other species, created opportunities for a variety of individual "strategies" for prospering and replicating that are fundamentally intra-species parasitic. I will rely upon a common sense definition for producer and parasite behaviors, but if you're having trouble think of a tribe that marauds a neighboring tribe, killing some of them, stealing their crops and possessions, burning their shelters, and taking prisoners for later use as slaves. The victor's rewards are from theft instead of production, and therefore it is a form of parasitism. Or think of a merchant ship on the high seas being pursued by a pirate ship, overtaken, commandeered, causing precious cargo to change "ownership."

I contend that each person inherits a repertoire for many survival strategies, and that the environmental setting (including the social component) elicits from the individual those strategies most likely to work best (based on the experience of ancestral generations). Strategies are "chosen" automatically from among a repertoire of brain circuits whose basic architecture was created by the genes. The process for choosing which behavioral circuits (modules) to activate is itself contained within brain circuits, created by genes.

I also contend that it is possible to assess strategies as belonging somewhere along a spectrum with "Producer" at one end and "Parasite" at the other. An individual person may engage in behaviors belonging to one type, then, in response to a change in the setting, switch to behaviors of the other type. Some people may engage in mostly producer behaviors, while others may engage in mostly parasitic ones. If the same person could be born into the world at different times, he may be mostly producer-oriented in one setting yet be mostly parasite-oriented in another.

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I will refer to the dynamical interaction of an individual's Genome with Environment to produce the person's specific Phenotype (expressed behavior, as well as expressed anatomy and physiology) using the term GEP (Symons, 1979), and described in Chapter 6. Over generations the physical and social Environment changed many times, and to the extent that specific environment "types" repeat, the Genotype would tend to provide for brain circuits that elicit an appropriate repertoire of possible behavioral Phenotypes suitable for each environment. If, for example, the climate in one locale alternates between two types, for which two different ways of life are adaptive, it is likely that the Genotype will eventually provide for the required pair of behavioral Phenotypes within each individual. Whereas the anatomy and physiology are relatively fixed, behavior can be elicited in response to perceived conditions, and it would be an oversight on the part of the genes if they did not provide for this adaptive flexibility.

Michael Gazzaniga has suggested (1997) that the brain's large repertoire of responses to social or physical conditions is analogous to an immune system, which has a large repertoire of immune responses to a very large number of pathogens. Because our ancestors survived exposure to many pathogen types, our immune system is "prepared" to respond appropriately to each specific pathogen that our ancestors survived. In any single individual's life only a few pathogens will challenge the immune system, so only a small portion of the immune system repertoire is made use of. By analogy, an individual's lifetime involves a small number of environmental challenges and these will elicit a small portion of behaviors that reside within our immense repertoire of possible behaviors. Each behavior type is "poised" for release by the appropriate social environmental stimulus.

Although individuals must have the capacity to switch from one behavior type to another in response to perceived conditions, thresholds for the switching must vary. Thus, some individuals are predisposed to be one way versus another. This complicates analyses that strive to understand the role of producer/parasite behaviors in leading to the rise and fall of civilizations.

As an aside, any modeling of the penetration of a gene into a gene pool is complicated by the large number of phenotypic measures that must be taken into account for determining an individual gene carrier's fate. Not only is an individual parasitic or productive, but he is more or less intelligent, resourceful, immune to infections, physically strong, etc. All phenotypic variables can be relevant to the fate of the genes making up the individual's genotype, and any study of the strength of environmental cues to elicit parasitic behaviors will have to make use of statistical multiple regression analyses.

Another feature of this dynamic deserves comment. Genes exist for thousands and millions of years, typically. The individuals they construct are just temporary residences, meant to survive within a variable environment and compete with other individuals for future genetic representation. Thus, if a person is parasitic, and prospers, the real beneficiary is the gene (or genes) that predispose the individual to

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behave in parasitic, gene-serving ways. The individual is sometimes the loser, in an individual welfare sense, in spite of the gene-winning ways of those that made him.

If we wanted to write a history of an animal species, such as the giraffe, it would be unthinkable to omit the role played by the animal's anatomic and physiological traits. These traits are fairly straightforward, and predispose the animal to specific ways of living. The behavioral capacities, predispositions and inabilities are no less important. They evolved in conjunction with the anatomical and physiological traits. We should therefore expect to find a compatibility among all three trait categories: anatomy, physiology and behavior.

The phenotype, or the way an individual organism is, consists of these three factors (anatomy, physiology, and behavior). For humans, behavior is probably a more important component of phenotype than for any other species (the immune response, a component of physiology, must be another important component). More genes must influence behavior for humans than for any other animal (which is supported by the emerging ubiquity of genes that influence the brain, amounting to as many as 50% of all genes by one estimate).

As a thought experiment, let us imagine that it is possible to measure each individual's "producer/parasite" score at a specific time, in a specific setting. For any population of humans living in a "society" consisting of many tribes that have at least some non-antagonistic social contacts, it would then be possible to create a histogram of these scores; we could determine what fraction of the population was "productive" versus "parasitic." If we could keep track of the parasitic fraction versus time for a society we would note variations in the incidence of expressed parasitism.

If we could also measure the per capita wealth of a society, the wealth parameter would also vary. Now, I allege that the two parameters, parasitism and per capita wealth, would be correlated. Moreover, I predict that they would be positively correlated, with a slight phase lag. Whenever a society reaches a peak in per capita wealth, parasitism is rewarded more than during the previous few generations; during the wealth peak parasitism will show its greatest growth. I suggest that it is the "rate of growth of parasitism" that is positively correlated with per capita wealth. (For engineers who like sinusoidal curves, the fraction of the population that is parasitic is alleged to exhibit a phase lag of 90 degrees with respect to per capita wealth - disregarding, for the moment, that the two traces are not sinusoids.) To investigate these speculations I created a spreadsheet model that incorporates wealth creation, parasitic gene payoff, and other factors, and have demonstrated that expressed parasitism does indeed lag the wealth trace. Chapter 15 has plots of "innovation rate" versus time, and population versus time. (In Fig. 15.14, and also 15.15, there might be evidence that parasitism rose as the population was rising, at the same time that the innovation rate was decreasing.)

The reason parasitism increases during "boom times" is that wealthy people are willing to tolerate the loss of small amounts to parasitism, whereas poor people will take measures to defend themselves from parasitic losses of the same absolute

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amount. An individual's actions are based on what effect it has on the genes in that individual, assuming the genes have experienced similar situations in the past and evolution has left mostly those genes that respond to situations "adaptively." If the genes in an individual do not benefit by allocating energy to a defense from parasitism, compared to the cost of that defense, they should not be expected to put up a defense. Thus, parasitic behaviors should be able to invade wealthy societies more easily than poor ones.

This argument does not require that parasitic people "invade" a society from "outside." Rather, desperate individuals may "switch" from being mostly productive to being more parasitic. Also, individuals who are predisposed to being parasitic (have lower thresholds for responding to situations in parasitic manners) may flourish, while their less fortunate producer-brethren flounder and produce fewer offspring. The first process can occur almost instantly, in a matter of years, while the second process requires generations to have an effect.

The previous argument assumed that within a society there was a wide range of wealth. A society that achieves wealth by capitalist means is likely to create wealth disparities. In America the wealthiest 1% now own 40% of the country's assets, and the wealth gap is increasing at a frightening rate. Among the Western industrial nations America has the highest levels of wealth inequality within its borders (Phillips, 2002). This growing disparity within a society is frightening because it causes those left behind to feel forgotten, and "left out" – which resembles banishment from the tribe. And whenever people feel banished, the tribe that banished them is "fair game" for reprisals by the banished.

The greatness of a civilization is probably correlated with its per capita wealth. When we refer to the "rise of a civilization to greatness," we may be thinking about the amount of activity devoted to the arts, science, and technology, and these are correlated with the availability of funds (patrons of the arts, etc.) for those activities, which is related to per capita wealth (consider the famous example of the Medici family's patronage in fifteenth-century Florence, Italy).

I am assuming that our ancestors have experienced a sufficient number of boom and bust episodes that our genome has "adapted" to this dynamic. Although it is theoretically possible the genome has not adapted to boom/bust scenarios, to the extent that they have our present civilization's zenith may be short-lived.

CHAPTER 17

FACTORS INFLUENCING THE FATE OF CIVILIZATIONS PART III - TROUBADOURS

The Troubadour Theory

This theory is a variant of the Producer/Parasite theory.

Consider super-tribe civilizations, for which we may take the ancient Mesopotamian as our model. A large city is surrounded by a sprawling countryside devoted to farming. Within the city is a society of "government employees" who report to the king. There is a strong division of labor within the city. There are jobs for collecting taxes from the farmers, recording tax and other government transactions, settling disputes, construction of buildings, roads and irrigation works, manufacturing (cloth, pottery, household wares, etc), commercial transportation of goods from the point of production to the shop-keeper, commercial sale of goods, entertainment (music, dance, story-telling), and waging war.

The concentration of wealth always increases the temptation for theft. Thus, other ways of making a living appeared that were not sanctioned by the king and his government, such as internal corruption, highway robbery, high seas piracy, and other socially parasitic activities.

I want to categorize all of the above lifestyles, sanctioned and unsanctioned, as "sedentary" or "adventurous." The warrior has a sanctioned "adventurous" lifestyle. It is important to realize that warriors are measured on many "fronts." The most obvious measure is during combat with other warriors. In a similar way the highway robber and high seas pirate are measured during their frequent conflicts and dangerous lifestyle.

Before making the central point of this section, I want to invite the reader to think about what the strongest evolutionary force might have been facing mankind during this era? Was it invasion by barbarian tribes, environmental destruction due to use of natural resources, natural disasters, predation by other animals, overpopulation and the deterioration of inadequate infrastructure? No, it was none of these! The greatest threat to super-tribe life has always been disease pandemics!

Diseases brought from distant places can decimate a population if the people have never been exposed to the pathogen. It can be assumed that a small fraction of any large population has a genetic immunity to every new disease. It is a fundamental principle of genetics that some individuals will have a better pre-adaptation to any conceivable new challenge or threat, regardless of how novel or old it is. For this

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reason we can argue that sometimes only a small fraction of a population will survive the experience of wandering into foreign lands where new diseases exist.

The era of kingdoms brought the threat of disease to its people as never before! The threat went in both directions. Invading armies carried their homeland diseases with them, and diseases in the lands being invaded would infect some of the invaders. Diseases were carried in both directions by more than invading armies. Migrants, traders, and any of the many new categories of itinerants were "vectors" for disease. One way or another, every large population center was at risk, no matter how great were its civilization's technical or military achievements.

Now, consider two hypothetical female inclinations under these conditions: 1) be sexually interested in mating with "adventurous" men, or 2) remain disinterested in the "adventurous" men while maintaining a loyal monogamous relationship with their husband. To the extent that women were inclined to be of one type or the other (and assuming that all other factors were equal), which type would have yielded more offspring surviving into adulthood? The answer is obvious: the better strategy for women is to cuckold their husband by feeling attracted to "adventurers" when she's most fertile (Haselton and Gangestad, 2006). These "calculating" cuckolding women will have a greater genetic legacy than the "faithful" women!

Female choice refers to the influence of female preference for mating choice. Female choice refers to any action taken by a female that is likely to influence which male makes her pregnant. It may take the form of influencing who she marries, or it may take the form of who she mates with outside marriage - *i.e.*, with whom she cuckolds her husband. Both types of choice, choosing a husband and choosing a cuckolding partner while married, will affect the success of her offspring. On first principles (evolutionary ones), the genes will have "something to say" about such behaviors. Female choice requires that women pay close attention to the males who can be observed. Females should be measuring them for "what they're good for" - from the perspective of her genes. All of this measuring, of course, will be automatic, and usually subconscious. But the woman who fails to evaluate men from her genes' perspective will be a failure as a woman.

A surviving warrior must not only have good genes for physical endurance, he must also have genes for an immune system that can deal with the germs that are out there in neighboring lands. It is just a matter of time for diseases in foreign lands to arrive at the doorstep of large settlements. Women who mate with adventurers and bear their children are likely to do their own genes a favor; for they will be hitch-hiking with a winner in Man's greatest battle - the battle with viruses and bacteria. The pirate who comes into port, has a legitimate lust, for his immune system has been measured and it has survived exposure to diseases on foreign shores. The troubadour travels with a similar right to women's hearts. And to a somewhat lesser extent, so does the common rogue and scoundrel, who is too easily excused by being portrayed as cute or naughty instead of parasitic! And now we see the glimmer of an explanation for the mild and ineffectual condemnation of scoundrels.

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How ironic, that the most parasitic of men should take on the role of exploring "immune system mutation space" to find solutions to near-future threats of bacterial and viral infection, and thereby appear to enhance the chances of a civilization's survival. Their role as unwitting pathfinders in the invisible war with the microbes can be lauded on this basis; but let us not be blind to the consequences of the rest of their genetic heritage. By this strange dynamic one parasite creates another; the microbial parasite creates the socially parasitic rogue.

I am perilously close to accusing women of being influenced by their genes in unthinking ways, about which they haven't the faintest clue of explanation. Surely, Ruth Westheimer was not driven by deep thought when she wrote (1986, pg. 21) that "Most married women want pirates, or something like pirates..." and "Here is a good marriage fantasy - to imagine that your nice steady husband, who never inconveniences you by being arrested or a fugitive (*sic*), is really a dangerous criminal..." She never explains why such fantasies should work. I just did!

If ancient kingdoms, like those producing such civilizations as the Mesopotamian, the Egyptian, early Greek, and the Roman, rewarded women carrying genes that caused them to be sexually attracted to soldiers, pirates, troubadours and scoundrels, then how might these genes have fared in subsequent eras? Diseases have ravaged Europe on many occasions since the kingdoms and empires created the conditions from which this curious female behavior originated. The Dark Ages, the Middle Ages, and even the Renaissance - have yielded up impressive episodes of spreading disease and death. The Black Plague reduced both China and Europe's population by almost 30% in the 14th Century. The European explorers in the New World brought diseases that killed perhaps 90% of the indigenous population. The driving force is unabated, so presumably women's adaptive response is undiminished.

What evidence do we have, besides Ruth Westheimer's fantasy, that contemporary American women continue to practice a female choice that favors rogues? I will cite two examples.

Several paternity test studies in the U.S. and Canada show that 9 to 20 % of offspring were not fathered by the mother's spouse. This would seem to be an important statistic, yet there is essentially no discussion of it in public. It is an unnoticed elephant in the room. This would rank as one of women's best kept secrets if it wasn't also true that men are universally vigilant about any sign that their wives are interested in another man, and when there is evidence of this interest men are universally jealous. This shows that men fear being cuckolded by women who wish to hedge their genetic bets by mating with other men, including traveling scoundrels with apparently good immune systems.

Additional evidence for the notion that women are attracted to traveling scoundrels can be seen in contemporary styles and fads: such as teenage girls' swooning over the barbaric antics of "rock stars," today's equivalent of the more romantically portrayed itinerate troubadours, the box office success of movies with angry young rebels (modeled after unlawful highway robbers), and the popularity of superficial, airhead

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movie muscle heroes. Even the new fad of wearing baseball caps backwards (when not riding a motorcycle) seems pathetically ridiculous and inexplicable without reference to this theory's payoffs to men for appearing to be unruly motorcycle-riding roustabouts.

There is evidence that this female fascination with rogues is modulated by cultural or economic conditions. The Great Depression in America seems to have produced a healthy regard for gentlemen "producers." This anomaly extended throughout the World War II years, and into the Fifties. Then, during the Early Sixties, the apex of American civilization, the preferred type began to shift to the rebellious, shiftless, social parasite. The new culture produced such epithets as egghead, nerd and workaholic. The generation that "saved civilization" from Hitler begat a pampered, spoiled generation notorious for its ingratitude and self-absorption. Well-mannered movie heroes like William Holden, Cary Grant, Gene Kelly, Jimmy Stewart, Gary Cooper, Spencer Tracy and Katherine Hepburn were gradually replaced by the likes of Arnold Schwarzeneger, Bruce Willis, Madonna and Roseanne - which is where we are today! If there's a pattern here, what could it mean?

When "times are tough" it pays to set aside whimsical and immature frivolities and become serious about commitment to hard work. At these times the over-riding benefits of men who are adult in their attitude, and capable of achievement, give them an advantage over immature, irresponsible rogues. But when times become "easy" the things men are good for changes, and parasitic men become relatively more valuable. Women's values adjust to the times. If the genes that govern women's subconscious behaviors are capable of making this distinction about men and can adjust their preferred type, then these genes would confer great competitive advantage over those women who cannot do these things.

There seem to be two ways to achieve a change in the temperament of a society. The fastest way to achieve a change in outward behavior relies upon female choice. Women are sensitive fashion watchers. They sense the "times" in ways that almost defy logic. Whereas men must sense a storm beyond the horizon, before it can be seen, women must sense a change in social climate before it occurs. Their response to a sensed change is to cuckold their husbands to different men at varying rates. When women make their "preferred mate choice" other women notice, and this speeds the shift. But men also notice these shifts, and they attempt to imitate the preferred male type. In just one generation we have seen a shift away from men wanting to be perceived as Producers to preferring to be perceived as Parasites.

The second way a society's manifest behavior can change is through a change in gene frequency. Once the dynamic of "female choice" has accomplished a shift, the stage is set for gene frequency change. Gene frequency changes are slow. The conventional wisdom is that evolution is so slow that noticeable changes require tens of thousands, and maybe hundreds of thousands of years. This conventional wisdom is ridiculous! The American Indian evolved from an Asian in less than 10,000 years. Darwin's finches change beak size in one generation! People with social agendas wish for slow change, and their beliefs are sadly influenced by their wishes. Try thinking in terms

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of "a few generations" for significant change when social pressures are great! A fruit fly study by Teotonio and Rose (2000) shows that a change in environment can produce an almost complete switch from one gene allele to another in as little as 10 generations. For humans, a generation is about 30 years (Pang, 1998). So consider the possibility that "the way men are" (genetically) can change during the course of a few centuries!

Female choice can be the "switch" that initiates the start of a gene frequency change. This is an efficient mechanism, since it causes immediate change, which in the past must have been adaptive most of the time, and then it secures this change for the long-term by adjusting gene frequency. The only problem with it in more recent times, during the past 10,000 years, is that it's a process that can kill a civilization.

These speculations can be used to make predictions. If women are capable of shifting their preferences in men, then the genome must also change (*i.e.*, co-evolution of genes and culture). A new instability appeared with the introduction of rogues into the equation, which had its greatest impact when civilizations arose. For when rogues dominate paternity for generations, because women are (unconsciously) seeking to protect their offspring from civilization-transported pathogens, the short-term benefits of immunity from disease is accompanied by long-term penalties of fewer producers and more parasites that threatens a civilized way of life.

In other words, we should expect that an "Age of Achievement" powered by the labor of Producer Men, and leading to the creation of civilization, should be followed by an "Age of Culture-Clueless Rogues" who not only cannot sustain civilization but who are by temperament inclined to destroy it! Over long timescales, the dominance of Producers and Parasites must alternate. But whereas Producers create an opportunity for Parasites, by creating the conditions that render them viable, the other half of the cycle will be much slower. After Parasites destroy a civilization, a much longer time is required for its reconstitution by the now-rare Producers. The ebb and flow of the rise and fall of civilizations may thus have the rhythm of slow rise and fast fall.

After two millennia where is the greatness that was once Rome, Greece and Persia? Today's residue of the Roman Empire is the Mafia, modern Greece is a dysfunctional country and Iran is currently ruled by the Koran. Notice that places that once gave rise to the world's greatest civilizations are now dysfunctional societies. If the human genome creates women who prefer to mate with producer men when times are bad and parasitic men when times are good, then it is close to inevitable that civilizations that rise will later fall.

Women Speed a Civilization's Fall

In the previous speculation women play the role of "enhancers." To use a term from chemistry, women are "catalysts" since they speed the process of change by selecting from among the wide range of men who present themselves for consideration. Their choices tilt the direction of evolution to favor their fashion-obsessed taste. They do

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this by exercising "female choice," or rewarding men who match their fickle preference by carefully choosing their secret paramours. It is not necessary that women change their preference for husbands, since they should always want a maximum of paternal investment. Their preferences should rather be expressed in who they prefer for extra-marital matings and how frequently these matings occur.

The producer/parasite theory for explaining the rise and fall of civilizations requires that there were many changes in tribal wealth during the Pleistocene. The troubadour theory for a civilization's decline requires that population density and migration rates have fluctuated many times during the Holocene.

Sometime in the mid-Sixties I commented to a friend that we had just witnessed the apex of Western civilization, and I still agree with that assessment. In stating that the Sixties were the best of times, I now understand that I meant they were best for Producer men, and that a switch was about to occur. All the new male fashions, which men copied because women preferred such men, fit the pattern of a civilization that was shifting from one that rewards the Producer to one that rewards the Parasite.

It's not that men and women live more fulfilled lives by doing what they do; we all have no say in what we do (notwithstanding "free will"). As always, the "winners" are the genes, for they make us this way, that they may prosper - at our individual expense! I am suggesting that the thing we call "civilization" is an artifact, or unintended consequence, of a competition between the genes, a competition in which their "gene carrying machines" lumber across an illusory stage where the protagonists mistake themselves for real players in life's drama. And I am further suggesting that the rise and fall of civilizations is driven by a script the genes have prepared for their machines, a script that recognizes when it is optimum for the lumbering machines to produce and when to parasitize. And finally, I am suggesting that women play a crucial role in causing a civilization to fall.

CHAPTER 18

FACTORS INFLUENCING THE FATE OF CIVILIZATIONS PART IV: MUTATIONAL LOAD

The Dangers of Turning Inward

Some people seem intent on reaching within themselves for guidance on what to believe. This is lamentable! For when a person turns inward for guidance, he is asking to be led by his slave masters, the genes!

Although objective reality has helped to create brain circuits for intuiting the nature of the world, the genes have been successful in creating brain circuits that distort our intuiting of reality in ways that serve the genes agenda for genetic proliferation at whatever cost is required to the individual! Our brains are assembled (by the genes) with circuitry that renders us blind to certain realities. Hence, our intuitions can only sometimes be trusted, and are many times betrayers!

The person who looks inward for affirmation of an idea is less inclined to look outward for observational evidence to be judged rationally using logic. In contrast, the scientific endeavor owes its immense success to the custom of bravely measuring ideas against outward looking observations. But while science marches forward, people from an older mold continue to look inward. We have "two cultures" of people marching into an uncertain future.

When a person looks inward in search for wisdom he is more likely to find "belief traps" set by self-serving genes, and unlikely to find that cold reality called Truth. It is irrelevant that the monk returns from the mountain with a measure of poise, and with the demeanor of someone who has attained superior insight. Any inward contemplation is at risk of delivering the unwary individual to a gene-created sucker's heaven. Liberation is more likely to come from the brave adventurer who has survived forays into the real world, where stark truths force themselves upon a reluctant mind.

Throughout the 2.5 millennia of recorded human thought the inward and outward approaches to understanding have been in conflict. Aristotle was a voracious observer, whose observation-based system was abandoned for almost 2 millennia. His ideas retained their authority for so long because after his era the world abandoned the outward looking approach to learning, as if a cultural pendulum had swung "inward" where no new information could be found. During this sterile period, when endless arguments could rage over how many teeth were in a horse's mouth, the discovery of knowledge was paralyzed. The Dark Ages brought with it the darkness of a world outlook riddled with spiritual explanations, culminating in 3 centuries of

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witch hunts throughout Europe and America. Fortunately, the 18th Century swung the pendulum "outward." The *Philosophes* challenged Aristotle's authority and an era of exploration, literal and figurative, was initiated.

It can be argued that the inward turning mind was a result of changes that had already been set in motion by other forces, and is not a cause of change. But it should also be valued as an indicator, or harbinger of changes to come. Let us be vigilant when movements appear that preach the inward-looking mind-set.

As described in the previous chapter, 20th Century LBS (Left-Brain Styled) scientists are acutely aware of the threat posed by the newly-emboldened RBS (Right-Brain Styled) common man. It is ironic that in a series of public lectures by Jose Ortega y Gasset in 1928, collected and published posthumously as *What is Philosophy* (1960), 19th Century scientists are criticized for their expansive dominance of the climate of thought. Ortega y Gasset's accusation is that the philosophers of this period were *"humiliated by the imperialism of physics and frightened by the terrorism of the laboratories. The natural sciences dominated the surrounding atmosphere."* He then asserts that *"When the surrounding atmosphere ... is hostile to us, it forces us to a perpetual state of struggle and dissociation, it depresses us and makes it difficult for our personality to develop and come to full fruition."* He characterizes the conflict between philosophers and scientists with the phrase *"...philosophers, having suffered the disdain of those men of science who kept throwing up at them the charge that philosophy is not a science..."* but then wins the argument by claiming that *"...philosophy is not a science, because it is much more than a science."* As a scientist, I find this logic somewhat tortured, especially coming from the person most responsible for presenting the argument that mass man unfairly resents the esteem and influence of the academic who devotes his life to understanding a subject. So strong are the RBS neural circuits that even Jose Ortega y Gasset was occasionally misled by them!

If this, then what else? How can we expect the uninformed masses to restrain their resentment and contempt for knowledgeable people if even an academic is occasionally gripped by this primitive impulse?

In his *The Revolt of the Masses* (1930) Ortega y Gasset wrote that because the 19th Century empowered the masses economically, the masses were emboldened to view their undisciplined opinions, coming from within themselves without the benefit of academic study, to have equal validity compared to those from scholars. He writes: *Today ... the average man has ... "ideas" on all that happens or ought to happen in the universe. Hence, he has lost the use of his hearing. Why should he listen if he has within him all that is necessary? There is no reason now for listening, but rather for judging, pronouncing, deciding. There is no question concerning public life in which he does not intervene, blind and deaf as he is, imposing his 'opinions.'* "

To the extent that the newly empowered and unschooled mass of men influence public opinion (see Price, 1970 and Allen, 1989), new forces are returning the pendulum "inward" where today's fashion claims Truth can be found. Seeking truth

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by looking inward is a dangerous trend. It contrasts with the scientific approach of looking outward: observing, speculating, and testing the speculations by appeal to additional observations designed to possibly falsify the speculation.

The scientific process can lead to unexpected, unwanted insights. Thus, LBS inquiry represents a threat to RBS beliefs, and naturally RBS people react by restricting LBS research. Many subjects still cannot be studied because they are too threatening to RBS beliefs. Some of the most lamentable example today are: 1) race differences (Rushton, 1995), 2) the genetic basis of intelligence (Jensen, 1973), 3) eugenics, 4) the sociobiological basis for rape (Thornhill and Palmer, 2000), 5) the role of sociobiological "group strategies" to account for Jewish history (MacDonald, 1998), and 6) the origin of religious belief as an evolutionary adaptation (Alper, 2000).

Scientific inquiry into "uncomfortable" subjects is suppressed by RBS people, such as the (take a deep breath) "Jewish, Marxist, politically-correct New York intellectuals" who have already hijacked a few choice nuggets of our culture and who continue to try to remold our values. New Age "feeling" people may be viewed as harmless, but their politically correct intellectual comrades are harmful, for every time they interfere with "thinking" people there is an incremental loss in the prospects for civilization's continued growth and prosperity.

The Mutational Load Theory

In most contemporary primitive cultures women have an average of eight babies. Allowing for the fact that in prehistoric times women may have died during their reproductive years (due to difficult births, disease, starvation, tribal warfare, etc), 50% to 75% of offspring would die before reaching reproductive age (which was 16 or 17 years until modern diets changed it to its present 12 or 13 years). In modern cultures women bear an average of two babies, and both of them are likely to live throughout their reproductive years. If this sounds like progress, read on!

According to Alexey S. Kondrashov (1988, p435) "*in modern human populations detrimental mutations are probably accumulating faster than they are being eliminated by selection*" due to the survival of a larger fraction of newborns than in former times. He postulates that normally there is a steady-state between the processes of mutational degradation and preferential survival of babies with few deleterious mutations.

Now, pause again, and take a deep breath! Anyone reading this far will sense that they're entering politically incorrect waters! To rationalize your desire to draw back, to recoil away from the uncomfortable implications that you suspect are implied by the preceding, you will probably feel obliged to question Kondrashov's allegation: "*Surely, deleterious mutations do not occur at high enough incidence to matter in just one generation!*" But what if they do? Because if they do, and if humanity's slow march forward toward an ever-higher and more glorious pinnacle has depended upon the "sacrifice" of those bearing the deleterious mutations, then what Pandora's box have we opened by creating a society that assures survival for virtually everyone?

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The implications are unthinkable! "Would God permit a world that produces an ever-expanding population of people afflicted by physical deformities, physiological weaknesses, and mental defects?" "If we are in dysgenic decline, is our only recourse that reviled, discredited, mean-spirited theory called eugenics?" "Didn't Hitler practice eugenics?" (For the record, the answer is "no" – Jews score higher on IQ tests than non-Jews.)

Theory predicts that a population's genetic quality should decline when the mutational load is not removed by a process of differential survival of individuals before they reach reproductive age. This should be self-evident (but I can provide an analysis to support it, upon request). Is there evidence for a decline in genetic quality during recent generations? The published literature has little to say about this, possibly because it is a taboo subject. Epidemiologists are still puzzling over the dramatic increase in asthma during the past few decades (they say you can't blame it on air pollution). And the incidence of "learning disabled" children is increasing rapidly (although this may be due to changing thresholds for labeling children as such). Herrnstein (1978) has studied IQ in America and concludes that it has declined 4 or 5 points during the past 5 or 6 generations. However, Herrnstein attributes this decline to a higher fertility rate for people with low IQ, and this explanation is unrelated to mutational load theory. Most traits are a product of both genetics and environment, and this presents a special challenge to anyone seeking evidence for the case that we are in dysgenic decline due to an accumulation of a load of genetic mutations.

As an aside, the "Flynn Effect" (Flynn, 1987) purports to show an IQ increase of between 11 and 18 points between 1950 and 1980 among young Americans, with similar upward trends in other countries. However, questions have been raised about the use of the early, original IQ tests for measuring changes across generations, and Flynn himself has concluded (1990) that this is the case. Interestingly, IQ scores over time are rising while SAT scores and academic performance are decreasing. These waters are muddied.

With the observations of IQ trends ambiguous, we are left with mere theory to guide us. As there seem to be no publications that address this question, I developed a very simple model meant to explore how far a heritable trait can be "degraded" when mutational load is not "corrected" by the normal amount of differential survival of offspring. I used IQ, since it's a well-studied, multi-gene trait, and it has a high heritability (0.75 according to identical twin studies conducted by Bouchard *et al*, 1990). Allowance was made for the fact that the average offspring IQ is a 70/30 weighting of the parent's IQ and the genomic average IQ (defined to be 100) according to various studies that start with Galton (1909). If all of the bottom 50 % of offspring fail to reach reproductive age, the average adult IQ of the adult offspring would be 105.7 in the absence of mutational load. A more realistic assumption is to assume that survival probability ranges linearly from 0% at an IQ of 60, to 100% for an IQ of 140. This would produce an offspring average IQ of 102.0. I interpret this to mean that the mutational load on IQ is about 2 IQ points! In other words, starting

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with a parent generation IQ that averages 100, the average IQ of offspring is 98, but after the 50% culling of preferentially low IQ offspring during infancy and childhood, when the surviving offspring reach adulthood their average IQ is restored to near 100!

Since this culling effect is greatly reduced in developed societies, the theory predicts that we are producing generations of offspring that reach adulthood with IQs that average closer to 98 than 100. Over time this will lower the "genomic IQ" (the IQ, which is commonly taken to be 100, toward which offspring IQ is "attracted" with a 30/70 weighting). I calculate that this is a very slow process.

If IQ is decreasing by amounts as large as the Herrnstein study suggests, then it probably is not due to mutational load. Herrnstein's theory of different fertility rates for groups with differing "genomic IQ" may be capable of producing the faster changes. That topic is not relevant to this essay, and will not be discussed further here.

IQ is a multi-gene trait, and therefore has greater "inertia" to change from random mutations. Single-gene traits, such as hemophilia, should be capable of increasing their representation in the gene pool at much faster rates. For example, before modern medicine most individuals carrying the X chromosome allele for hemophilia would have died before reaching reproductive age. Today, they can be treated, as almost all of them are, and they then have the full potential of reproductive years for passing on the hemophilic gene to their offspring (by way of a sex-specific X chromosome transmission path). Under such conditions the hemophiliac gene can rise to levels in the genome that are much higher than had ever existed in earlier times. (Although most cases of hemophilia can be attributed to an inheritance of it based on family history, some cases are apparently due to "spontaneous" mutations at a mutation-prone site.) This qualifies hemophilia as an example of mutational load.

As more diseases become identified with DNA locations, the list of examples of mutational load genes will grow. The importance of addressing this problem will also grow, not just because we will be able to identify more diseases as gene-caused, but because the incidence of gene-caused diseases will be increasing and the burden to society will become more costly.

The mutational load theory, with its prediction of a deterioration of the mental and physical health, or vigor, of the population, is just one more pressure on a civilization's continued existence. The timescale for repairing the damage that could be done to the genome by a "too kind" society is much longer than the timescale for creating the problem. Thus, the wealthy society unknowingly, and with the best of intentions, contributes to its own decline. In other words, a society that experiences a rise in wealth is hit by two new challenges: the poorest in society are encouraged to become parasitic and the wealthy are burdening society with defective children.

Empathy for the plight of one's children is a "micro-motive" produced by the genes. The "macro-behavior" resulting from these micro-motives may produce a perpetually

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recurrent oscillation of gene pool vigor, producing the rise and fall of civilizations. The oscillation will not be sinusoidal, for the building process should take far longer than the destructive process. How fortunate we are to be living through the cusp of our civilizations apex! Yet how disheartening it will be for our children who will live through the crash.

Why are the opinion shapers of society loathe to talk about this? Every year that society postpones dealing with the problem is a year that the problem grows, and becomes more difficult to solve. It's not just mutational load; there are many other subjects deserving attention that are not being addressed by responsible societal discourse. Some subjects are just naturally taboo!

In this chapter several factors were suggested as possible contributors to the decline of a civilization. The next chapter provides some evidence that civilizations rise and fall in the manner described in this chapter, and that today's global civilization might be the last one to exist because humanity is doomed to become extinct during the current millennium.

CHAPTER 19

FACTORS INFLUENCING THE FATE OF CIVILIZATIONS PART V: FASCISM

"Democracy is the theory that the common people know what they want - and deserve to get it good and hard!" H. L. Mencken

Any discussion of causes for the collapse of an empire and threats to civilization would be remiss if it did not include an analysis of what's happening right now to the American Empire. That is the subject for this chapter. The risk in describing a current event is that it will inevitably lack perspective, and it is fraught with the temptation to insert opinions instead of facts. I have tried to prevent this chapter from becoming a "political rant" but I know it still has that flavor. Forgive me for caring passionately for my home country.

America went from being the world's biggest lender nation (peaking in 1981) to the biggest debtor nation in less than 2 decades (passing from creditor to debtor in 1984). When this happened, accompanied by a host of other troubling changes, everyone should have been asking "why." Interesting forces must have been at work to account for such a switch. Can these forces be understood well enough to assess the possibility that America's economy and stature as an empire are on a path to collapse?

The chapter reviews American history with frequent reference to two theoretical sub-themes. My hope is that the two theories will be supported so convincingly that when my historical review arrives at the "present" I can use the theories to extrapolate America's future.

Theory 1: Review of Group Selection Theory

This section will review Chapter 11's discussion of a sociobiological group selection theory used to account for changes in individual behavior as conditions fluctuate between war and peace. It serves as essential background for understanding a trend in America that began in the 1980s.

One enduring principle of evolution is that the strong rarely miss an opportunity to exploit the weak. The exceptions are few, but significant. The strong refrain from exploiting the weak in three situations: 1) when related individuals are involved, 2) among friends with a history of reciprocal relationships, and finally 3) when one's tribe is at war with a rival tribe this exploitation is rare for intra-tribal interactions. This last situation was described in Chapter 11 in great detail, and it will be reviewed

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here because it is a crucial ingredient for understanding America's current predicament.

When a tribe is at war with a neighboring tribe individuals are “programmed” to act altruistically by becoming unquestioning patriotic warriors. Individuals also refrain from any intra-tribal behaviors that are likely to weaken the tribe, and jeopardize the outcome of the ongoing conflict. Any tribe in which this does not happen cannot survive, so through a “group selection” way of thinking we expect that all tribes that survive in such an environment will consist of individuals that act this way.

After the tribal conflict is resolved, perhaps with one tribe achieving decisive victory over its rival, inter-tribal relations will be peaceful. The victorious tribe may in fact achieve such overwhelming dominance over its newly enlarged realm that it can be called an empire. During this prolonged interlude of peace the need disappears for patriotic altruism. There is also diminished need for intra-tribal good behavior since the overall strength of the tribe will not affect the survival of its members. The intra-tribal component of this theory can be summarized by stating that there are rewards for *genes predisposing for intra-tribal niceness* during warfare and there are rewards for *genes predisposing for intra-tribal nastiness* during peaceful conditions.

Since the alternations between war and peace and war, etc., can often be shorter than a lifetime, which is much too short for gene pools to evolve, human brains must be pre-wired to produce these condition-based behaviors. This pattern for human behavior is supported by game theory simulations (Choi and Bowles, 2007) and also a careful re-reading of recorded history (Turchin, 2007). In order to understand its relevance today I need to review how it came about at the transition between human pre-history and recorded history.

Pre-History Lesson

Humans must have lived in tribes for millions of years. Chimpanzees live in their version of tribes, and they wage war with their neighbors, so it is not unreasonable to assume that humans have lived this way since the time of the human/chimpanzee split, about 6 million years ago.

The size of human tribes was probably limited by a nomadic lifestyle as well as hunting and gathering conditions, with numbers probably in the 20 to 50 range (chimpanzees live in troops of about 10 members). Group selection pressures are probably insignificant for such small tribes. Like chimpanzees, where males often join neighboring troops, an individual's fate is not determined as strongly by the fate of one's tribe when it is small.

Probably sometime about 50,000 years ago, when tool making became a full-time occupation for a designated artisan in most tribes, and when division of labor for other tribal tasks may have begun, the size of human tribes must have grown. Tribal cohesion would have greater rewards when this interdependence of membership was important. A tribe could only sustain a large size when it had specialized roles. And

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large tribal size was important when tribes engaged in warfare. Whereas small tribes had been organized “democratically” these larger tribes needed coordinated leadership to respond effectively during inter-tribal warfare. I envision that tribal size was in the 50 to 150 size range from about 50,000 years ago until the end of the Pleistocene (12,000 years ago). A tribal chief may have been identified for directing warfare; during peaceful intervals the “chief” may not have had especially important privileges, and decisions may have been made democratically.

During the Holocene (starting ~12,000 years ago), which is an inter-glacial with a warmer climate, there were new opportunities for supporting large tribes. Agriculture was one path to growth, and marauding agricultural communities was another. Inter-tribal warfare may have been more frequent and the fate of individuals may have been tied more to the fate of one’s tribe. An intuitive understanding of “all for one, and one for all” would have been an asset for all tribal members. Greater powers would have to be given to the tribal chief, who may have recruited his favorite and most loyal companions to help him during battle and maybe during peaceful interludes. The democratic form of coordinating tribal activities would yield to a more “leader controlled” tribal structure. During the Holocene, as some tribes thrived and others were decimated, there would emerge a new tribal structure in which a strong leader could count on the loyalty and obedience of the others. Any tribe that embraced individual rights and a deliberate process of reaching a consensus before taking any action would simply disappear.

Theory 2: Emergence of Strong Central Leadership During Holocene

Feudalism was a form of social organization created to offer protection of workers (peasants) by warriors who took their direction from powerful, land-controlling rulers (kings) whose claim to power is based on their past performance as a warrior. The king acted as if the land belonged to the kingdom that he ruled. He allowed the peasant farmer to cultivate a portion of land in exchange for a tax on the produce and sometimes an obligation to join with warriors when called upon to defend the kingdom. This arrangement was made necessary by the incessant threat of marauding bands.

Since it is “the man with the hoe” where almost all production begins there is a sense of unfairness inherent in feudalism. The warrior is not a producer, nor is the king and his cronies. The peasant producers resemble a herd of cattle who are protected because they provide sustenance for their keepers. It would probably be fair to say that the poor peasants are exploited by those with power.

But for the powerless peasant the deal may be good, even though there’s no alternative. By himself he can’t protect his storage of crops, so a tax on them in exchange for security seems fair. The land he tills can’t be protected from stronger neighbors in search of greater production, so the arrangement of tilling an agreed upon portion of the king’s land is a safe alternative. The underlying worry that kept the peasant in his place was fear; the fear of marauders, the fear of invasion by neighboring kingdoms and the fear of intimidating take-over by his nearby fellow

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peasants. As long as this quasi-enslaved peasant works hard he can count on surviving.

The willing peasant is helped by having the slave's mental attitude. Were he to rebel, as some surely did, the alternative lifestyle would be risky and he would have fewer grandchildren. Inexorably, over 12,000 years, a peasant class of men evolved who instinctively accepted this feudal social order.

Feudalism has appeared in many cultures, so the readiness to form a feudal society could almost be called a "human universal." Feudalism involves two mutually-dependent populations: the masses of semi-enslaved, semi-impooverished peasants and the minority of wealthy leaders and the defenders that they command. We should not be surprised to find in 21st Century men a residue of readiness for these two attitudes and a feudal form of governance.

American Revolution

The Founding Fathers of America were fed up with England's overbearing rule. King George III tried to extract money from the American colonies. When colonists objected to his excessive taxes he was enraged by their disobedience and believed they should be dealt harshly. The "Tea Act of 1773" unfairly favored the monopoly power of a British company, the East India Company. The pattern of King George's dealings with the colonists was clear, and there was no hiding the fact that the colonists were being exploited in order to favor the monarchy and a large British company. King George over-played his hand and eventually lost everything at the conclusion of the American Revolutionary War in 1783 (he was later called "the king who lost America").

Thomas Jefferson, the primary author of the Declaration of Independence (1776), wanted America to be an experiment in democracy. He had no use for "allegiance to a monarchy." Amazingly, some colonists preferred to be ruled by King George III. They were referred to as "royalists" and also "conservatives" since they wanted to "conserve" a monarchy form of governance.

Jefferson and Alexander Hamilton had a long-standing disagreement about the ability of ordinary people to sustain a democratic form of government. Jefferson believed that educated people could be trusted to govern themselves wisely, and that eventually the world would rid itself of monarchies and dictators. Hamilton called this wishful thinking because he believed human nature lacked the requisite wisdom to sustain a form of democratic self-governance.

The Constitution was written (1787) with safeguards against abuse of power. For example, it included a ban on monopolies in commerce (prompted by their experience with the East India Company). Many of its provisions were aimed at preventing a repeat of the abuses suffered under the British monarchy. The creation of three branches of government was supposed to achieve this. The Constitution can

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be viewed as a reaction to a history of only monarchies and dictatorships stretching back 2000 years to the first great experiment with democracy in Greece.

19th Century America

If history is viewed as a swinging back and forth between power of the wealthy and power of the people, then late 18th Century America was surely a swing toward the latter. However, the late 19th Century had an opposite swing. After the Civil War (1861-1865) some businesses grew powerful enough to influence the US Congress, and undermine the moral attitude of the executive branch. This time is referred to as the American “Gilded Age.” When it was in full swing (1877 to 1893) extravagant wealth for the few contrasted with poverty for the many. The most memorable wealthy few are referred to as “robber barons” (*e.g.*, Rockefeller, Vanderbilt, Carnegie and Morgan). They manipulated the federal government in ways that benefited them greatly, with no regard for the workers who sustained their enterprises. The government was too weak and unmotivated to prevent unethical financial manipulations. Labor abuses led to uprisings and the beginning of unions. This movement ushered in a “progressive era” (1896 to 1920). Slow progress was made in the areas of worker’s rights (*e.g.*, child labor laws) and reversing other social injustice issues (*e.g.*, women’s right to vote).

The Roaring Twenties

The 1920’s decade has so many take-home lessons that are relevant for this chapter that I will give it plenty of attention. As this section illustrates, history does repeat itself!

The Progressive Era is partly responsible for the booming economy of the 1920s. The Roaring Twenties was a time of unleashed creativity, leading to many inventions, new businesses, and advances in literature, art, music and entertainment. America’s image of itself is that this is where any entrepreneur could prosper and achieve the American Dream. The optimistic belief that prosperity was in store for everyone overshadowed the growing disparity of wealth between the rich and the middle class.

President Calvin Coolidge (1923–1929) was naively optimistic about the economy as he proclaimed “The business of America is business.” But the so-called “Coolidge Prosperity” had not benefited everyone. The disparity between rich and poor grew throughout the 1920s. By 1929 the top 0.1% of Americans had a combined income equal to the bottom 42% (Brookings Institute, 1981). Businesses were not regulated sufficiently. Businesses, it seems, never ask to be regulated. Speculation in the stock market was viewed by those who had money to invest as the path to greater wealth. The stock market was also not regulated sufficiently.

On October 24, 1929 the stock market “crashed” and in 3 weeks had plunged 40%. During the ensuing Great Depression the unemployment rate reached 25%.

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According to Gusmorino (1996) “The federal government contributed to the growing gap between the rich and middle-class. Calvin Coolidge’s administration (and the conservative-controlled government) favored business and as a result the wealthy who invested in these businesses.” He goes on to write “...the Revenue Act of 1926 ... reduced federal income and inheritance taxes dramatically. ... In effect, [a wealthy person] was able to lower federal taxes such that a man with a million dollar annual income had his federal taxes reduced from \$600,000 to \$200,000.”

Sound familiar?

The Reagan to Cheney administrations resemble the Coolidge administration. There are other resemblances, and since this will play an important part of this chapter’s argument I will use the rest of this section to paraphrase key points in an article by Gusmorino (cited above, also at <http://gusmorino.com/pag3/greatdepression/>). All quotes in the rest of this section are from Gusmarino.

Productivity increased 32% during the 1920s whereas wage earners only saw an income increase of 8%. “... the bulk benefit of the increased productivity went into corporate profits...” “It was not that the surplus products of industrialized society were not wanted, but rather that [the poor could not afford to buy them, whereas] the wealthy were satiated [after] spending [only] a small portion of their income.”

“Throughout such a period of imbalance, the U.S. came to rely upon two things for the economy to remain on an even keel: credit sales and luxury spending and investment from the rich.” “One obvious solution to the problem of the vast majority of the population not having enough money ... was to let [them] buy products on credit. The concept of buying now and paying later caught on quickly. By the end of the 1920’s 60% of cars and 80% of radios were bought on installment credit. ... Installment credit ... created artificial demand for products which people could not ordinarily afford.” At the time of the crash “80% of Americans had no savings at all.”

Sound familiar? (The marketplace reinvented credit purchasing to maintain corporate sales after President Ronald Reagan started busting unions, causing workers to lose purchasing power – as described by Thom Hartmann on his radio show.)

“While America was prospering in the 1920's, European nations were struggling to rebuild themselves after the damage of war.” The US had loaned European nations over \$7 billion during the war, and during the 1920’s the rate of loans rose to \$1.25 billion per year. “Of these funds, more than 90% were used by the European allies to purchase US goods.” One wonders if US corporations were looking for markets to supplement the dwindling buying power of Americans and cleverly influenced the government to subsidize them through a good-sounding scheme of foreign aid.

After the crash “the middle-class and poor stopped buying things with installment credit for fear of losing their jobs and not being able to pay the interest. As a result, industrial production fell...” (If Americans were smart they’d start doing this now.)

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Want to hear a sanitized version of what caused the crash? Economists (whose infamous adherence to the idiotic model that “individuals are guided in their personal decisions by rational thought” should discredit most of what they say) tell us that “The Federal Reserve kept the money supply tight, because they feared the runaway inflation that they saw devastating postwar Germany. So they over-corrected. They should have let the money supply increase slowly. And the other cause was the Hawley-Smoot tariff act, which was protectionist. The word that the US was about to tax foreign imports spread globally and caused other countries to erect trade barriers, so everyone suffered from the loss of trade.” (Tom McDonough, private communication)

Before proceeding with a recapitulation of the 1930’s recovery I want to highlight what I think is the take-home lesson of what happened to the economy of the Roaring Twenties. When corporations earned large profits they didn’t share them with workers. This led to a shortage of people who could afford to buy those products. The demand for products was there, but the ability to pay for them was not. The marketplace was creative, however, for it promoted installment credit purchasing. This stratagem had the temporary effect of maintaining purchases and corporate profits. But optimism, based on years of a booming economy, kept people from recognizing that the economy was really unstable and prone to failure, until it actually failed.

No single company can be blamed for the crash. Most of them behaved in their short-term interest, oblivious to the possibility that they were “killing the goose that lays the golden egg.” A better metaphor for the tragedy that’s possible when everyone pursues their self interest would be Garrett Hardin’s “Tragedy of the Commons.” In his 1968 article Hardin describes a hypothetical situation of a pasture that is grazed by many flocks of sheep; each flock owner is faced with the decision of whether to add more sheep to his flock. From the owner’s perspective adding one sheep to a flock increases his income by an amount proportional to his flock size increase. Since each owner thinks the same way they all can be expected to increase their herd size. At some point the pasture’s capacity is exceeded, and starts to become over-grazed. Still, it makes sense for each flock owner to add one more sheep because the increment of overgrazing from an additional sheep is small (being proportional to the total of sheep grazing) whereas the benefit is proportional to the increment of the owner’s flock size. Eventually the pasture is not suitable for any sheep, and all sheep die. The lesson from this hypothetical exercise is that it is in the long-term benefit for all flock owners to come together to create an agreement concerning each person’s behavior so that all may continue to benefit from the pasture’s potential. If we apply this lesson to the companies in the 1920’s they should have been regulated by a government that brought them together to formulate a behavior that would promote financial survival of them all, as well as any other social benefits – such as the welfare of American society. In other words, market forces cannot be trusted to fix all problems, and government is sometimes needed to provide solutions. Government is not “the enemy” – it can be the solution. This lesson was either forgotten during the Reagan administration (1981–1989), or it was intentionally ignored for the short-term gain of corporate leaders with inexcusable disregard for societal welfare.

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There are so many parallels to the present American economy that I had goose bumps while reading parts of the Gusmarino article.

The underlying “human universal” that accounts for this sad episode in American history is that humans are capable of short-term greed; when the rich have the opportunity to exploit the weak, they will.

The Great Depression

When Herbert Hoover accepted the Republican party’s nomination for President (1928) he declared “We in America today are nearer to the final triumph over poverty than ever before in the history of any land. The poorhouse is vanishing from among us.” In his inaugural address March, 1929 (just 7 months before “the crash”) he continued this happy talk with “Ours is a land rich in resources; stimulating in its glorious beauty; filled with millions of happy homes; blessed with comfort and opportunity.” It is likely that he believed his speeches. After all, “on the surface” the economy was booming. But the waters were deep, and turmoil was rising inexorably to the surface.

After the crash Hoover reassured America that the economy was sound. This is what leaders say when things falter. They’re not simply trying to comfort their suffering followers, they probably actually believe their optimistic pronouncements. After all, their beliefs are like a religion, and it’s unthinkable that their religion could be wrong. Hoover’s religion was Republicanism, or conservatism, which has at its core the idea that as long as the wealthy aristocrats prosper the rest of the kingdom will be OK. It’s what today is called “trickle down” economics. The mechanism by which this trickle down is supposed to occur is called a “free market.” Only someone with religious fervor could believe that the free market will solve all problems. As Hoover repeated, we just have to wait for market forces to right our economy.

Homelessness swelled as bank failures wiped out savings and unpaid mortgages led to foreclosures. Some people lived in old crates and shacks called shantytowns, which were also referred to as “Hoovervilles” as a bitter reference to the fact that Hoover refused to give government assistance to the unemployed. He repeated his belief that the economy was sound and that public confidence would soon lead to business investments and job creation. But why should a business expand production when their warehouse was full of merchandise that no one could afford to buy? When this didn’t seem to work Hoover tried raising taxes thinking that a balanced federal budget would help. But this strategy only made things worse because it reduced discretionary income, as anyone should have predicted. Hoover refused to believe that it was right to help people outright because that would undermine their self-reliance. Everything Hoover tried failed because he only tried things that were compatible with his conservative economic principles.

Again, we should be reminded of the great Holocene experiment that favored men who embraced a concentration of power at the top of the super-tribe. The king knows

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best, especially during inter-super-tribe conflicts. During peaceful interludes the notion of kingly infallibility was turned to a feudal economic order for society, as if recovering strength for the next challenge from beyond the kingdom's borders. Human evolution is slow, and royal abuses of power may not have been checked by mutations within the genome or the meme belief systems. I like to view people as inclined to embrace one of the two major approaches to how a society should govern itself. The original idea is that everyone should be involved in reaching a consensus (e.g., the Japanese management style). The other is that decisions should come from above, from leaders, from the gods! Little people should not question the gods, nor should they question the king.

I have no doubt about **my** inclination! The king's infallibility is as much an illusion as all the gods that humans have invented. Both repositories of wisdom are "imposters" – dangerous, malicious imposters. I also have little faith in the consensus form of governance, for the same reasons as Alexander Hamilton. Most humans lack critical thinking skills; they latch onto whatever beliefs they are guided to by genetic predisposition and tribal taboos, and they behave in ways that are a confusion of what was adaptive in the ancestral environment and what seems to make sense within a modern paradigm.

Hoover's inclinations are obvious; he was so Republicanized that during his term as president the market forces he believed in, the ones that he interpreted as signifying a fundamentally "sound economy," just kept making things worse. Most of the world was also in its own economic depression, thanks to World War I and minimal real help from America. Consequently, in America's time of need there was no one to help. (I'll come back to this point in a later section.) Hoover was "king" and he had no answers. The deepest depression year was 1933, when Hoover left office and Franklin D. Roosevelt (FDR) took over as president.

It is ironic that FDR was born into aristocratic wealth. His outlook should have been like Hoover's. But maybe he had the pre-Holocene genes that distrusted concentrated power. Or maybe his personal experience with "polio" changed his outlook, and sensitized him to the suffering of others.

FDR showed that government, when properly used, could be "the solution" just as starkly as the previous administrations showed that government could be "the problem." If government didn't try new things then unchecked market forces would simply continue grinding down the little guy and a continuing depression would bring the American experiment in democracy to an end. The common theme of FDR's "New Deal" was a shift from serving big business to serving working-class people.

FDR moved quickly to impose overdue regulations on banks and the stock market. Minimum wage and maximum work hour laws were passed (June, 1933). Jobs were created by the government under the Public Works Administration (WPA). The Social Security Administration was created in 1935 to provide a minimum of financial assistance during retirement, unemployment or disability. Labor unions

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were treated with less hostility than during the Republican administrations. Other public works were created, such as the Tennessee Valley Authority, which not only created jobs they also improved living standards in the rural areas surrounding the TVA. Banking was made safer by his creation of the FDIC. Throughout all these massive government initiatives FDR was concerned about federal budget deficits. This concern made him somewhat cautious, but a growing resentment by Republicans put the brakes on his innovative programs starting in his second term (1937).

There is still argument whether FDR's progressive programs were responsible for bringing America out of depression, or whether the immense budget deficit spending and job creation demanded by World War II was mostly responsible. However, there is no argument that from 1933 onward America's depression was less painful than it would have been without FDR.

FDR provided strong leadership to a nation in economic crisis that might otherwise have floundered and faded from world relevance amid starvation and misery. His hopeful, moderate policies also prevented people from flocking to the American fascists and communists, who could have created a dictatorship. Where Hoover was a weak leader who was clueless about what to do, FDR understood the essential nature of what had to be done and he was persuasive in getting on with needed changes. Part of FDR's persuasiveness was his ability to appeal directly to working people, to allay their fears, nurture hope and renew national optimism. This is called "leadership." The entrenched business community hated FDR, and resisted his programs as strongly as they could. Even some of FDR's friends from the aristocratic wealthy class called him a traitor. FDR achieved success by switching government's main mission from partnering with business to partnering with people. And under FDR "We the people" usually prevailed over wealthy conservatives who resisted people policies.

Theory and Reality During the 1920's and 1930's

Let's pause for a moment and consider if the Roaring Twenties and the Great Depression are compatible with the two theories that are an underlying theme for this chapter.

The 1920's were a time of peace following a world war. According to Theory #1 patriotic altruism during the war years should have been replaced by the pursuit of individual fulfillment during the following peaceful years. A frequent theme of 1920's social commentary is that individual liberation and the pursuit of pleasure became tiresome; a purposeless life emptied the soul of meaning. Ennui and aimlessness, amid hedonistic diversions, pervade the literature (e.g., *The Great Gatsby*). The new rich felt no social obligation for others. This, indeed, is what Theory #1 predicts should have happened during the 1920's.

The 1930's somewhat resemble a time of war, when most people are suffering as if besieged by an outside enemy. Compassion is rediscovered; those for whom food and

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housing are scarce receive help from those better off (but only from the residual of the middle class, for prospering wealthy people were inclined to ignore other people's suffering). FDR tapped into a groundswell of dissatisfaction with the *laissez-faire* policies of the previous decade when he appealed in 1933 for people to vote for a leader who will ask for sacrifice from those who are "able to help" lend a hand to those who are unable to help themselves through no fault of their own. This altruistic response to a national need is what Theory #1 predicts.

Theory #2 also fares well when comparing these two decades. During the 1920's regulations were lax and the strong took advantage of opportunities to exploit the weak. Business influenced government, creating a partnership that was so obviously corrupt that muckraking journalism had a "field day" exposing it (*e.g.*, H. L. Mencken). If corporations could have installed a figurehead king to rule over America they would have done it. The wealthy aristocrats would have welcomed an American counterpart to King George III in order to more efficiently enslave workers and dominate world commerce.

During the 1930's FDR might be likened to a king, considering his expansive use of executive power to make bold changes. FDR might even be described as a beneficent dictator. However, FDR respected the powers of the other two branches of government, which did at times deal him defeat. More importantly, FDR worked to move wealth and power from the wealthy few to the many in poverty. Since his actions had the sanction of most Americans, it is fairer to say that FDR returned the country closer to the pre-Holocene tribal democracy in which decisions are made by consensus.

The 1940's

The American involvement in World War II technically began when Japan bombed Pearl Harbor (1941). Years before this event FDR was concerned about the looming war in both Europe and the Pacific but he was unable to mobilize the American people to prepare for it. Massive war spending that began in 1942 gave a boost to employment and the economy generally. Factories that had been building cars at a slow pace swiftly switched to producing tanks for which there was unlimited demand. (With "full employment" the WPA and other employment programs were discontinued.) War material was shipped to the British (under the Lend-Lease Act) before America was officially at war with Germany. FDR did not require payment for these shipments, which contrasted with the way Coolidge pretended to help European countries during the 1920's. FDR died April, 1945, a few months before the Allies won the war.

The Democratic Party dominated American politics from 1933 until about 1968, thanks to the effectiveness of FDR's three presidential terms of office during the first 12 years of this period. The middle class prospered throughout the 1940's, 1950's, 1960's and 1970's, and FDR can take credit for that too.

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The 1950's

I have first-hand knowledge of America starting in the 1950's, for I started college in 1957. My family was middle class and I recall the excitement of getting a television, a new family car every few years, and a general sense that society was stable. The Cold War was always in the background of our thinking, and the ever-present concern about atomic warfare with Russia instilled in everyone a serious side. Sputnik prompted the University of Michigan to offer an Honors Program to help catch up with the Russians in space technology, which I took advantage of.

Some of my college reading assignments accused my generation of being disengaged from social issues and political activism, and being overly concerned with individual pursuit of material wealth. We were accused of being too willing to wear a "gray flannel suit" and work obediently for a large company. In retrospect this was merely the quiet before the storm, which was unleashed in the next decade.

The Sixties

"The Sixties" is sometimes defined as 1963 to 1973. I'll treat the beginning as 1960.

General Dwight Eisenhower was courted by both the Democratic and Republican parties before he decided to run as a Republican (1952). The Eisenhower administration (1953-1961) has stood the test of time. He was experienced in assessing intelligence reports, and he correctly assessed Soviet missile capability as less of a threat than popularly believed. He launched the Space Race with Russia by establishing NASA (1958). He also initiated the building of a national freeway system (in case the military were to need it).

Eisenhower was not the traditional Republican, since he embraced much of FDR's New Deal. He expanded Social Security coverage and established the Department of Health, Education and Welfare. He enforced school integration, prevailing over the resistance of the Arkansas governor (1957).

In the 1950s the president of General Motors captured the essence of how to promote corporate interests when he said "What's good for General Motors is good for America." Perhaps this famous quotation influenced Eisenhower as he wrote his 1961 televised speech about the military/industrial complex. He feared that large industries that serve military hardware needs would have so much influence over the government that they would dictate spending decisions without being held accountable to voters. By this time American corporations had been growing for two decades, and they might have been emboldened to explore the limits of their growth potential. One of those limits for factories is the cost of labor. At this time workers were feeling pretty good about their prosperity, thanks to laws that protected unions. A collision was unavoidable, and the tumultuous Sixties were when it occurred.

If Eisenhower were alive today he would expand his military/industrial complex fear to include the influence of all large corporations, not just the military ones. Large

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corporations share the same “personality” by making opportunities that benefit them at the expense of anyone else sucker enough to subsidize them. The new industries to fear include pharmacy, health, insurance, banking (including credit), mortgage lenders – and others (discussed below).

The presidency of Jack Kennedy (1961-1963) symbolized the rising influence of a younger generation, a passing of the torch of power from an older generation (Eisenhower) to a younger one. Eisenhower would always be General Eisenhower, the man who led the Allies to victory in World War II, while Kennedy was all about future possibilities. Lyndon Johnson’s presidency (1963-1969), which began after Kennedy’s assassination, succeeded in passing many of Kennedy’s progressive policies.

I recall remarking to a friend in the mid-1960’s that this time would be remembered as the best of all times in both American and world history. America was prosperous, the Cold War had not produced a nuclear holocaust, and there were indications that in the future American society might coarsen and become unstable. I believe that subsequent history has confirmed my assessment.

Prosperity in America just kept growing after World War II. Babies born after the war were raised by parents who remembered the Great Depression and wartime sacrifices, and they vowed to save their children from these deprivations. There was a temptation to “spoil” the children, and those born between 1945 and 1950 were college age starting in 1963. It is more than a coincidence that this is when college age students exhibited an excess of irresponsibility, a mocking of their parent’s work ethic and a rebellion against conformity. Drugs, hanging out, mocking society and protesting anything embraced by the Establishment created a generation gap like no other.

Gone were the accusations hurled at my generation, those born just before the war and during, that we were too quiet and disengaged from public affairs, or that we were preoccupied with material wealth, or a desire to work obediently as a Company Man. I was fascinated by the undisciplined, free-thinking lifestyle of those just a few years younger than me. The questioning of authority, and especially the government, became a constant irritant for the Establishment, comprised of a generation that came immediately before mine.

Being in that transition generation, between those older than me in the Establishment and the younger hippies, predisposed me to see both sides of the arguments. I continued my work on the space program with NASA government “establishment” funds while socializing with some of the hippies. My sympathies were divided, for although I could not endorse irresponsible lifestyles I nevertheless agreed with the younger generation about one of the most important things that irritated them: a compulsory draft that forced peace-loving young men to take-up arms for killing foreigners who didn’t threaten America. The entire Vietnam War struck me as immoral. The so-called “domino theory” neglected nationalism considerations, borne

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out by subsequent events, so one alternative explanation that I found attractive was that the war benefited the military-industrial complex.

It is probably always true that whichever class of a society is favored by the greatest growth of wealth, that class will increase its influence in changing the society. During the Sixties, as before, the middle class grew in wealth and influence, and it is natural that this would scare the Establishment. Other things besides losing influence must have scared the Establishment; the very stability of society appeared to be threatened. Just consider that political assassinations felled Jack Kennedy, Martin Luther King and Bobby Kennedy. The disenfranchised of society rioted in Los Angeles, Newark and Detroit. Whereas during the Great Depression there was cause for concern over the country's survival due to an economy that seemed resistant to cure, during the late Sixties there must have been the same concern that was instead based on growing social instability.

This concern over social instability may have been a factor in the election of the first true Republican since Herbert Hoover, Richard Nixon. He was elected president in 1968, the year of the aforementioned race riots and assassinations. Nixon promised to end the war in Vietnam and achieve social stability by restoring "law and order." Barry Goldwater had sparked a resurgence of interest in reviving Republican control of government 4 years earlier, but when he campaigned (1964) the hippy/Establishment culture war had only begun and was not a paramount issue for voters. Goldwater rejected the New Deal progressivism that had brought America out of the Great Depression. Although Nixon won the election largely over a desire to end social instability, he was also a beneficiary of what Goldwater started.

The Seventies

Nixon was accused of being an Imperial President (Schlesinger, 1973) because of his exercise of more power than allowed by the Constitution. His original transgressions were intended to bring the Vietnam War to an end by expanding the war to nearby countries without the required Congressional knowledge or approval. Later Nixon expanded his powers to domestic issues. Congress passes budgets and the president can sign or veto them. Nixon assumed powers not in the Constitution to reward and punish those who agreed and disagreed with him. He also selectively enforced laws. Some of the Nixon administration offences include "burglary, forgery, illegal wiretapping and electronic surveillance, perjury, obstruction of justice, destruction of evidence, tapering with witnesses, giving and taking bribes and conspiracy to involve government agencies in illegal actions" (wikipedia). His inept cronies were caught illegally wiretapping Democrats at the Watergate Hotel, and this led to an unraveling of his presidency and his resignation (1974).

Many aspects of Nixon's presidency resembled rule by royalty, by King Richard Nixon. The Constitution was written to prevent what Nixon tried to get away with; thank goodness for the ineptness of his cronies!

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Gerald Ford was Vice-President when Nixon resigned, so he completed Nixon's term as president (1974-1977).

Probably because Nixon had "blown it" for the Republicans the election of 1978 went to Democrat Jimmy Carter. I believe his presidency (1977-1981) has been unfairly maligned, and I suspect this is due to a re-writing of history by Republicans. Carter is the only US president to win a Nobel Peace Prize (2002). He created a Department of Energy, and promoted conservation and new energy technology development for the goal of achieving energy independence. During his administration oil imports were reduced 50%. He is also known for his human rights activism.

Carter's interest in achieving oil independence was largely a response to the 1973 OPEC decision to reduce oil exports in order to increase profits from the ensuing shortage. This occurred during the Nixon administration, but Nixon never addressed the matter. Peak oil production in America occurred in the middle of the 1970's, so American oil producers were handicapped in ramping up production to stave off rising oil prices. The economies of 20th Century advanced countries ran on energy produced by oil, which mostly explains why Carter's administration was burdened by high inflation, high unemployment, slow growth and an increasing federal budget deficit. A "malaise" pervaded the country near the end of Carter's term. In short, OPEC ruined Carter's presidency.

The Reagan Era, the 1980's

President Ronald Reagan is the protagonist of this chapter. He aspired to be the Coolidge of the 1980's. His attempt to unflinchingly pursue conservative policies that threaten to destroy the middle class ran into just one problem: the rest of the world was prospering and had money to loan credit companies so that Americans could buy, buy, buy until they dropped – in 2008.

Well, I'm getting ahead of my story, so let's start over with Reagan's election in 1980. Reagan won the election because Carter was pursuing long-term solutions and Americans demanded short-term solutions. When Reagan said "It's Morning in America" that's just what voters wanted to hear as a counter to the Carter malaise. Reagan was charming, he could speak well, he made jokes, and never mind that he set in motion ruinous policies as Governor of California.

As governor of California he was cheered by voters who liked his pledge "to send the welfare bums back to work" and "to clean up the mess at Berkeley." In order to lower taxes he disbanded mental hospitals, which had the effect of filling the jails with people the jail staff weren't prepared to deal with.

Reagan's presidential campaign echoed his California governorship, whose disastrous consequences were not apparent to national voters. He stated that "Government is not the solution to our problems; government is the problem." What a clever line, for anyone who can't think. He therefore won the election (1980).

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Reagan was a conservative's dream-come-true. Half a year into his administration the federal air traffic controllers went on strike, so he fired them, thus sending a message to employers that they could confront unions. Also during his first year in office he lowered taxes by amounts that ranged from 20% for the wealthiest to 3% for the lowest income bracket. The underlying theory for this imbalance is called "trickle-down" economics, which assumes the wealthy will invest their savings in job-creating businesses which will benefit the poor. An alternative explanation for tax cuts that favored the wealthy is to consider who funded his campaign then recall the old saying that "you dance with the one that brung ya."

In 1986 Reagan signed a second tax reducing bill, which lowered the top tax rate from 50% to 28% while the bottom rate was raised from 11% to 15%. In addition, interest on credit card debt could no longer be declared as a deduction, which hit poor people harder. Capital gains were taxed at a lower rate, which helped wealthy investors. The same tax act increased incentives for investing in home ownership versus home rental, which also favored the wealthy. Changes were made to the Alternative Minimum Tax that had the effect of increasing taxes for the middle-class, with ever-increasing effect as inflation raised incomes.

What an amazing feat for Reagan to have lowered wealthy taxes from 70% to 28%, while raising rates at the low end of the income scale, and all in just 5 years! Did this Reverse Robin Hood tactic improve the American economy? While it's true that the rate of inflation and jobless rate came down, tax revenues also came down at the same time that federal expenditures went up. The budget deficit just kept getting worse during the Reagan years. The federal government had to borrow to pay for the national debt, which grew from \$0.7 trillion to \$3.0 trillion during his presidency.

A hallmark of his administration is that he did what corporations wanted: union-busting, less government regulation of business, lower taxes for the wealthy and disregard for anti-trust laws. Working people started losing their good-paying jobs and had to settle for lower-paying ones, median income stagnated and eventually decreased, employee benefits began to erode (health insurance and retirement funding). Families headed by two wage-earners became the norm, and job security worsened. Downsizing while promoting overtime allowed employers to save on health care costs. The working classes became docile for they feared that complaining could jeopardize the jobs they had. Social stability was achieved, and labor costs for corporations were reduced. Corporations achieved some of these savings by lobbying lawmakers and infiltrating the executive branch of government. Corporate mergers were allowed to happen in defiance of monopoly laws. "Trickle down" didn't happen, because corporations aren't motivated to help workers, they're motivated to exploit them, wherever that exploitation is easiest and cheapest. Instead of "trickle down" the American economy had become "trickle up" – with the wealthy able to steal from the poor.

In 1981 the US was at its peak as a creditor nation. During the last six Reagan years America became the world's largest debtor nation, with an economy increasingly

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owned and controlled by foreign investors from across two oceans. In the 23 years since 1981 America changed from having a \$3.3 billion credit standing to having a \$2.5 trillion debt owed to mostly foreign investors. The turning point from creditor nation to debtor nation occurred in 1984, just 3 years after Reagan took office. (Reader, judge for yourself whether President Reagan deserves the nostalgic accolades that Republicans heap upon him as they campaign against Democrats in 2008.)

One of the most interesting economic tricks of the 1980's relates to consumer credit card purchasing. As Thom Hartmann explains (on his radio shows), the immediate effect of busting unions and creating opportunities for businesses to exploit ways to lower wages is that ordinary consumers had less money for buying the products businesses were trying to sell. This situation resembled the Coolidge years, for the same reasons, and some clever people recognized this as a business opportunity. Why not restore credit purchasing by offering credit cards (the new technology twist) for "buy now, pay later." It worked during the 1920's, so let's try it again. The credit industry grew, and grew, until today it is a \$30 billion dollar industry. Personal savings during the past 25 years have undergone the same changes that occurred during the 1920's, from positive to negative. Investors from around the world have come to America to keep the credit industry funded, thinking that this was a good investment opportunity. And it has been a good investment opportunity, for the government has allowed the industry to charge "usury" rates.

I stated earlier that Reagan aspired to be the Coolidge of the 1980's. You may wonder why Reagan did not produce an economic collapse like the Great Depression. The answer is that during the 1920's the rest of the world was still suffering from World War I and they could not loan money to alleviate the American debt and domestic credit crisis. During the 1980's the rest of the world was prospering, and they could help Reagan continue his fiscally irresponsible policies, and they could buy American credit card debt. This postponed the day of reckoning by 25 years, as I will describe in a later section.

There's another way of viewing Reagan if you are most interested in a long-term campaign of returning America to that conservative dream of being ruled by a wealthy elite. The shortest path to "royal rulership" is to ally the government with corporations and create policies that benefit corporations. There's a small matter of disregarding common people. The trick in doing this is to fool the middle class into thinking the government is doing things for them. Instead of declaring honestly that measures are being taken to "starve the beast" that helps the needy by creating a debt that requires drastic reductions in social benefits, the conservatives pitch the merits of individual ownership and getting the government out of the way for economic growth. As corporate lobbyists draft laws that benefit their corporate employer, and contribute to the campaigns of congressmen who pass those laws, the government is transformed from being "of, by and for the people" to one that is "of, by and for corporations." There's a name for this kind of government; it's called fascism!

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Benito Mussolini defined fascism as “...a system of government that exercises a dictatorship of the extreme right, typically through the merging of state and business leadership, together with belligerent nationalism.” I’ll discuss his references to “dictatorship” and “belligerent nationalism” in a later section (“The Cheney Administration”). For now, focus attention on the reference to “merging of state and business leadership.” In the shortest path to royal rulership the first step is to form an alliance with corporations, and this was Reagan’s greatest accomplishment.

I hereby confess to voting for Republicans until I saw Reagan’s actions as president during his first term. For his second term election I started voting for Democrats. This year, 2008, I will not vote, for reasons given in the last section.

The 1990’s

I have noted that Democrats dominated American politics from FDR’s election in 1932 until Nixon’s election in 1968. Since then American politics has been dominated by Republicans. Reagan was wildly popular during the election following his two terms, in 1988, when George H. W. Bush (Bush Senior) won. Bush had been Reagan’s vice-president for 8 years and the American people were clueless about the slow-ticking economic time-bomb that this administration had created.

Bush Senior had a single term presidency (1989-1993). His first task was to get control of the national debt, that had tripled during Reagan’s tenure. He and the Republicans wanted to reduce spending while Democrat-controlled Congress wanted to raise taxes. His efforts to do both ended with more tax increases than budget cuts, and this caused Republicans to feel betrayed. This set the stage for Bill Clinton’s election win in 1992.

The Bill Clinton Years

Bill Clinton’s presidency (1993-2001) began just as the American economy was recovering from a mild recession that kept Bush Senior from being re-elected. During his first year in office he supported and signed NAFTA (North American Free Trade Agreement). This may be one of his gravest mistakes, for it accelerated American job losses. His administration wanted to reform health care but well-organized lobbyists (AMA and health industry) got in the way. One of his successes was lowering taxes for the poor and raising them slightly for the wealthy. During most of his two terms the Republicans controlled Congress, and this hampered what he could accomplish. Nevertheless, the economy grew dramatically during his second term due largely to the internet and speculation in the high technology sector. By the end of Clinton’s presidency the federal budget was balanced and the national debt had been paid off, leaving a surplus. Al Gore was vice-president for both terms and he played a major role in reducing the size of government. It’s ironic that the Democrats were able to accomplish two key goals that Republicans claim as theirs: reducing the size of government and balancing the budget to the point of creating a surplus.

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The Cheney Era

The election of 2000 was nasty by anyone's account. Karl Rove had refined the winning use of dirty and divisive politics from the days he helped George Bush Junior win the Texas governorship. Rove had set as a goal delivering Texas to the Republican party, and he was amazingly successful in this. His tactics were so unethical that even George Bush Senior kept him at arm's length. The Rove-orchestrated smear of Senator John McCain during the Republican primary campaign was adept, and it knocked McCain out of the running. Even ignoring the voting irregularities in Ohio and Florida, it is a credit to Rove that he propelled Bush to a close-call vote against a more articulate, more experienced and more intelligent Al Gore. The outcome was eventually decided by the U.S. Supreme Court.

Because subsequent events have shown that vice-president Dick Cheney has played a very important role "behind the scenes," and some think his influence exceeded Bush Junior's, I will refer to the following 8 years as the Cheney Era. Bush Jr. acted as a figurehead, or, as the campaign touted, someone "regular folk" would like to have a beer with.

The Cheney Era has been the least concealed attempt to recapture "royal rulership" of any previous Republican administration, including the one that created the Great Depression by Calvin Coolidge. It is generally recognized that the Bush family has a history of elitism (Philips, 2002), so it was not surprising when Cheney began maneuvering to expand the power of the Executive branch of government. Cheney uses the term "unitary executive theory" to justify giving the president final decision over all actions by the Executive branch of government. Other behaviors of the Cheney administration expand on this, the most egregious of which are "signing statements" that specify what parts of a newly passed law by Congress the president intends to execute. Every year of their two terms has seen a growth of presidential power under Cheney.

The federal budget surplus that the Cheney administration inherited was returned to the taxpayers in the form of a \$1.35 trillion tax cut, which almost exclusively benefited the wealthy – especially when secondary effects are taken into account. Cheney sold the tax cut with the following slight of words "the surplus is not the government's money." Because a recession was looming Treasury Secretary Paul O'Neill opposed the tax cut, claiming it would worsen the budget deficit and threaten Social Security. But if that was one of the purposes for the tax cut, O'Neill's argument must have just strengthened their resolve to go through with them – which they did. O'Neill describes a conversation with Cheney thus: *Cheney says to O'Neill, "Reagan proved that deficits don't matter. We won the midterm elections. Our due is another big tax cut."* (from the 2004 book *The Price of Loyalty* by Ron Suskind, about Paul O'Neil's rocky tenure as Treasury Secretary). The federal debt rose every year of the Cheney administration, to a current value of \$9.5 trillion.

Cheney wanted to loosen regulation of industry, and two of those to benefit were the mortgage and investment industries. Sub-prime interest mortgages were promoted

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during the second term (Federal Reserve Chairman Alan Greenspan did not object) and they were issued to home buyers regardless of ability to pay (some without jobs or down payment), and the mortgage loans were bundled and sold as highly rated “derivatives.” When owners began to default on mortgage payments and their property was foreclosed (starting in 2007) there was confusion about who owned the property. Executives of mortgage companies guilty of unethical financial dealings nevertheless collected large salaries and bonuses, even as some of those companies went bankrupt.

Much of the Cheney “royalization” project was done using lobbyists who drafted legislation that Congressmen would promote in exchange for campaign contributions. There are many examples; consider the following.

The Medicare Act of 2003 created a drug insurance program to be offered by private insurance companies that would compete for the privilege of offering this supplement to Medicare. It passed in Congress after a long, arm-twisting session with irregular procedures, well past the midnight hour, with a provision that the price of drugs could not be negotiated by the private insurance companies. This law, which has greatly benefited the pharmacy industry, is the kind of legislation that the pharmacy lobbyists would have drafted if they could have, and they most likely did.

Cheney must hate Social Security. He began with a first step for its dismantlement the idea of allowing contributors to divert part of their Social Security payment obligation to a personal account in the stock market. This was given the nice-sounding name of “personal ownership.” But since it was promoted at a time when the stock market was faltering the idea aroused broad public disdain and it went nowhere. This legislation would have greatly benefited investors on Wall Street, and it might have been drafted by their lobbyists.

Early in the first term Cheney convened a secret Energy Task Force meeting to create an energy policy. The list of participants has never been released, but given its supply-side, oil oriented structure one can speculate that oil company executives were in attendance.

The Cheney position on global warming, which they slyly refer to as “climate change” (thanks to Frank Lunts), is that it may be a natural climate cycle so it is premature to enter into any international treaties (e.g., the Kyoto Protocol) that would restrict CO2 emissions or regulate industry.

Words can deceive, and that’s what was done with the “Clear Sky Initiative” (another sly title that misleads), an amendment to the Clean Air Act (that Cheney’s administration reluctantly inherited). This regulation-emasculating legislation failed to be enacted by Congress so Cheney implemented key provisions by instructing the EPA (Environmental Protection Agency) to proceed with NOx, SO2 and mercury trading; this questionable administrative procedure led to a court challenge.

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The EPA systematically censored reports it was mandated by Congress to issue in a way that made it seem like industry regulation was not necessary. Climate scientist Jim Hansen was ordered to not speak candidly at public scientific meetings because his message was clearly at variance with what the Cheney administration wanted to believe. Even NASA is guilty of implementing some of the administration's "clearance before speaking" directives. It is easy to imagine that the oil, coal and electric utility industries lobbied for these policies.

Every business must like cheap labor. There's nothing wrong with this, but is it legal to urge the Executive to hamper enforcement of illegal immigration in order to have a large pool of compliant workers? The "undocumented alien" (UDA) will not complain about job safety, overwork, low pay and they will not unionize. The Cheney attitude of neglecting to enforce employer sanctions was a "dream come true" for the poultry, meat packing, agriculture, construction and landscaping (gardening) industries. The Democrats in Congress also like illegal immigration because Mexicans tend to vote Democratic. The assumption is that after hordes of Mexicans make it to America they will become American citizens through amnesty legislation, which most Democrats and Republicans want. But the UDAs create a burden on local communities, for they use emergency rooms for their routine medical care, they have lots of children who attend schools paid for with property taxes, they steal people's identification (mostly Social Security numbers), they cause high-speed chases that lead to frequent deadly accidents and they trash rural pathways to their transportation rendezvous sites. I live 7 miles from the Arizona/Mexico border and I understand these problems. The Republican business people are as guilty as the Democratic Party for neglecting these problems.

Within days after the 9/11 Saudi Arabian Islamic terrorists flew airplanes into the World Trade Center buildings and the Pentagon, Senator John McCain renewed his call for attacking Iraq. He advocated bombing, not an invasion at that time, and his rationale was to scare Middle Eastern countries into "not messing with America." He didn't claim that the terrorists had been helped by Iraq's Saddam Hussein. Cheney, Rumsfeld and Bush, however, had been talking about invading Iraq since the first month of the Cheney administration, and their plan was for an invasion. The real motivation for such an invasion may never be made public, but speculation includes a desire to have access to Iraq's oil fields (a boon for oil company business). The 9/11 attacks gave Cheney and Rumsfeld the excuse for invading that they wanted. Cheney heavy-handedly interfered with the CIA investigation of any possible links between the 9/11 attackers and Iraq, and made unprecedented visits to the CIA that are described by intelligence officials as intimidating. Selling the war took 1½ years, and the final step was to convince the United Nations that Iraq had weapons of mass destruction poised for use in ways that would interrupt Saudi Arabian oil production and lead to global recession. Cheney's aide "Scooter" Libby drafted a speech for Secretary of State Colin Powell to deliver at the UN, with only a few days left for fact-checking. Powell's credibility was exploited shamelessly, and he must view his speech before the UN as the most embarrassing day of his life. The speech did the job, for the UN passed a resolution, which was Cheney's "green light" for the invasion.

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The FDA (Federal Drug Administration) is supposed to regulate the pharmaceutical industry. Instead, they protect and promote it. Drug testing, that used to be conducted by independent laboratories, is now conducted by the pharmaceutical company that manufactures the drug. As a result drug side effects are usually discovered after it has been on the market and billions of dollars have been made from it. Cheap alternatives to drugs are disparaged by bogus experimental trials. When a patent drug approaches the date when it should become “generic” the FDA allows a small change to be made that resets the calendar. It has been estimated that over 100,000 deaths can be attributed to drugs that are taken as prescribed by a doctor (to the extent that charlatans are wearing white coats the above statistic may be more of an indictment of doctors than the pharmaceutical industry.)

There are so many regrettable actions taken by the Cheney administration that books could be written about them, and have been. My purpose here is to recount some of the ones that illustrate Cheney’s attempt to grab power from Congress, ignore the Constitution, favor corporations, retrench on New Deal advances for the middle class and the poor, and bring America closer to a “proto-fascist state” headed by the president as a dictator/king.

These are strong accusations. They deserve a review to show how my chapter’s theme is supported by the Cheney administration. But before doing that, let’s ask how America fared during the Cheney Era.

Cheney “Results”

During the Cheney administration the national debt almost doubled, from \$6 trillion to \$9.5 trillion in early 2008 (about \$100,000 per family). This will take decades to pay off, assuming the American economy does not slip into another recession. This burden will fall on future generations, maybe some not yet born.

A report in 2005 stated that Americans spent \$42 billion more than they earned, and the most recent report from the Commerce Department found savings rates at a negative one percent, the lowest since the Great Depression, and down from 11 percent after WWII. An update for 2008 would show a far worse savings rate. Only four times have savings rates fallen so low: The other two were during the Great Depression when a quarter of the workforce was unemployed and Americans spent their savings for essentials such as food and rent.

E. Manning writes the following (TNTalk.). “Many millions of jobs ... have been moved to distant locations outside the U.S. where labor costs are significantly reduced. ... Multiple times, Congressional measures have been considered to restrain the federal government from granting contracts to companies that send work overseas. The Bush Administration has consistently opposed the legislation. The administration has continually supported tax incentives to outsource jobs overseas. ... The government has worked as a partner to stem public scrutiny of job outsourcing with no federal reporting requirements for outsourced jobs. Multinational

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corporate America is fearful over a public backlash of opinion that would prevent them from exercising complete autonomy over their corporate work forces. ... The Brookings Institute [estimates] that outsourced re-employed workers recover 47 cents of every dollar that they used to earn.”

Ohio has seen a loss of 209,000 jobs, or 3.7%, during the first 7 years of the Cheney administration. The US job loss during this period was 19.5%. 61% of Americans fear job loss due to outsourcing. In 2004 the head of the president’s Council of Economic Advisors, Gregory Mankiw, described the advantages to US companies for outsourcing jobs overseas. Mankiw said “When a good or service is produced more cheaply abroad, it makes more sense to import it than make or provide it domestically.” “...outsourcing is just a new way of doing international trade. ...that’s a good thing.” Federal Reserve Chairman Alan Greenspan defended Mankiw.

A typical worker in a Chinese factory earns ~50 cents per hour, without the protection of workplace safety regulations or limits on overtime. Chinese factories also have fewer environmental laws to deal with. How can American workers compete with workers in Communist China? From the standpoint of a manufacturing company it would be a good thing to use slave labor, or maybe invent a machine that could reduce their labor costs to zero by dispensing entirely with workers. It would make sense for a company to adopt such a cost-saving change, but only if very few other companies did the same. After all, if there were no jobs for workers anywhere, who would buy the products? The “free market” left to itself cannot handle this situation; this is a role for governments, which, after all, are supposed to represent the interests of all the people.

The trade deficit in early 2006 was \$817 billion, and rising each year. About a third of this imbalance was due to trade with China. Foreign interests hold about \$2 trillion. More than half of US Treasury bonds are bought by foreigners. US companies and infrastructure are being purchased by foreigners with the American dollars that just keep accumulating in their bank accounts.

The unemployment rate is rising as I write. It now stands at 6.1% (mid-2008). When discouraged former workers are included the rate is ~ 10.3%. For reference, during the Great Depression it reached 25%. Because of American worker wage losses the credit industry generates over \$30 billion in annual profits.

David Walker, the US Comptroller General (who audits the federal budget books) has been traveling throughout the country warning Americans about the dire economic situation. Here are some comments that I found on the internet (apologies for not keeping track of the sources). “Foreign governments and investors now hold fully half of the United States' total outstanding debt, making Washington susceptible to a new form of geopolitical conflict” “Japan and China are America's two biggest lenders. Great Britain is third, followed by a bloc of oil-producing states including Iran, Kuwait, Saudi Arabia and Libya.” “So in trade and military disputes, China, as America's No. 2 lender, holds considerable influence.” “Foreign lenders, Bixby notes, can demand conditions - or threaten to stop buying U.S. Treasury securities, or even

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dump their existing holdings outright. To lure other buyers of Washington's debt, U.S. interest rates would then have to rise sharply, throttling the nation's economy." "It means foreigners have more leverage on us and we have less leverage on them," Walker said. "You have to pay attention to your bankers." "If the US could no longer borrow as it has been doing, interests rates would skyrocket, home values would plummet, people would lose their jobs, and government services would have to be cut drastically. Shantytowns could spring up, making America look more like Haiti and South America." "I'm sure that people during the Roman Empire never thought that Rome would fall," Walker said in an interview last week. "I don't think we should assume that we are too big to fail." "All...agree it's a fantasy to argue that the U.S. can grow its way out of its debt," Bixby said. "The economy would have to grow at an implausible rate forever."

Critical Review of the Cheney Era

During the Cheney Era government power flowed to the presidency at the expense of other parts of the Executive branch and also at the expense of a "rubber stamp" Congress. Many laws were passed that appear to have been drafted by corporate lobbyists, and may have been coordinated by Cheney's office. The effect of the laws has been to loosen regulations affecting corporations, lower corporation taxes and allow them to exploit cheap labor in foreign countries. The Cheney administration's neglect of enforcing employer sanctions for hiring illegal aliens allows corporations to exploit workers by paying lower wages and neglecting safety regulations. Laws that encourage globalization led to job outsourcing to countries with cheaper labor (which began with Clinton's NAFTA, to be fair to Cheney). Tax law changes favored wealthy individuals and punished poor and middle class wage earners. Credit card purchasing allowed strapped wage earners to stay afloat, but because the credit industry is allowed to charge usurious interest rates many people are driven to bankruptcy. Health insurance continued to rise much faster than other family budget items, and this may be due to an unwillingness to resist laws drafted by pharmaceutical industry lobbyists that reduce competition. America's energy policy continues to be based on oil, with minimal funding of alternative and renewable energy technologies. The median family income (with an ever-growing number of two wage earners) has decreased slightly during the Cheney Era, while the top 1% have enjoyed unprecedented income increases.

As an aside, Jamie Johnson produced a movie "The One Percent" that documents attitudes of the wealthy. He is descended from the founder of Johnson & Johnson, and belongs to the wealthy class himself, so he had access to America's wealthiest people for the movie. In a recent web post (<http://www.huffingtonpost.com/jamie-joh>) he remarks that some of the wealthiest are looking forward to a recession for selfish reasons! It will result in a "thinning of the aristocratic ranks" and lower prices for luxury goods that they have had to pay more for in recent years. In other words, the ultra-rich resent the very-rich, and the poor others can just go fly a kite! Johnson writes "...under the threat of hard times the mega-wealthy aren't feeling a greater responsibility to reflect upon the problems surrounding the growing wealth gap; they are, in fact, trying to fatten their wallets and further insulate their lifestyles. I had

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hoped that foreboding economic circumstances would have caused the ultra-rich to think not just of themselves and increasing their own personal affluence. Unfortunately, however, too many of them lack concern and without this concern, the divisive imbalance will only worsen with recession.” I highly recommend viewing the above URL for it contains more damning evidence than I could include here. This rare insight into how the very wealthy think, and how little regard some of them have for ordinary people, helps explain why corporate executives can do some of the shameful things they do. It may also account for the radical core beliefs of the hard-core Republican conservatives, like Cheney.

Over and over, during the Cheney Era, the wealthy have prospered while the poor and middle class have suffered. This cannot be an accident; it has to be the result of policy changes that are part of a long-term project to return America to a less democratic, more authoritarian form of governance by the wealthy elite.

When America declared independence from England 232 years ago there were many who preferred to be ruled by King George III. These “royalists” had a resurgence during the Gilded Age of the 19th Century. And another resurgence during the Roaring Twenties. Their most recent resurgence occurred during the Reagan to Cheney era.

Government has become a better partner with business than at any time since 1929. The 9 years that led to the Great Depression resemble the 25 years since Reagan became president. The slowness of the present economic decline is due to the ability of the rest of the world to loan money to America. But America is now so deep in debt that the outcomes for these two periods may eventually be the same.

The American government is no longer “Of the People, By the People and For the People.” Instead, the government is “Of Corporations, By Corporations and For Corporations.” America has quietly created its own version of a Proto-Fascist State!

Let’s review Mussolini’s definition of Fascism to see how accurate my indictment is: *“...a system of government that exercises a dictatorship of the extreme right, typically through the merging of state and business leadership, together with belligerent nationalism.”* The word “dictatorship” is partially fulfilled because Cheney uses his figurehead president to issue signing statements that overrule Congress. The “merging of state and business leadership” is almost completely fulfilled, thanks to the common practice of lobbyists drafting laws that elected congressmen are expected to pass (in exchange for campaign contributions). And “belligerent nationalism” was demonstrated by the way America installed a new regime in Iran in the 1970’s; by the American CIA assisted assassination of Chile’s socialist president Allende in order to pave the way for murderer Pinochet to take power; and by America’s unwarranted invasion of Iraq with dubious provocation. I think this demonstrates “belligerent nationalism.”

America’s evolution to a proto-fascist state may have gone too far to be reversed. Once again in the history of humans, power wins! The strong have figured out a way

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to steal from the poor, and they've done it so quietly that the poor don't even realize that they've been victimized. So naturally the poor are unaware of who's been doing the stealing. The victim's pockets were picked so expertly that with their clueless vote the pick-pocketers continue to enjoy everlasting opportunities for continuing their scam.

Will America Avoid a Great Depression?

The question to ask now is "Will America descend into another Great Depression?" Let's review the similarities of the 1920's and the 25-year Reagan/Cheney era:

- During the 1920's, businesses achieved 32% productivity gains but wages increased only 8%. During the Reagan/Cheney era business productivity rose 40% but for 72% of workers wages declined. A new force came into play during the Reagan/Cheney era: corporations fired American workers and hired cheap foreign ones.
- During the 1920's, median savings dwindled to negative values just before the Crash. During the Reagan/Cheney era median savings dwindled from positive values to -1%. In 2005 the poorest 10% of families had a negative net worth.
- During the 1920's, installment credit purchasing increased as a solution to falling purchases and filling warehouses. During the Reagan/Cheney era the credit industry boomed for the same reasons, reaching \$30 billion per year.
- During the 1920's, Republicans controlled government and they empowered their "rule" through corrupt and immoral stratagems. During the Reagan/Cheney era the same occurred.
- During the 1920's, the income gap between rich and poor grew to the staggering state in which 0.1% of people controlled the same wealth as the lowest 42%. I don't have the 2008 statistic for the top 0.1%, but in 2008 the top 1% controlled about half of America's wealth (Jamie Johnson, 2008). During the 21 years from 1984 to 2005 the top 2% of American families doubled their wealth while the bottom 25% lost wealth (corrected for inflation). During the Reagan/Cheney era, the ratio of a Fortune 500 CEO earnings to the average worker's earnings changed from 40:1 to 424:1 (Allan Ornstein, 2008). In 2006 the top 1% earned 20.3% of all income.
- During the 1920's, "...the Revenue Act of 1926 ... reduced federal income and inheritance taxes dramatically." In just 5 years Reagan lowered taxes for the wealthy from 70% to 28%, while raising rates at the low end of the income scale.

Had enough? If you want to be scared some more, go back and re-read the section on the Roaring Twenties, and note the many similarities to the Reagan/Cheney era.

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Theoretical Extrapolation of Current Trends

This penultimate section of the chapter is a valiant if not foolhardy attempt to predict the future of America using the two theories that underpin the chapter.

Theory #1 states that during times of war, or times of extreme hardship that resemble war, people are likely to sacrifice themselves on behalf of the over-riding goal of tribal survival. For maybe 50,000 years this meant that at the onset of inter-tribal conflict ordinary men would become patriotic warriors and everyone else would support them with whatever patriotic acts strengthened the tribe. The theory also states that in times of peace tribal survival is not threatened, which releases people from patriotic duty. With the breakout of peace people can be expected to act in ways that I have described as “nasty and selfish.” This includes a form of greed accompanied by an unwillingness to share one’s good fortune with those who made it possible, as well as a mocking indifference to the poverty and suffering of others. Everyone who can will aspire to wealth, and those who succeed will continue to exploit those who have not succeeded.

Theory #2 states that the last 12,000 years of conflict between super-tribes, that can decimate the losing tribe, evolution has favored people who are programmed to prefer a form of governance in which decisions are made from the top by a strong leader. Nevertheless, there is also a minority (of pre-Holocene “throwbacks”) who are inclined to prefer a more democratic form of governance in which the people make decisions that regulate how everyone is to behave, regardless of their strength.

Maybe these two theories can be combined into the following prediction: During war (or times of extreme hardship) people demand strong leadership for coordinating the efforts of everyone else, who in turn are all deemed essential for the group effort to survive. During times of peace people want to be left alone to pursue their own aspirations to prosper. But those who prosper the most (achieve wealth) take advantage of their power to exploit and subdue the others. Since most people are susceptible to being followers (because following during war is essential) they may follow when it is not in their best interest to follow. The danger of this is especially great when a powerful leader is very clever at redefining which social condition is operative. This can lead to an unwanted leadership that neglects the aspirations of everyone who lacks power.

The illegitimate leader situation is self-limiting, because a society requires the productive labors of that “man with the hoe” and if his hoe is taken from him he cannot produce. Every empire is destined to collapse following corrupt leadership. After the collapse the productive peasant reclaims control of his life and it is his responsibility to figure out how to prosper, and in the process maybe create another empire. This implies that history can be viewed as a pendulum that swings back and forth between the two states. The pace of the pendulum’s swing may vary greatly.

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Let's review how the pendulum has swung during America's 232 years as a country. It will be convenient to invent terms for referring to the two extreme states of the pendulum. How about "producer" and "parasite."

Starting with the War of Independence, which is "producer," we see a slow swing to the "parasite" state called the "Gilded Age" (1877-1893). During the "Progressive Era" (1896-1920) the pendulum swung back to "producer." The 1920's saw a fast swing to "parasite," culminating in 1929. The New Deal era of FDR saw a swing back to "producer" – which endured until Nixon's election (1968). Slowly the pendulum swung in the "parasite" direction until it got a big boost from Reagan, which caused the parasitic movement to accelerate. With Cheney the pendulum has swung to a "parasite" state that is about as far as it can go. What, we now ask, what will the pendulum do next?

At the risk of overusing a metaphor, I allege that there's no guarantee that the pendulum will keep swinging. When it goes too far in the "parasite" direction it may be "caught" and held there.

You may have thought that I was going to predict that the pendulum would soon swing in the "producer" direction. This would be good, but for this to happen the corrupt leadership would have to "return the hoe to that man who wants his hoe." If the wealthy Americans refuse to give that man his hoe, America could become a fascist state!

This happened in Italy and Germany 75 years ago, and it happened in Japan somewhat earlier.

During the Reagan/Cheney interval America's wealthiest people have prospered from productive labors that have shifted ever-so-slowly, but irreversibly, to workers in third world countries. The American worker has had his hoe taken from him by the parasites, and those parasites have given the hoe to workers overseas.

But the parasites "made a deal with the devil" as they did this. The producers overseas have started to own America. It's more accurate to say that the overseas governments have begun to own America. Those overseas governments are also prone to exploit their workers, and when American corporations wanted the labors of workers in those overseas countries the governments saw an opportunity for improving their wealth, so they allowed the corporations to locate their factories there. America now has "its hands tied." It cannot object to anything our creditors want. If China wants to take over Taiwan, they can do it with impunity. If Saudi Arabia wants to buy controlling interest in profitable American companies, the laws will be changed to allow that rather than risk financial ruin.

Little by little America will become fractured into pieces that resemble colonies belonging to many other countries. China will own mines that produce the minerals they need, they will buy farms that grow the wheat, and the cattle ranches that used to provide meat to Americans will ship the meat to China. America will become a

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source of resources that will flow to our creditor nations, and Americans will be working for foreign employers. It will be a reverse of the present situation where Chinese workers make Nike sneakers for export to America.

Order will have to be maintained in America for our colony status to remain valuable to our creditor nations, and this may be done by the American parasites using a fascist fist. Cheney is suited for this job, but as he retires there will be other Cheneys eager to exercise fascist discipline.

The grim portrait of America's future may not happen. I hope it doesn't happen. But it may happen!

Prospectus for America

I mentioned earlier that I was not going to vote in the 2008 elections. This is because I believe America's fate is sealed, and nothing can turn around the inevitable slide to fascism.

McCain/Palin might actually be good for Planet Earth! The sooner America slips into depression, the sooner our Earth will be relieved of a profligate polluter and destroyer of nature.

It's frustrating to see things about America the way I do. Sometimes, when I feel a pang of optimism, I hope that I'm wrong. But I always come back to this unhappy picture. Imagine standing at the bow of the Titanic, seeing an iceberg, shouting warnings to the others on the ship, but no one listens! That's how I feel.

American voters have lost the right for a winning place in the world. When voters get what they want, they deserve what they get – "good and hard" as Mencken would say. Long-term prosperity has to be earned, and the pursuit of short-term prosperity by taking short-cuts has a deservedly uncomfortable end point. If I were younger, I would try to relocate to New Zealand. But as a retiree, nestled on a small acreage in the Arizona countryside, I shall sit back to watch the unraveling of a country that I once loved.

CHAPTER 20

THE FALL OF CIVILIZATIONS - PART II DATING THE DEMISE OF HUMANITY

Introduction

This chapter relates world population data with science and technology innovations and arrives at a "per capita rate of innovation" graph. The "per capita rate of innovation" shows two peaks, one starting during the Golden era of Greece and the other starting during the Renaissance and peaking at the end of the 19th Century. A range of dates for the demise of humanity is calculated on the very speculative principle that there's a 50% chance that we now find ourselves between the 25th and 75th percentiles of the sequence of the birth dates of all humans who shall ever be born. In 1990 I wrote a brief version of this essay, dealing specifically with the statistical argument for inferring that the demise of humanity was imminent; it appeared in an unpublished book, *Essays From Another Paradigm*. The present chapter is adapted from a 1993 expanded essay on the same subject.

Population Versus Time

Table 1 is a compilation from many sources of the world's population for 26 epochs. The original literature almost never provides uncertainties, but if scatter is any guide the uncertainties range from 3% during this century, to ± 3 dB (+100/-50%) at 8000 BC, and ± 5 dB at 100,000 BC.

Table 1

Year [AD]	Pop'n [millions]	Year [AD]	Pop'n [millions]	Year [AD]	Pop'n [millions]
-100,000	0.5	1500	440	1950	2530
-50,000	1	1600	470	1960	3000
-18,000	3	1650	545	1970	3600
-8,000	9	1700	600	1980	4400
-7500	10	1750	725	1990	5300
-3000	30	1800	907	2000	(6380)
-1000	110	1830	1000	2010	(7300)
0	200	1900	1600	2025	(8500)
1000	340	1930	2000	2038	(8500)

A 10th order polynomial fit to the relationship of "log of population" versus "log of time" is given in Appendix D. It has been used to perform integrations from the distant past to dates of interest. The following figure plots the tabulated data (symbols) and the 10th-order fit (trace).

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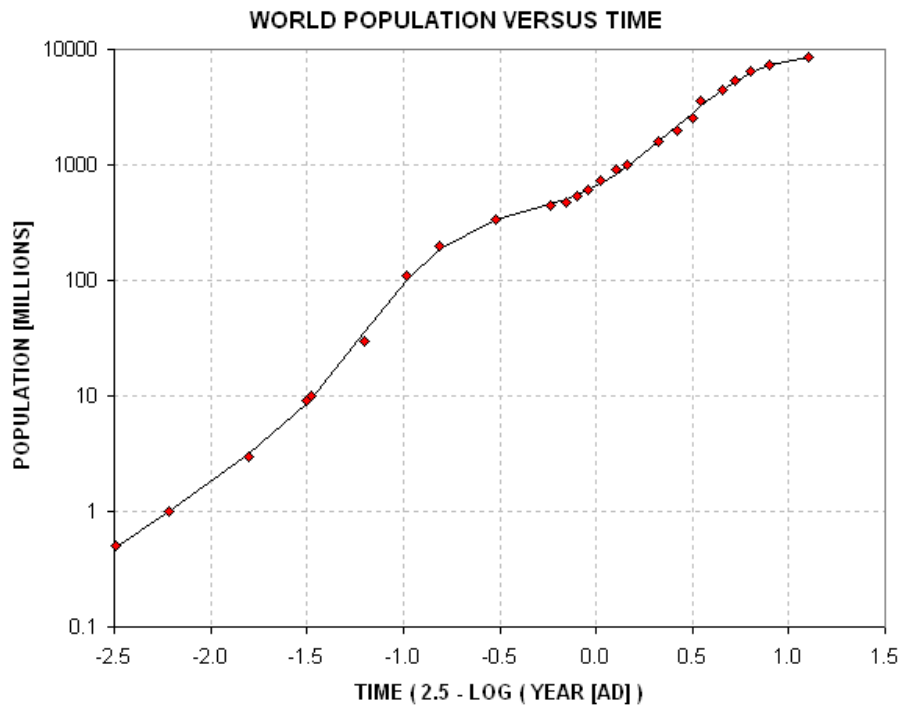


Figure 20.01. World population versus time, using a special Log scale for time. The trace is a 10th order polynomial fit, used to assist in later calculations.

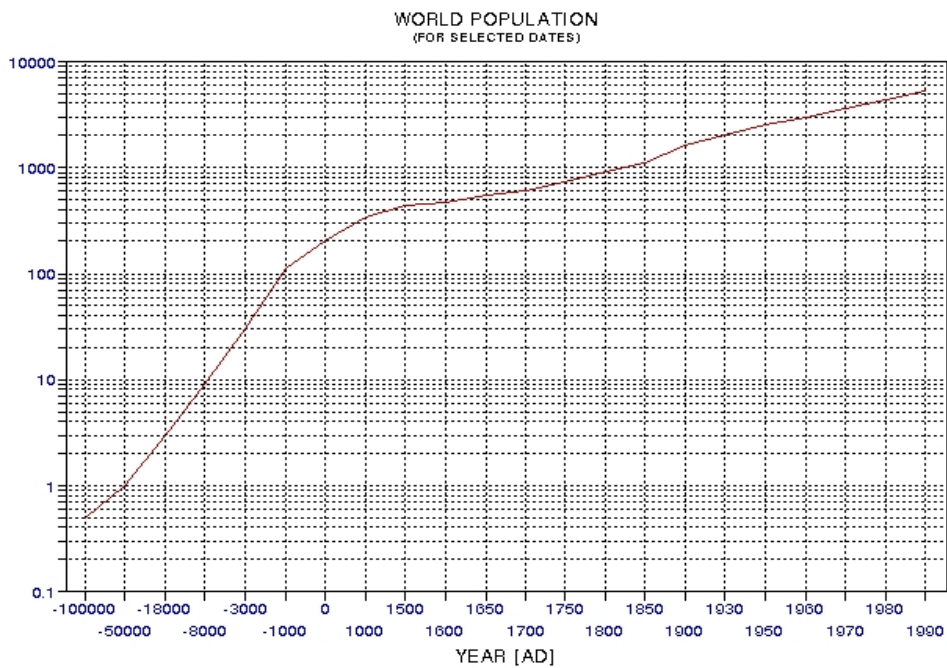


Figure 20.02. Adopted world population, with arbitrary choice of year for x-axis representation.

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Birth and Survival Rates

Before proceeding to the calculation of the integrated number of human live births and adults, it is necessary to address the issue of birth and survival rates. The simplest method for calculating the integral of population from some arbitrary start time to x-axis time is to multiply "crude birth rate" times "population" times "time interval." I've adopted a crude birth rate table that starts at 45 births per thousand at 100,000 BC, and decreases monotonically to 26 births per thousand in 1993. It has been established that the main decrease started at approximately the time of World War II, when it had a value of 38 births per thousand. Not all babies live to adulthood. Throughout the world prior to the 18th Century approximately 25% of babies survived to adulthood (taken to be the age when reproduction begins, about age 18 in primitive societies, and age 13 in developed world societies). In other words, in the natural order of things approximately 3/4 of all newborns are destined to die before adulthood! Since the 18th Century the developed world has achieved a much better survival rate, approximately 95% (versus 25%). But still, the undeveloped world (about 71% of the world's population) has survival rates of approximately 30 to 35%. The adopted world average survival rate conforms to estimates of the fraction of the world's population that is "undeveloped" versus "developed." The adopted birth and survival rates are shown in the following figure.

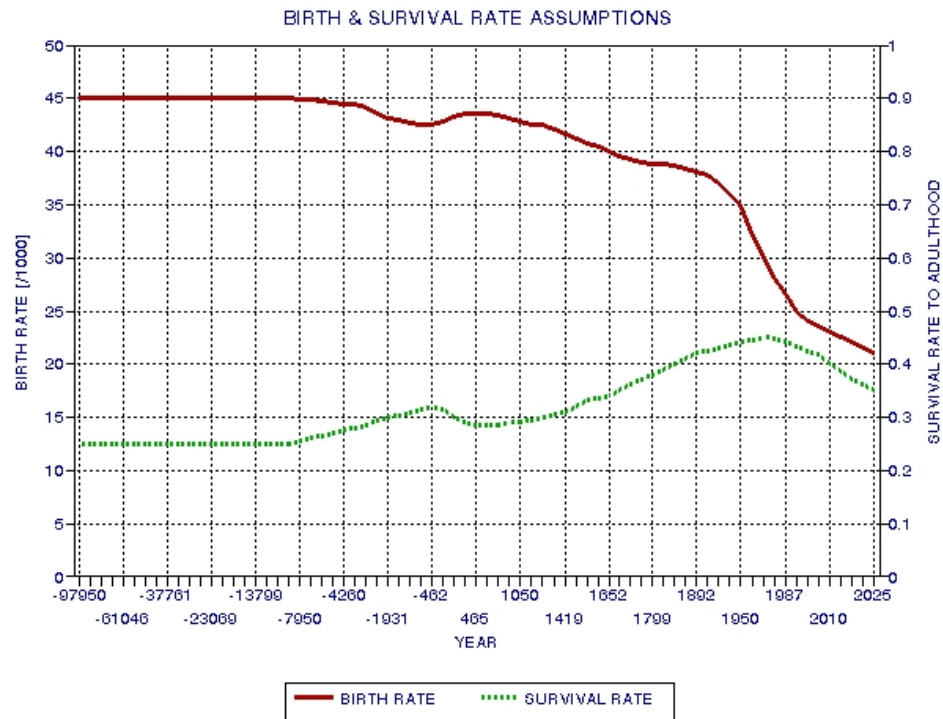


Figure 20.03. Adopted crude birth rate (solid) and survival rate (dashed).

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Integrated Population Versus Time

The previous graphs illustrate time interval averages for population, birth rate and survival rate. These are combined to calculate the integrated number of births from 100,000 BC to x-axis time. In the following figure the upper trace is labeled "live births." Thus, this trace is the total number of live births from 100,000 BC to x-axis time. Note that the x-axis is neither linear nor logarithmic, but corresponds to dates in the original population data, above.

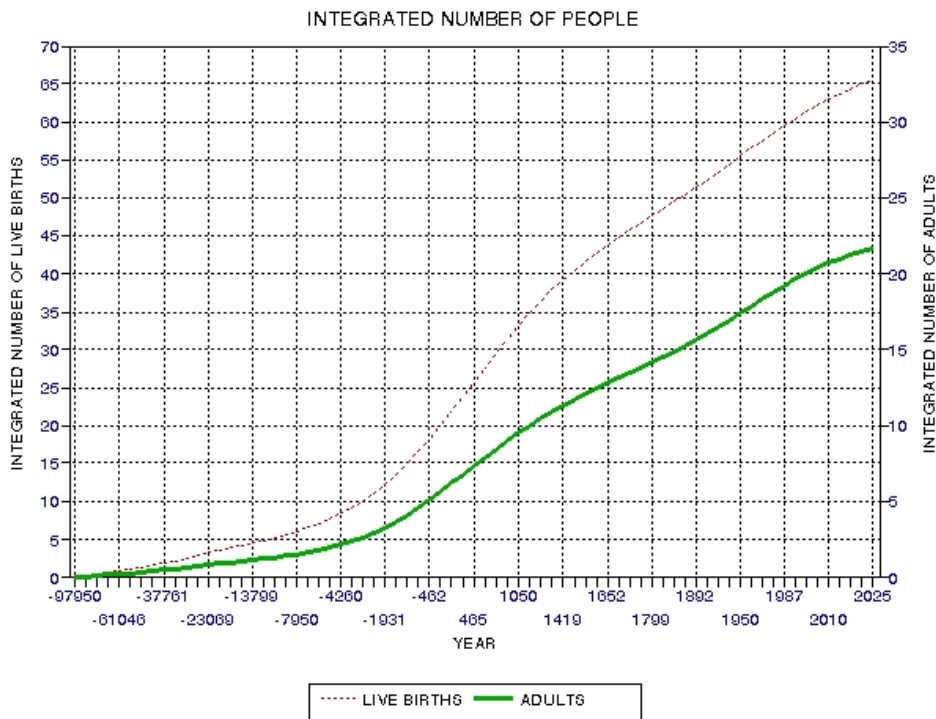


Figure 20.04. *Integrated number of live births (dotted) and integrated number of humans reaching adulthood (solid).*

Note the solid trace, the integral of adults who have inhabited the earth from 100,000 BC to x-axis time. To calculate this it was necessary to use the estimated survival rate versus time (the lower trace in Fig. 20.03). The number of "adults" that have inhabited the world is about 33% of the number of all humans born. For the epoch of these calculations, 1993, the total number of "live births" was 60.3 billion, and the total number of adults who have ever lived (to 1993) is 19.6 billion.

As an aside, Fig. 20.05 is a plot of the D/L Ratio, defined as the ratio of dead to living. This parameter was apparently treated by Asimov (reference unavailable).

At the time of this writing (2001) the D/L Ratio is about 8.6. Figure 20.06 shows how the ratio "people alive at date" to "total births to date" has varied over time.

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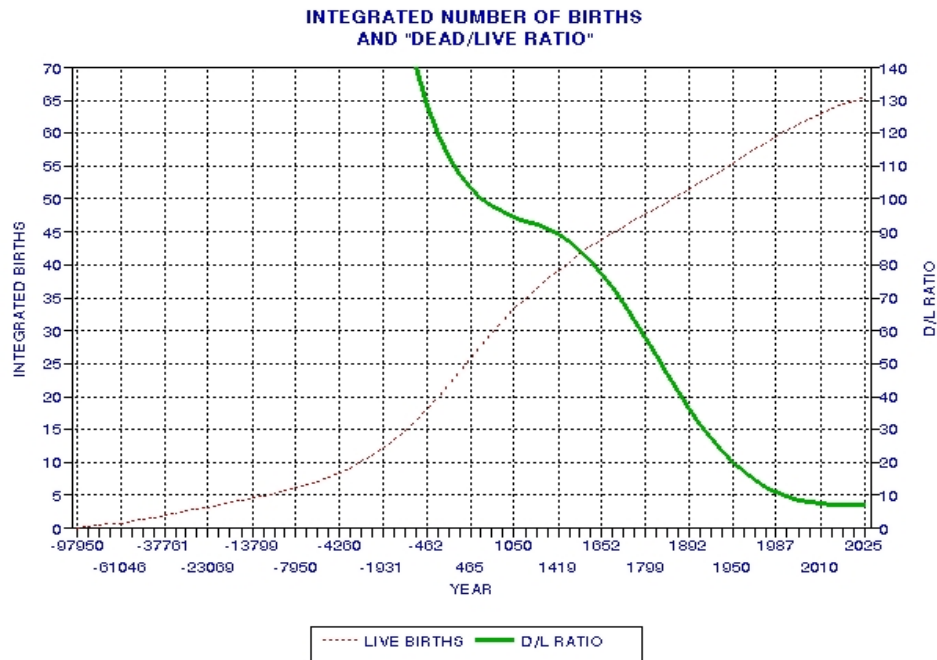


Figure 20.05. Ratio of dead to living (solid trace) versus time.

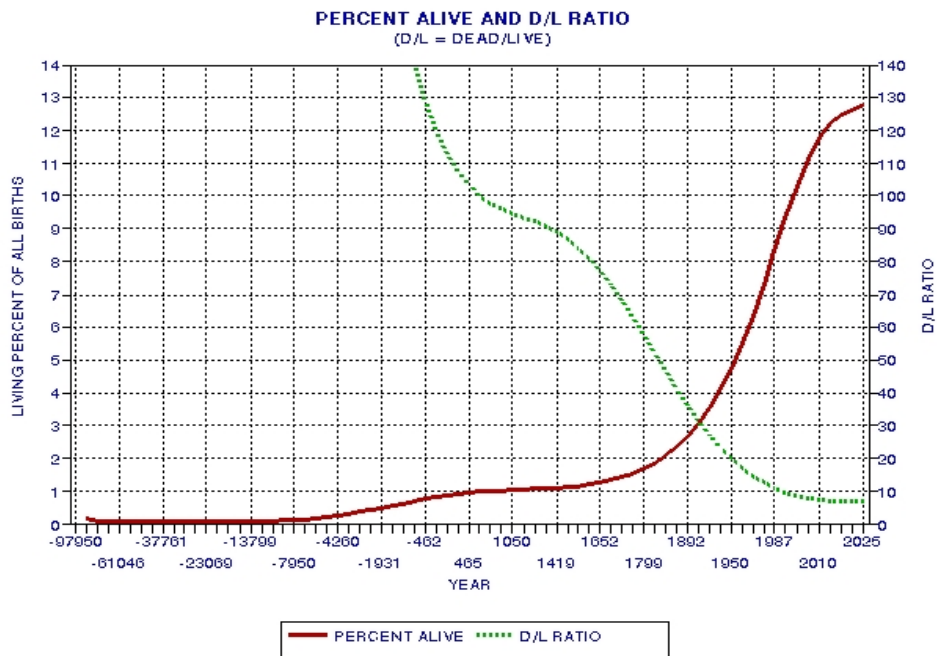


Figure 20.06. Percentage of "all births" represented by "people alive."

In the year 2006, when 6.8 billion people are supposedly alive; they constitute 11% of all people who have ever been born.

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The following figure is an alternate presentation of the data in Fig. 20.04, with a rescaling of the y-axis so that in 1993 the integrated number of people is 100%.

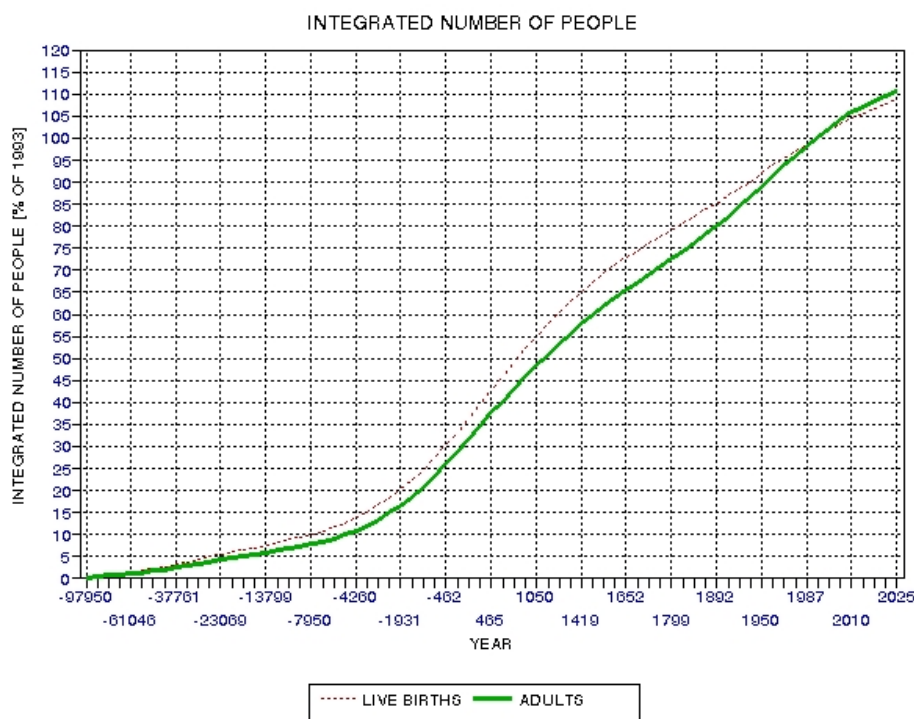


Figure 20.07. *Integrated number of human live births and humans reaching adulthood, normalized so that 1993 has 100% of the integrated numbers.*

The above figure plots the "integrated number of people" as a percentage of the 1993 numbers. The "live births" and "adults" traces cross at 1993, by definition. These traces can be used to define what I shall call the "Humanity Time Scale." Which of these traces should be used? The "live births" trace has fewer assumptions; just the population versus time and the birth rate versus time, both of which are well established. The "adults" trace may be more appropriate for what we are going to do with the Humanity Time Scale as it reflects the number of humans who have lived long enough to think about the world, and contribute to it's irreversible legacy of innovations. The weak part of the argument for adopting the "adults" trace is that it depends on survival rate, which is an assumed parameter. It is less well-established than the other two properties. The halfway points (the 50% level) for the two traces are at 834 AD and 1118 AD, for "live births" and "adults."

The following figure is a plot of "% of adults before date" versus year for a set of arbitrarily chosen integer dates.

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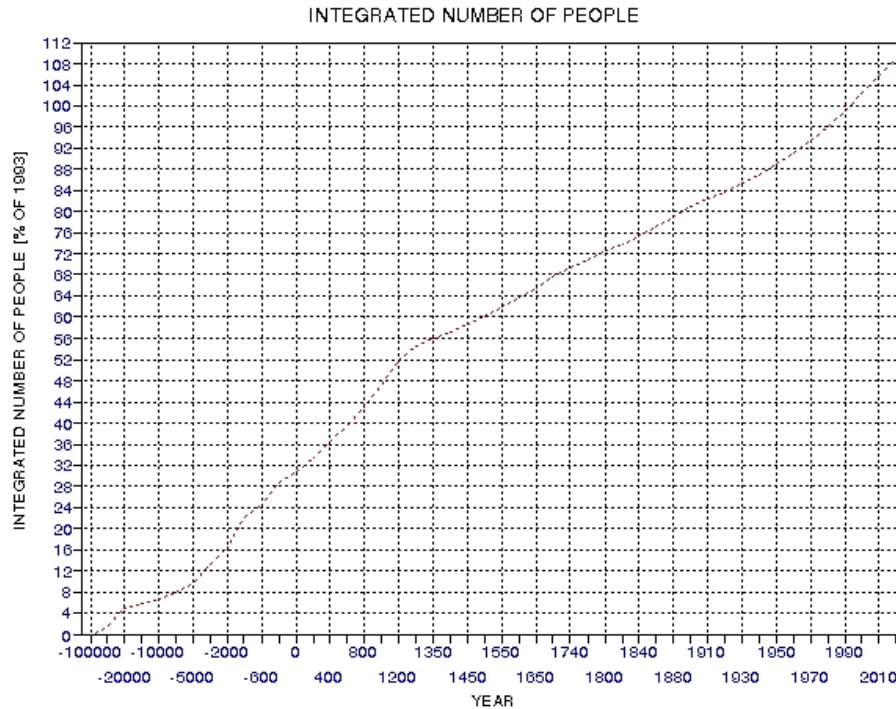


Figure 20.08. *Integrated number of human adults born before (arbitrarily selected) x-axis years.*

It is slightly easier to use this graph to determine dates before which specified percentages of all human adults were born. For example, 80% of adults lived prior to the year 1891 AD, and 82% of adults lived before 1908 AD. Thus, 1891 to 1908 AD is a "2% of adults" interval (corresponding to 80 to 82% of adults). There are 50 such 2%-intervals prior to 1993, and each has corresponding beginning and ending dates.

Innovation Data

"*Asimov's Chronology of Science and Discovery*" (198?, 1994) has been analyzed to determine how many innovations belong to each of the 2%-intervals. Asimov's list has 1478 entries, from 4 million BC to 1991. For the time span 100,000 BC to the present, there are 1474 items. A histogram was created showing the number of items for each 2% date interval. For example, for the 2% date interval 1891 to 1908 AD, there were 120 citations in Asimov's list. As there are 2% of 19.6 billion adults during each 2% interval, or 392 million adults, the number of innovations per billion people can be calculated by dividing the number of citations by 0.392. The results of this conversion are presented in the following figure.

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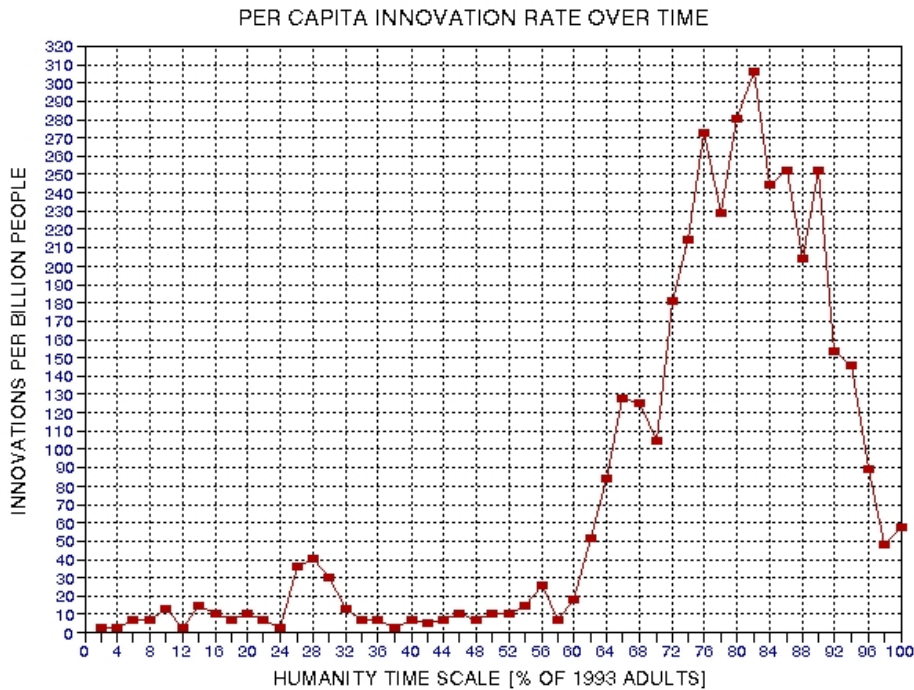


Figure 20.09. Number of innovations per billion adults for each 2% interval of the Humanity Timescale.

The first peak, at 28%, the 2% interval of 26% to 28%, corresponds to 500 BC to 290 BC. The minimum at 38% corresponds to the dates 390 AD to 500 AD. The abrupt rise after 60% corresponds to the mid-15th Century, which is when the Renaissance began (1453 AD). The peak at 82% (corresponding to the 80 to 82% time interval cited above) is for the period 1891 to 1908 AD. The steady decline since 1908 has progressed to a level corresponding to that of the 16th Century.

Weighted Average Innovation Rate

About 96% of Asimov's science and discovery citations belong to a category that requires formal education, by my cursory review. It is thus natural to ask how many "literate" people there have been over time, and how does the innovation rate look when it is normalized to the relative numbers of literate people? Better, how does the innovation rate look when it is normalized using a 96% weight for the literate population and a 4% weight for the illiterate population?

To normalize the innovation rate traces to the population of literate adults it is necessary to adopt literacy rates over time. I have chosen to do this on a region-by-region basis, since literacy commences at different times in different world regions. It is also necessary to estimate regional population traces. I have chosen 9 world regions for this task. Figure 20.10 shows the population of 5 regions (the most populace), and Fig. 20.11 shows the population of the remaining 4 regions.

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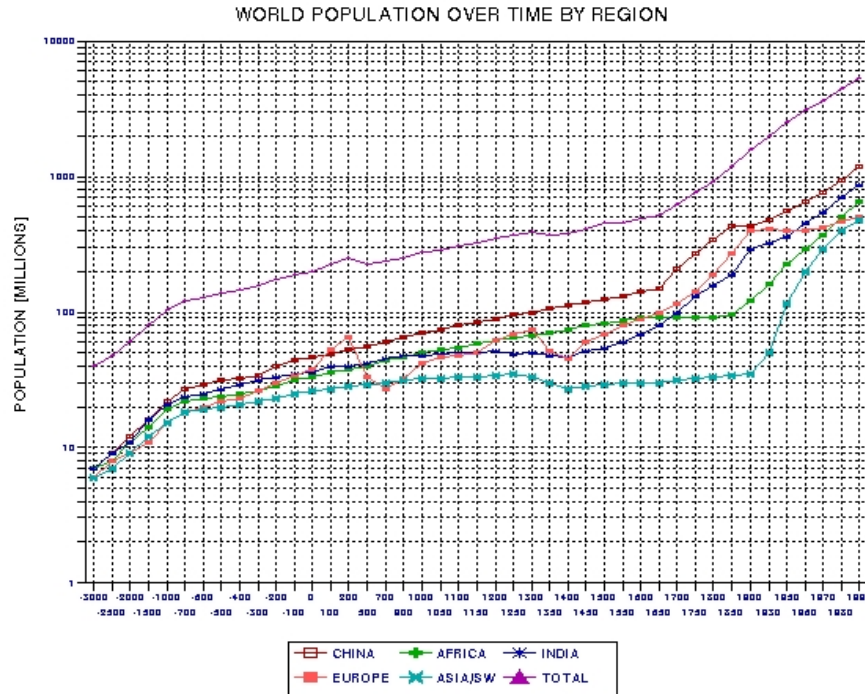


Figure 20.10. Population breakdown for 5 regions and their total.

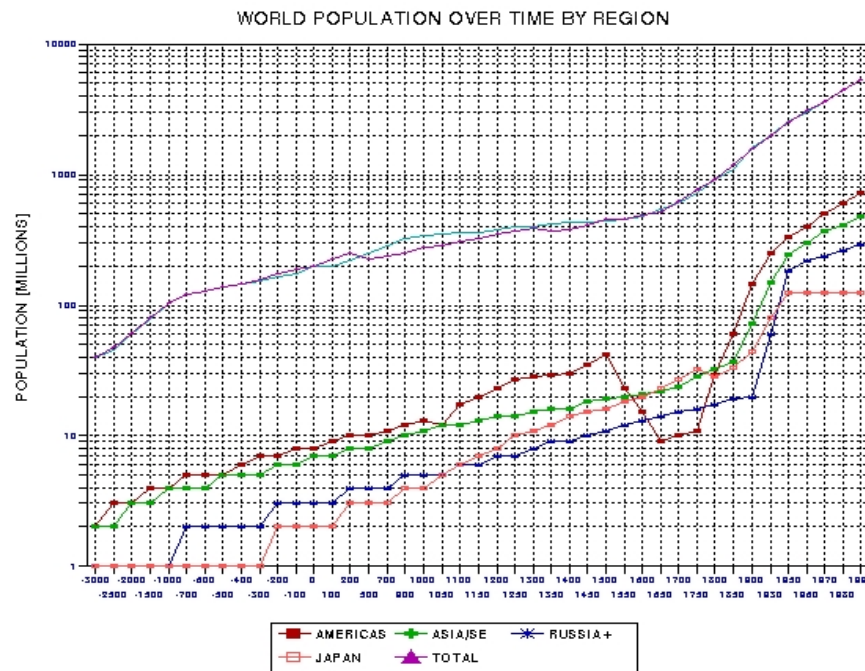


Figure 20.11. Population breakdown for another 5 world regions, and their total.

Notice that in Fig. 20.10 Europe experienced two population peaks before the Renaissance: in 200 AD and 1300 AD. There are population collapses after each

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peak. The first collapse must have something to do with the inability of urban centers to support large populations (the population of Rome fell dramatically, for instance), while the second collapse was produced by the scourges of the Black Death. In Fig. 20.11 there is one (documented) population collapse, starting in 1500 AD, caused by diseases brought to the New World by European explorers and settlers. The population rise starting in 1750 is due to massive migrations of Europeans.

It was not possible to find literacy rates for all these regions for the times of interest. After the suggestion of Dr. Kevin Pang, I adopted the procedure of estimating literacy rate by assuming that most urban populations are mostly literate while most of the rural populations are illiterate, at least until recent times. Urban and rural statistics are easier to estimate, so this procedure can be used for more regions and can be extended back in time to the adoption of writing in each region. In constructing these tables it was assumed that approximately 50% of the pre-15th Century urban population was literate, and approximately 1% of the rural population was literate. After 1500 AD a gradual increase in the two literacy rates are adopted, ending with a present day 90% and 40% (weighted average of all regions).

Other minor adjustments were made as an attempt to represent "realism." For example, for the Americas the literacy rate was allowed to climb from zero during the first Century AD, when the Mayan "civilization" is thought to have adopted writing. The Americas literacy rate remained at low levels during the pre-Columbian era, and rose rapidly during the European immigration. Similar "origins" of literacy are attributed to China in the 17th Century BC, and "Europe" (actually Mesopotamia) during the 4th Millennium BC. Regional literacy rates were combined with regional populations to produce a global literacy rate and total number of literate adults, which is shown in Fig. 20.12.

Figure 20.13 is innovation rate per literate adult. It is a renormalization of Fig. 20.09, using the global literacy rate as a normalizing factor; so it thereby retains the property of showing how many innovations were produced per million literate adults who lived during the "equal increment of adults" intervals.

It is remarkable that after the classical Greek period the rate of innovations is level at about 50 per million literate adults until well into the 19th Century. This could be the source of interesting speculation, but for now I will defer. The pre-Greek times produced innovation rates comparable to those of the Greek era, but this feature is less robust for several reasons: 1) there are fewer innovations in the numerator, and 2) there is great uncertainty in estimating (or even defining) literacy during this time.

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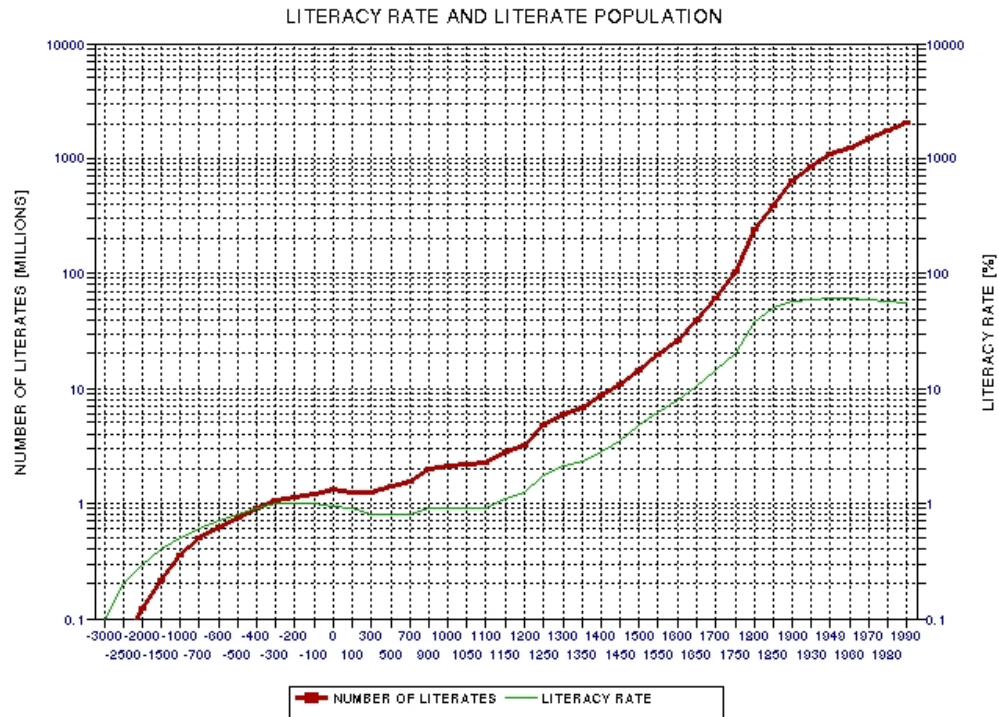


Figure 20.12. *Estimated global literacy rate and total number of literate adults versus time.*

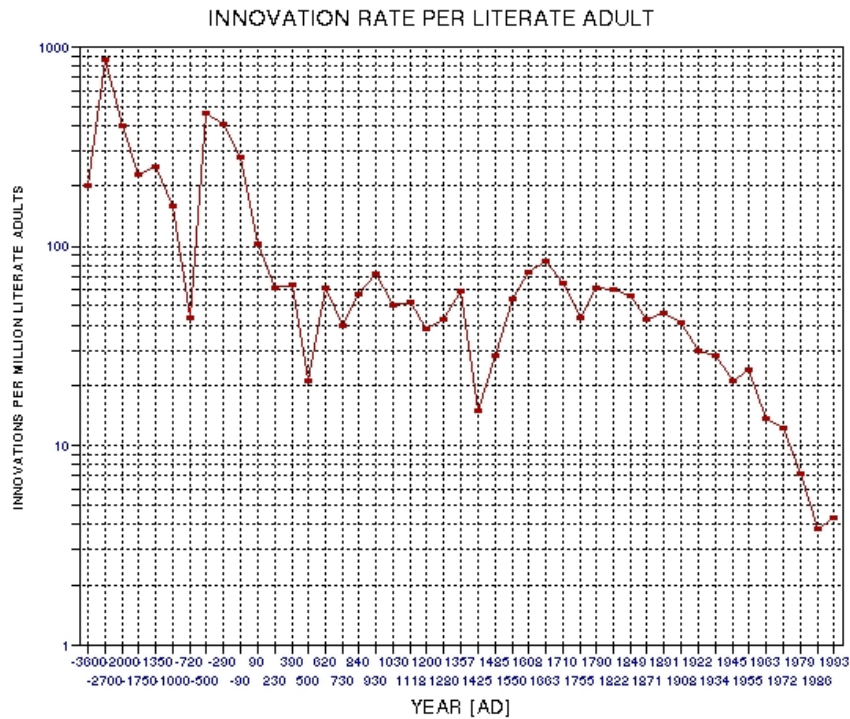


Figure 20.13. *Innovation rate per literate adult.*

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The drop in innovation rate since 1800 is attributable to two equally important factors: 1) a population that rose by a factor of 5.5, and 2) literacy rate grew by a factor of 3.8. Since both factors move the innovation rate trace in the same direction, a factor of 21 decrease is predicted due to these two considerations alone (while a drop of 15 to one is observed).

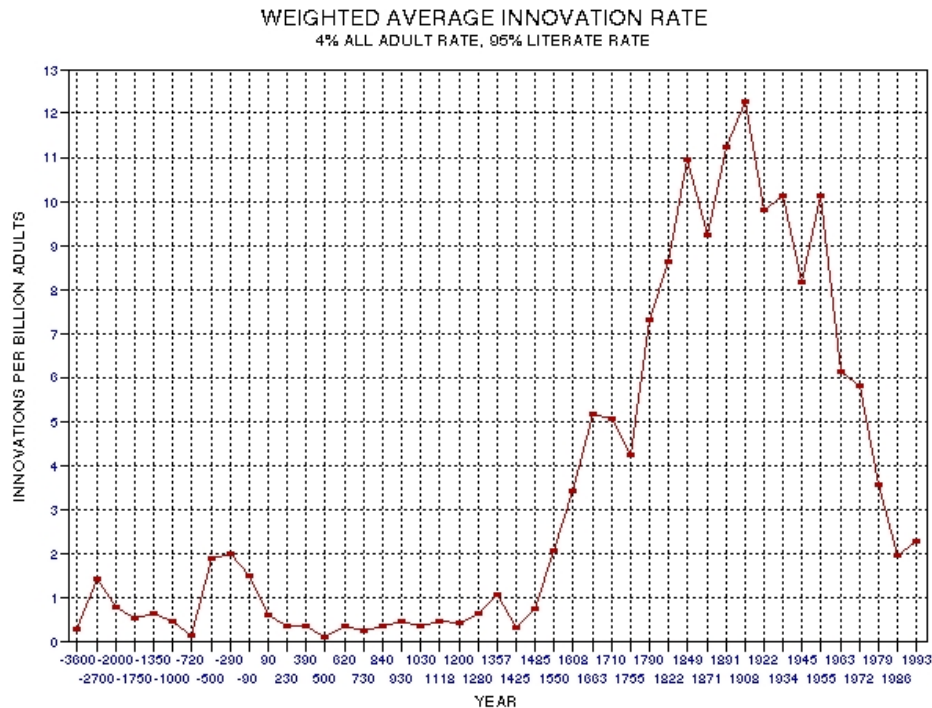


Figure 20.14. *Innovation rate per billion population, weighted average of rates for literate and all adults.*

This figure is a plot of the innovation rate using the weighted average of 4% for illiterates and 96% for literates. This trace is based on the concept that the literate person is 24 times as likely ($96/4 = 24$) to produce an innovation (that Asimov would include in his list) compared to the illiterate person. This presentation is the "fairest" way that I can think of for representing innovation rate using Asimov's compilation as the measure for significant innovations.

The Two Major Peaks in Innovation Rate

There are still two peaks in Fig. 20.14, as there were in Fig. 20.09. The classical Greek peak in relation to the 19th Century peak is 13% in Fig. 20.09, and 17% in Fig. 20.14. Normalizing by a weighted average of literate people and illiterate people's overall productivity did not significantly change the relative appearance of the two versions. The Greek peak endures for about 4 centuries, from 500 BC to 90 BC. The 19th Century peak occurs between 1550 AD and 1993 AD, approximately, which is about 4.5 centuries long. Thus, the durations are approximately the same in terms of

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normal, calendar time, being 4 or 5 centuries. I will refer to this most recent peak as the Renaissance/Enlightenment innovation peak.

There is another similarity between the Greek and Renaissance/Enlightenment peaks. They are both accompanied by an increasing population, and the Greek population rise reaches a maximum some centuries later. The Greek infusion of new ideas was exploited by the Romans, who made it possible for populations to increase until a collapse after 200 AD. The population maximum occurred 5 centuries after the innovation peak. Figure 20.15 illustrates this.

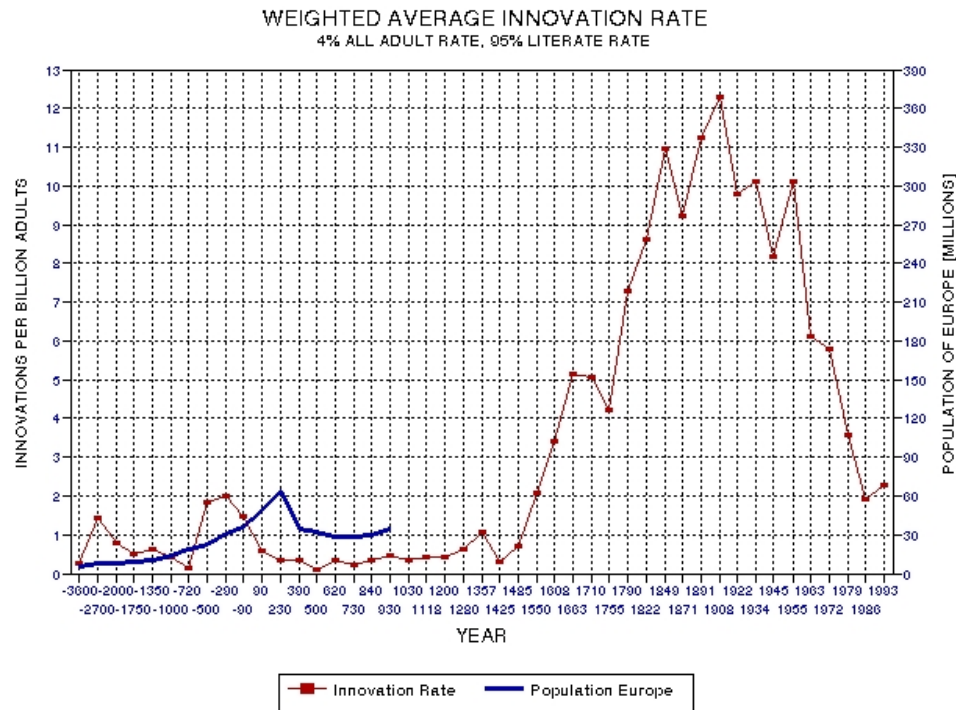


Figure 20.15. *European population in relation to global weighted-average innovation rate, showing that the "Greek" innovation peak is followed 5 centuries later by a "Roman" population peak.*

Figure 20.16 shows a 1400-year expanded portion of the previous figure, centered on the Greek innovation peak. The Roman population peak follows the Greek innovation peak by 4 to 6 centuries.

Figure 20.17 shows another 1400-year period, centered on the Renaissance/Enlightenment innovation peak. Clearly, this dynamic cycle is still unfolding, and we alive today are naturally interested in its outcome.

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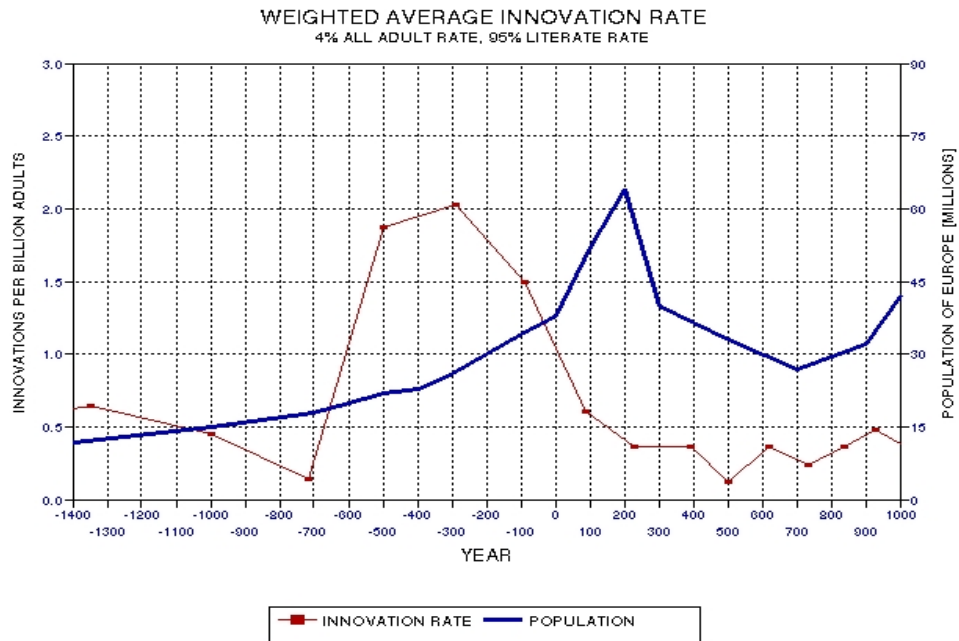


Figure 20.16. A 1400-year expanded portion of the previous figure, centered on the Greek innovation peak.

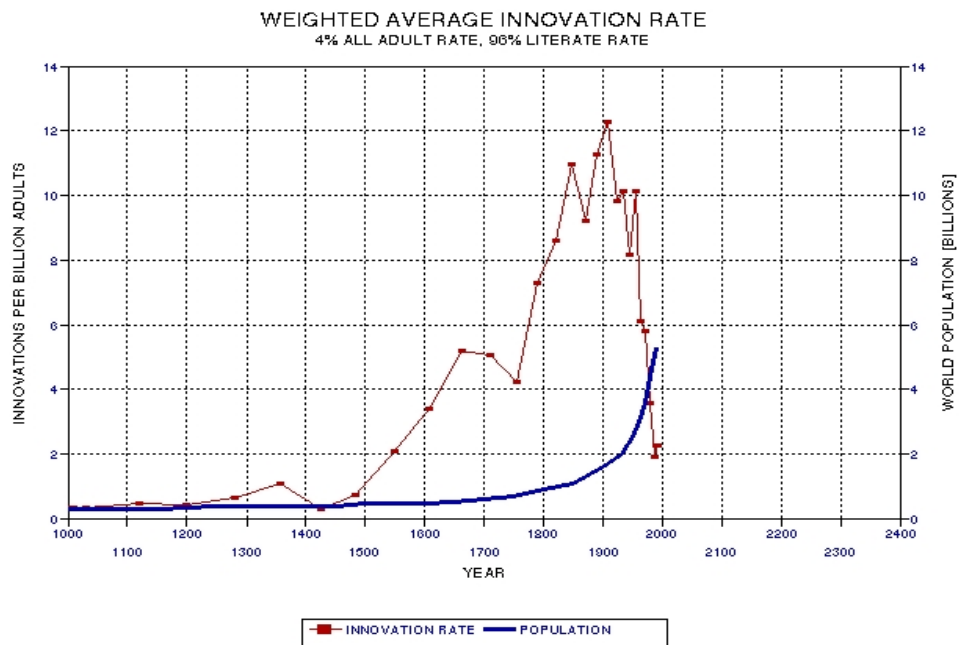


Figure 20.17. Another 1400-year period, but this time centered on the Renaissance innovation peak.

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It is inevitable that the still-unfolding Renaissance/Enlightenment innovation peak will be followed by a population peak, and I conjecture that its timing will be similar to the timing of the Greek innovation and Roman population peaks. We do not know the future, but some population projections resemble the plot in the next figure, with a population peak in ~2200 AD, and a collapse afterwards.

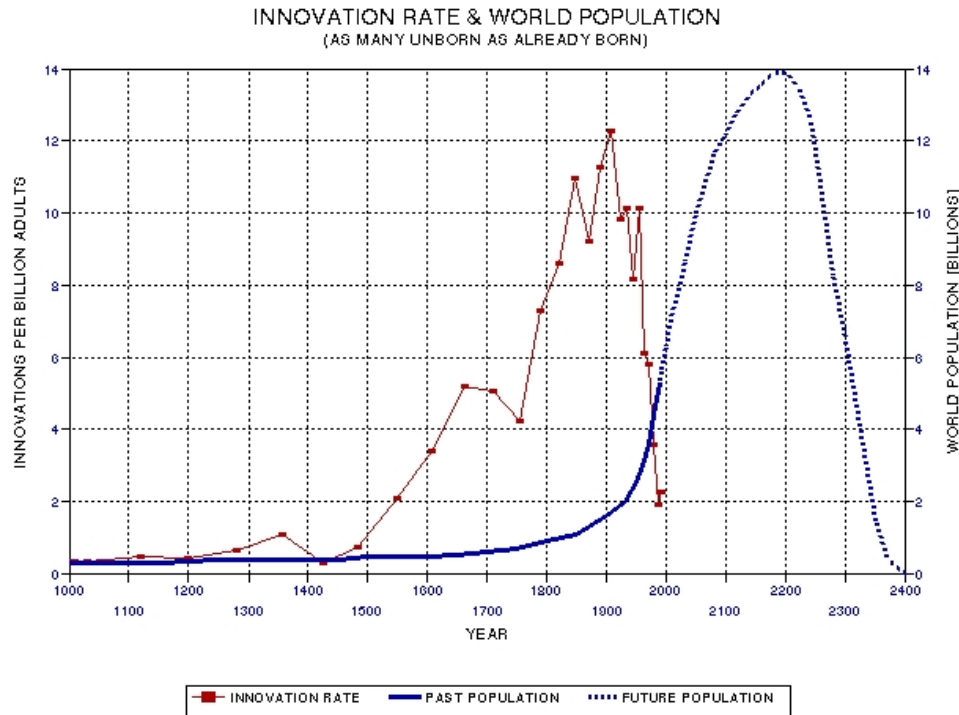


Figure 20.18. *The same Renaissance 1400-year peak period, but with a future population trace, showing a population peak aafter the innovation peak.*

Actually, this particular future population curve is a special one, for which I shall present an argument in the next section. Note, for now, that the population peak occurs only 3 centuries after the innovation peak, whereas the Roman population peak followed the Greek innovation peak about 5 centuries. By analogy, the currently unfolding population explosion in the undeveloped world owes its existence to the Renaissance/Enlightenment innovation peak at the end of the 19th Century.

It is also interesting that for both pairs of innovation/population peaks, the innovations and population growth occurred in different parts of the world. The spread of technology from the site of its origin allows other populations to grow almost as surely as it allows the innovating population to grow. This is reminiscent of the old saying: "When the table is set, uninvited guests appear."

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Random Location Principle and Forecasting the Future Population Crash Date

It is perhaps important to put the upcoming population crash scenario to the test of what I shall refer to as the Random Location Principle. After I performed the analysis presented here I learned that the subject had been discussed in a late 1980's publication and was referred to as the "Anthropic Principle" (erroneously, I think). The Random Location Principle states that "things chosen at random are located at random locations." This innocent sounding statement is not trivial. It can have the most unexpected and profound conclusions, as I will endeavor to illustrate.

Before applying the Random Location Principle (RLP) to the population crash question, let us consider a simpler example that illustrates the RLP concept. Consider the entire sequence of Edsel cars built. Each car has an identification number, thus allowing for the placement of each Edsel in a sequence of all Edsel cars. Assume for the moment that we don't know how many Edsels were manufactured, and let's try to think of a way to estimate how many were manufactured by some simple observational means. Suppose we went to the junk yard and asked to see an Edsel. Assuming we found one, we could read the identification number and (somehow) deduce that it was Edsel #4000 (the 4000th Edsel manufactured). Would this information tell us anything about the total number manufactured? Yes, sampling theory says that if we have one sample from the entire sequence, and if it is chosen at random, then if we double the number in the sequence we'll arrive at an estimate of the total number in the sequence. In other words, doubling 4000 gives 8000, which is a crude estimate of the length of the entire sequence.

Sampling theory goes further, and states that we can estimate the accuracy of our estimate. Namely, we can assume that a sample chosen at random has a 50% probability of being within the 25th and 75th percentile of the entire sequence. If 4000 were near the 25th percentile, then the sequence length would be 4 times 4000, or 12,000. If 4000 were near the 75th percentile, the sequence length would be 4000×1.333 , or 5300. So, with just one random sample, the number 4000 in the sequence, we could infer that there's a 50% probability that the entire sequence length is between 5300 and 12,000. Moreover, there's a 25% probability that the entire sequence length is less than 5300, and another 25% probability that it is greater than 12,000.

Now we're ready to apply this principle to the human sequence. Assume every human birth is assigned a sequence number. Let's delete people who fail to reach adulthood, so our new sequence is for all people born who eventually become adults. The next step is going to be difficult for most readers, but I want to try it. Imagine that the future exists in some sense. It's like watching a billiards game and having someone exclaim that while the balls are moving the future motion of the balls is determined. Thus, after the balls are set in motion the unfolding of future movements and impacts is determined. For physicists it is somewhat straightforward to conceive of the universe as a giant billiards game, set in motion by the Big Bang 13.7 billion years ago. So imagine, if you can, that there is a real sequence of unborn people who will be added to those already born, and that this sequence is somehow inherent in

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the present conditions. If it helps, think of time as a fourth dimension, and the entirety of the future is just as real as the entirety of the past, and the NOW of our experience is just a 3-dimensional plane moving smoothly through the time dimension. If you can accept this concept, then the rest is easy.

Each person is just one in a long sequence of people comprising the entirety of Humanity. Few people can expect to find themselves at a privileged location in this sequence; rather, a person is justified in assuming that they are located at a "typical" location in the sequence. For example, there's a 50% chance that you and I are located between the 25th and 75th percentile along this sequence of all humans. If we are near the 25th percentile, and since 19.6 billion adults were born before us, we could say that another 58.8 billion adults remain to be born (i.e., $3 \times 19.6 = 58.8$). Or, if we happen to be near the 75th percentile, we could say that another 6.5 billion people remain to be born (i.e., $19.6 / 3 = 6.5$). In other words, there's a 50% chance that the number of humans remaining to be born is between 6.5 billion and 58.8 billion. To convert this to calendar dates, we need to experiment with future population curves to find those which end with the required hypothesized number of future adult births.

Consider the future population trace in Fig. 20.18 that goes to zero in 2400 AD. Integrating it to 2400 AD yields 35 billion new adults. If this is humanity's destiny, then those born in 1993 would be at the 56% location in the entire Humanity sequence. Or, those who were born in 1939, as I am, would be located at the 49% location of the entire Humanity Birth Sequence. These locations are definitely compatible with the Random Location Principle, and the population projection that goes to zero in 2400 AD is an optimal candidate to consider, since it places today's adults near the mid-point location of the Humanity Birth Sequence.

However, we are searching for a population curve that has an integral of 6.5 billion new adults, and also a curve with an integral of 58.8 billion. Through trial and error I have found two curves that meet these requirements, and they are presented as Fig. 20.19.

The curve with a population collapse to zero in 2140 corresponds to the hypothesis that we are currently near the 75% location in the Humanity Birth Sequence. The population collapsing to zero at 2400 AD is a most likely scenario, and corresponds to our being near the 50% location. And the right-most curve, with a population collapse to zero at 2600 AD, corresponds to our current location being near the 25% location. There is a 50% chance that the collapse will occur between the two extremes. Thus, by appealing to the Random Location Principle, we have deduced a range of dates for the end of humanity!

The future population shapes can be rearranged, provided areas are kept equal. Thus, the real population curve is likely to have a small "tail." I would argue that after such a colossal collapse the people surviving and living in the tail would be genetically and culturally distinct from today's human. Following the example of Olaf Stapledon,

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in *Last and First Men* (1931), humanity after the collapse will enter a transition from a First Men phase to a Second Men phase. New paradigms will define the new man.

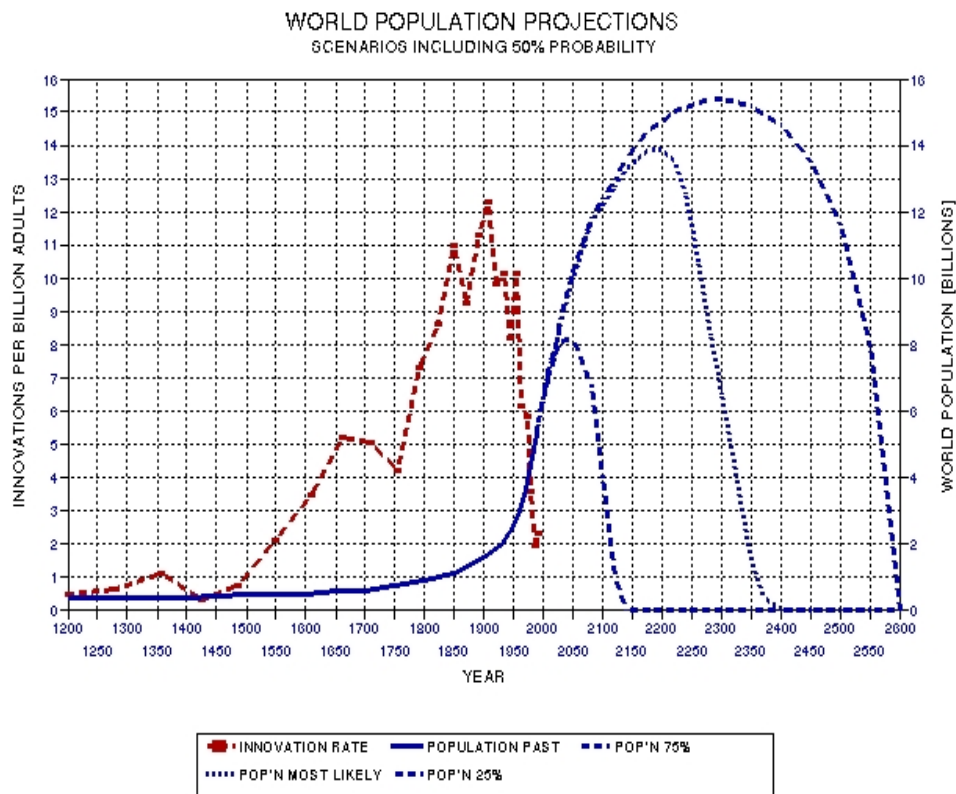


Figure 20.19. Three future population scenarios, encompassing 50% of what is forecast by my usage of the Random Location Principle. See text for disclaimers.

Final Humanity Time Scale

The following table lists equivalences of "YearAD" and "Humanity Time Scale %." The table extends to 200%, corresponding to the "most likely" population crash date of 2400 AD.

The following figure is a visual representation of the Humanity Time Scale described by the equations (modified so that the year 2000 AD corresponds to the 100% point on the scale), presented in Appendix D.

Caveat and Comment Concerning Humanity's Collapse

The population collapse suggested by the "Random Location Principle" is clearly speculative! Its claim for consideration hinges on the applicability of the Random Location Principle to the situation of a sentient being posing the question "where am I in the immense stretch of humanity?" I suppose the conventional wisdom, if

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someone representing it were pressed to respond to such a question, would say that we are now close to the very beginning of this immense sequence, and that humanity may exist forever. In addition, that person would say, when our sun explodes in 5 or 6 billion years, humans will have migrated to other star systems, and will have secured its rightful place as an immortal cosmic species.

HUMANITY TIMESCALE

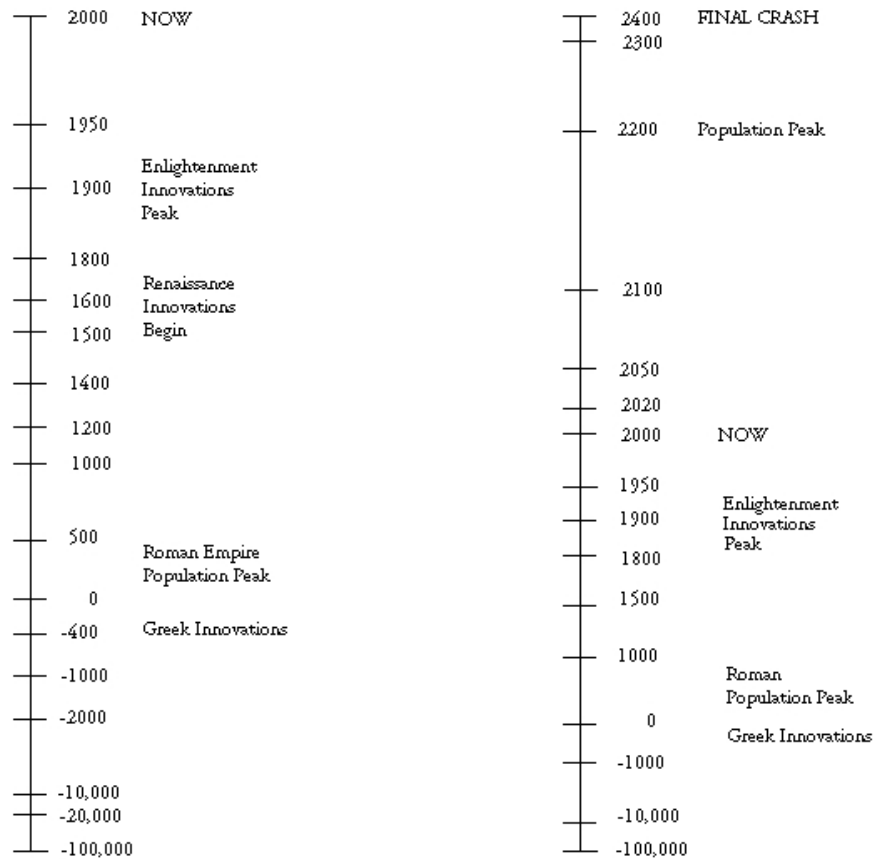


Figure 20.20. *Humanity Time Scale. Left scale is for past, right is for past and future, and assumes humanity (as we know it) ceases after 2400 AD. Equal intervals along the vertical scale correspond to equal numbers of adults in the entire sequence of births leading to adults*

Well, that optimistic belief requires a response to the following: “If humanity is going to endure for another 6 billion years at something like its present population level and lifespan, then isn’t it amazing that we are located at the 0.00006 % place on the long sequence of human existences.” How likely is it that we are really this close to the beginning of everything that will comprise the human story? What a privileged position we would now have if this were true!

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Additional Thoughts on the Meaning of This Result

The Andromeda galaxy is moving toward our Milky Way galaxy at 500,000 kilometer per hour, and the collision date, assuming it's a direct hit, is approximately 3 billion years from now (*Science*, January 7, 2000, p. 64). Speculation over consequences has just begun, and initial thoughts are that a burst of new star formation and supernova explosions might bathe the solar neighborhood with radiation, photon and particle, that could pose a hazard to all Earthly life, or that too many comets will be forced out of the Oort cloud and increase the rate of climate disrupting impacts. I assert that Humanity may not survive the present millennium, so "not to worry!" about things 3 billion years from now!

If only such optimism as worrying about hazards 5 or 6 billion years from now were warranted! Of course, none of us know if this will be true. We must be content with speculation. And mine is merely one, conceivable speculation.

It surprised me to discover that for the past century the innovation rate has been decreasing. At first I thought this must be due to an under-representation of innovations from the 20th Century. But the absolute number of innovations continues to increase during the 20th Century. There's a simpler explanation. The innovations are coming from slow-growing populations of America, Europe, Australia, New Zealand and some Asian countries, while the world's population can be attributed almost entirely to the undeveloped countries. Thus, even though America and Europe, and parts of Asia, are producing an ever-growing number of innovations, and perhaps growing on a per capita basis, world averages show an innovation rate decline.

The careful reader may have wondered "The causes for a population rise following a spurt of innovation are easy to imagine, but what could cause a decline? This subject is treated in Chapters 11, 14 and 16.

It has just come to my attention (March 16, 2000) that many people have independently stumbled upon the idea for inferring the imminent demise of humanity, as we know it, using what I referred to as the "Random Location Principle" - but which apparently has a generally accepted name, the "Doomsday Argument," and which is closely associated with a related topic referred to as the "Anthropic Principle." My original essay on this subject, "A New Estimate for the End of Humanity," appears in Chapter 7 of my 1990 book *Essays From Another Paradigm* (self-published, not for sale). This essay actually post-dates similar writings by others by a few years, but I wasn't aware of any of these writings until about 1995. A good starting point for learning what others have written about the subject can be found at: <http://www.anthropic-principle.com/profiles.html>

One intriguing way to reconcile the "Doomsday Argument" with a long human lifespan is to assert that a "long **individual** human lifespan" is compatible with the Random Location Principle and a very long human existence. If biotechnology affords some lucky individuals the means for achieving immortality, they may come

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to dominate world affairs and eventually extinguish the mortal sub-species of humans. Then, the number of humans ever born will have reached a final maximum number, on the order of 2 or 3 times our present accumulation, and the Random Location Principle viewpoint will remain valid even though humanity will extend indefinitely into the future. For an essay explaining the threat of nanotechnology, which could include the means for achieving individual immortality, see the article by Bill Joy at <http://www.wired.com/wired/archive/8.04/joy.html>

Appendix D contains a description of equations presented for those wishing to reproduce some of the preceding material concerning population versus date matters.

CHAPTER 21

THE PULL OF TRIBALISM THREATENS CIVILIZATION

Man is at bottom a dreadful wild animal. We know this wild animal only in the tamed state called civilization... Schopenhauer, 1851, *Parerga and Paralipomena* (i.e., *Aphorisms*).

Introduction

In the previous chapter I estimated that there's a 50% chance that humanity, as we know it, will cease to exist sometime between 2100 and 2600 AD. In earlier chapters I have tried to identify factors that may contribute to the disintegration of civilization. In this chapter I will try to imagine how one scenario for an unfolding disintegration may occur, and then present a theoretical unification that should embrace all scenarios of this type. The specific scenario is based on the notion that communists and fascists, with their primitive longing for opposite aspects of the tribal lifestyle, are twin enemies of artisan-created civilization.

The closer we approach the final population crash during the next few centuries the more accurate will be our speculations about it. It is inevitable that future generations will view speculations from this era as "outdated" - and I acknowledge that the following hypothetical scenario may never happen. But it at least contains elements which have a credible claim for relevance.

Perhaps the biggest disclaimer for the many endeavors in this book to discern civilization crash scenarios, and an exploration of new directions for human evolution, is that the world's population may not crash, and that to rely upon the Doomsday Argument is to be misguided since it may not apply to the human population situation. Therefore, the preconditions for the evolution of a new species of humans who achieve liberation from their genes may therefore never exist, and consequently there is a greatly reduced probability that a new species of gene-liberated humans could evolve. These are uncertainties we must live with.

Scenarios Overview

The population of Europe began to collapse at about 200 AD, coinciding with the disintegration of the Roman Empire. Rome's population fell by a factor 10 during the centuries following 200 AD. Civilization is needed to sustain a large population, and since civilizations are more quickly destroyed than created, population collapses will be faster than their rises. The important point here is that for the one well-documented example of the world's intellectual vigor and its population, the latter has a peak centuries after the former. For the reader's convenience, I repeat two figures from the previous chapter that illustrate this concept.

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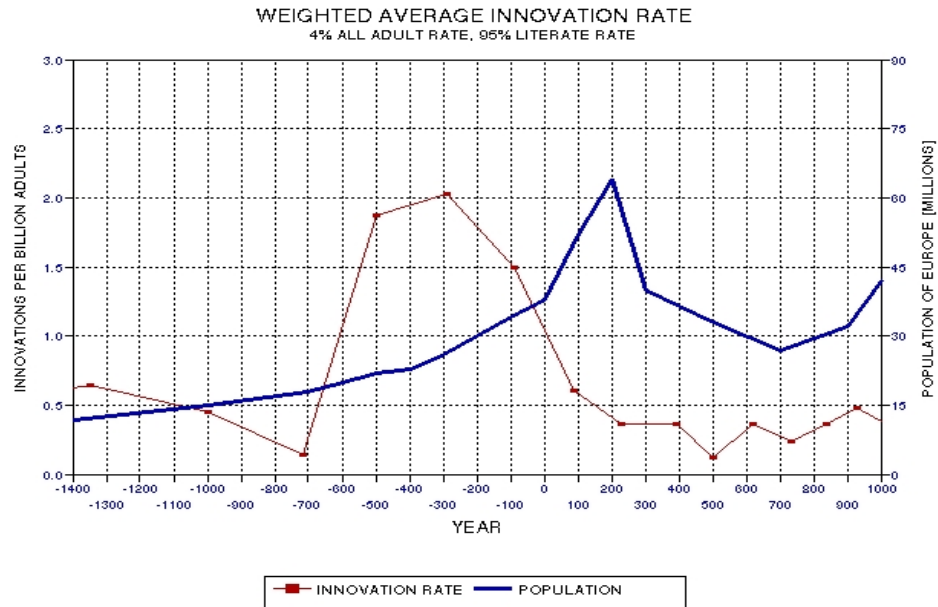


Figure 21.01. Repeat of Fig. 20.16, for a 1400-year period centered on the Golden Era of Greece (Chapter 20 has a fuller explanation).

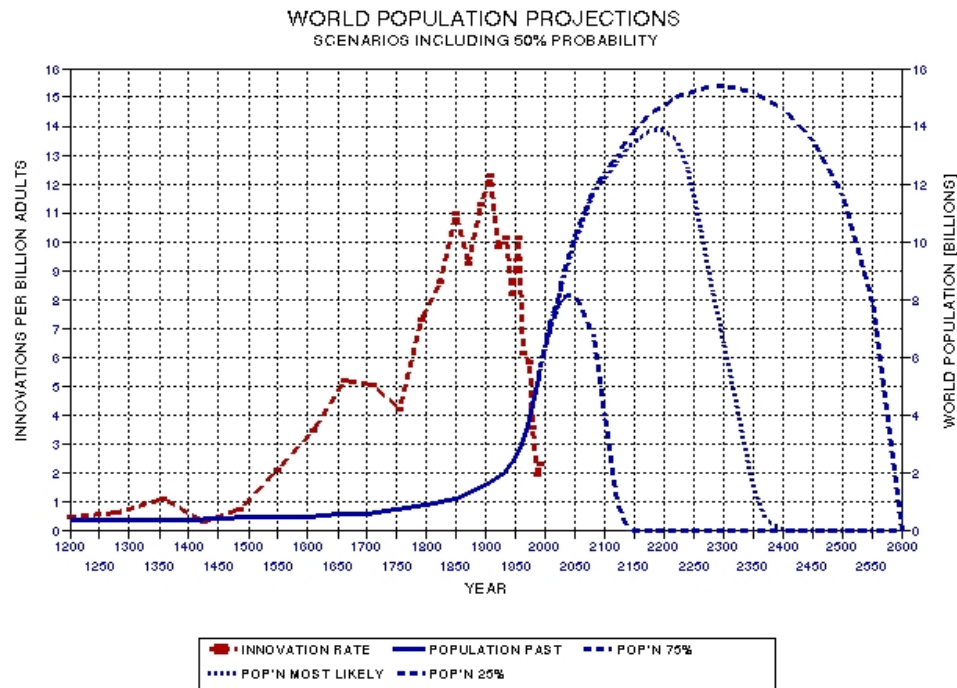


Figure 21.02. Another 1400-year period, showing three hypothetical world population scenarios (Chapter 20 has a fuller description).

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Innovation rate and population during the current, post-medieval period appear to be following a pattern similar to the one associated with Classical Greece and the Roman Empire. In both cases the population continues to rise after a peak in innovation rate.

The reader may find it difficult to believe the precipitous drop of the innovation rate trace in Fig. 21.02, but recall that the trace is a "per capita innovation rate," and is therefore influenced by the rising world population. In absolute terms the rate of innovations is still increasing, but the world population is increasing at a stupendous rate which causes the per capita innovation rate is to drop.

I claim we might gain insight into our future by studying the fate of the Golden Era of Greece, which prepared the path to the Roman Empire (which ran its course and was replaced by the Medieval Ages). At the height of the Roman Empire the influence of Rome spread across the entirety of that part of the world known to the Romans. After the "decline and fall" the influence of Rome was greatly reduced, and regions went their separate ways, like wanderers lost in a forest. In each distant region the rule of Roman law was replaced by the rule of local lawlessness. Grievances could again be settled by the action of small, local coalitions, probably family-based in most cases. In some ways this resembled the state of affairs before the Roman Empire, when tribes had two sets of rules: those that applied to others within the tribe, and those that applied to outsiders (Spencer's amity/enmity duality of morality).

I shall assume that whenever the rule of law disintegrates, a population collapse begins. Consider the 50% population scenario of Fig. 21.02, which has a population peak at about 2200 AD. This scenario corresponds to a disintegration of the rule of law throughout the world at that time. During the subsequent 200 years the world's population shows a collapse to small values, as happened after the Roman Empire's "decline and fall." In this chapter I will adopt this specific timetable for describing scenarios of how today's global civilization might collapse.

Some of Civilization's Discontents

Let us "step back" for a moment to review the long march of our human ancestors toward the glorious civilizations of the Holocene Epoch. Hopefully this will help us discern "big picture forces" which create and destroy civilizations.

Humans are presumed to have lived in tribes during the past 1.8 million years of the Pleistocene Epoch, dominated by glacial periods interrupted at 100,000 year intervals by 10,000-year interglacial warmings. The evolution of larger brains, occurring at 1.8 million and 0.3 million years ago, is probably climate-driven, ultimately, but also associated with tribal adaptations to the challenge of living with a variable climate. It was not the individual who faced a harsh environment, but individuals living in tribes who faced harsh and variable environments. The human mind must have evolved adaptations that allowed it to meet the challenges of tribal living when climate became variable, causing landscapes and hunting styles to change profoundly.

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During the Holocene interglacial warming, starting 11,400 years ago, those individuals prospered who changed their connection to their tribe by adopting farming and herding lifestyles. Gradually, a sedentary village way of living replaced the hunting and gathering lifestyle. As weakened tribes coalesced into super-tribes, then villages, cities and eventually the metropolis, civilization was created. Civilized cities act like a magnet attracting rural dwellers to the glitter of the city.

But life in cities is fundamentally different from life on farms, just as life on farms was fundamentally different from life in hunter-gatherer tribes. Both transitions brought the average person into contact with strangers on a daily basis. When the farmer returned from his fields to his village home, or when he sold his produce at a farmer's market, he was surrounded by strange faces. The strain of seeing strange faces on a daily basis may have been even worse for permanent city dwellers.

Recall that in the tribal setting a person is surrounded by friendly, fellow tribesmen on a daily basis, and the only time strange faces are encountered was during conflicts with neighboring tribes. During the 1.8 million years of Pleistocene living our ancestors must have evolved an automatic association "strange face means enemy." Mental modules (i.e., neural networks) were created by the genes to make this association, and those gene-created modules did not disappear as soon as tribal living was abandoned. It is possible that even today we become uneasy after encountering many strangers on a daily basis. We must suppress these ancient instincts as we pretend to not dislike strangers. Yet, we still have brain modules adapted to the ancient reality that "strangers" mean "danger." A part of us must wish for a return to the tribal setting, where we could count on a peaceful social setting, and where the need for tribal cohesion produced a "brotherhood" of loyal social relationships.

It is important to appreciate the abruptness of our transition away from tribal living. Compare the 1.8 million years of Pleistocene living, or even the 4 million years of human evolution following the separation from our chimpanzee-like ancestors, with the shortness of the Holocene's 11,000 years. Our experiment with non-tribal living represents less than 0.5% of the "human" evolutionary experience. How much could our genome have changed during the past 11,000 years? The genes coding for skin pigment can change during times this short, and some aspects of anatomy can change (witness the native American Indian, who left Asia at the beginning of the Holocene), but the bulk of our human genome is identical to the one that was adapted to the previous 1.8 million years of tribal living. We are forced to consider that there are parts of our brains better adapted to tribal living than to life in a modern civilization, and that in some ways people would feel more comfortable living in a tribal setting than the modern civilized one!

What a poignant realization! Civilized living is unnatural, and parts of ourselves wish to return to tribal living, as if we still primed to hear that "call of the wild."

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The implications of this speculation are profound. Not only does it help us understand the aimless frustration with life in these modern times, but it might help us understand the political motivations of various "social movements."

Alternation Between Inter-Tribal Conflicts and Intra-Tribal Harmony

In order to understand the subconscious feelings after being abruptly forced into a civilized world, let us dwell upon the "feel" of tribal living. It will be useful to think of tribal life as consisting of two flavors: things you do during intertribal conflicts, and the things you do during the longer interludes between conflicts. Conflicts can take the form of defending against attacks by neighboring tribes, or they be the initiating of conflict by the home tribe. All-out tribal conflicts may be rare, separated by years. The more frequent conflicts can be described as "raids," which are brief encounters by small bands from a neighboring tribe that attack when they feel they outnumber their victims and can overpower them with small risk to themselves. These will usually occur near the periphery of the territory claimed by a tribe, near contested borders.

The existence of defensive palisade structures, dating to at least 30,000 years ago, are testimony to the importance of the less frequent, large-scale conflicts (Keeley, 1996). For these inter-tribal wars tribes would have relied on their best warriors more than during opportunistic raids. The same warriors not only defended the home tribe, but they are the ones who initiated tribal conflicts. Let us appreciate the importance of the ancient warrior niche in every tribe. I will assume that there is a "warrior" mentality, as well as an instinctive appreciation of the warrior as a valued member of one's own tribe.

The majority of tribal life consisted of peaceful endeavors, of activities that sustained the tribe by providing food, shelter, tools, weapons and other economic necessities. The tribe's survival hinged as much upon economic strength as on its war-waging prowess. Indeed, the ability to defend the tribe and wage war upon one's neighboring tribe is determined by the productive payoffs of peaceful economic activities. I will therefore assume that there is a peaceful producer mentality, as well as an instinctive welcome of the producer members of one's own tribe.

As I have argued earlier, late in the Pleistocene the artisan became one of the tribe's most valuable assets. He was the full-time toolmaker and weapon maker. For the advanced tribes there was a place for the artisan who specialized in constructing dwellings, storing food, gardening, and domesticating the occasional animal that could be domesticated (goats, dogs, etc). Initially, tribes had few full-time artisans. When the climate warmed during the Holocene artisans became more valuable, as they could more profitably pursue farming, herding and other specialized economic activities. Therefore, I will assume that there is an "artisan" mentality, as well as an instinctive (though grudging) welcome of the artisan as a member of one's own tribe.

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Three Mentalities Enter Civilization

This was the condition of tribal living that existed before the artisan created "civilization." I have identified three mentalities that were important in the tribal setting of the Late Pleistocene; there are others, but for now I want to focus upon this most important triad. These three mentalities can be referred to as 1) the warrior, 2) the everyday producer, and 3) the specialist artisan. The distinction between the "everyday producer" and the artisan, both of whom are producers, is that the first has no unique skills and is pressed into battle during tribal conflicts, whereas the artisan is "protected" during tribal conflicts. Because of a resentment over this the acceptance of the few artisans in each tribe was made grudgingly.

Now, consider how these three types of people would react to the spectacular explosion of civilization. Since "civilization" is the handiwork of the artisan, he would feel comfortable in this new setting. However, the warrior and everyday producer would feel somewhat "left out" and "out of place." They would feel uneasy for being forced to endure daily encounters with strangers, since strange faces "trigger" subconscious anxieties. The loss of tribal rituals and a world of surrounding spirits would also contribute to a feeling of dissatisfaction with civilized living. Within the minds of people who are inclined to the warrior and everyday producer life, there would be an ambivalent feeling about the new civilized state. A subconscious "homesickness" for the tribe may become stronger the more civilization advances.

But the homesickness for tribal life would be slightly different for the warrior type and the everyday producer. The warrior would miss his crucial and celebrated role in defending his tribe and attacking others. The everyday producer, on the other hand, would miss the ambience of a peaceful interlude of cooperative comradeship. These best of times were peaceful, friendly, cooperative, and infused with an atmosphere of loyal togetherness that sustains effective group living. At these times it is fair to characterize one's fellow man as "peaceful" or "noble."

Birth of Communism

There's a "place in the brain" for the concept "noble savage." Jean Jacques Rousseau felt it, as do all present-day Marxists and communists. This faded memory is easily resurrected, and Marx played on this with his interpretations of history. He wrote that the "class struggles" characterized modern capitalist societies, and this struggle was due to the corrupting influence of culture. Moreover, since he believed that human nature remained noble, a change of culture could return us to that dreamed of state where everyone worked harmoniously together for the good of the group. His wish to return to commune living, and his belief in its feasibility, are manifest expressions of a subconscious nostalgia for our million-year experience with tribal living. I believe his perspective can be distilled to the following: "If only people could break the shackles of a dysfunctional culture (*i.e.*, civilization), then all Mankind could return to simply living together in ancestral peace and harmony."

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Birth of Fascism

Marx overlooked the other half of human nature, namely the human appetite for inter-tribal conflict. Those who most strongly longed for intertribal conflict are today's fascists! The fascist's gripe with civilization is that it is too peaceful, with too much civil behavior, codified by artisan-written laws and enforced by police and courts, which deprive the fascists their most important tribal role. Whereas no one celebrates the criminal today, everyone celebrates the warrior - even though both thrive on mayhem and murder. The fascist thus wishes for a breakdown of society, and a return to the kind of anarchy that so pleased his ancestors.

The fascist also dislikes civilization's celebration of individualism. Fascists instead embraced "authoritarian order, based upon the subordination of the individual..." (*Encyclopaedia Britannica*, 1977, **7**, 183). They also have "a definite attitude of mind that exalted the fighting spirit, military discipline, ruthlessness and action..." (*op cit*). "The Italian slogan [under dictator Mussolini] to 'believe, to obey, to combat' was fascism's antithesis to 'liberty, equality, fraternity'" (*op cit*). Of course, "liberty, equality, fraternity" grew out of the French Enlightenment, which in turn was an expression of the artisan's value system.

Chapter 19 defined fascism using a statement uttered by Benito Mussolini, who urged a combining of business and state leaders for authoritarian rule of a nation so that it may pursue "belligerent nationalism." The part about combining business and state leadership is simply a means for hijacking a nation from a democratic embrace so that it may be set on the belligerent nationalism course. "Belligerent nationalism" really refers to the primitive drive for initiating inter-tribal warfare for the goal of enlarging a tribe's dominion over a larger territory and subsuming rival tribes. A modern name for this desired end-point is "empire." In this chapter I will emphasize the warrior aspect of fascism since it springs from the deepest parts of a person's instinctual inheritance.

Communists and Fascists as Twin Enemies of Civilization

The fascist and the communist have something in common, even though they are traditionally assigned opposite ends of the political spectrum. Both wish for the destruction of the civilized state and a return of society to a tribal lifestyle. Both harbor a deep hatred of the artisan, whose creation they wish to destroy. The early part of the 20th Century was wracked by the simultaneous efforts of fascists and communists to destroy the society that had thwarted the expression of one's natural self, and denied realization of a half-remembered idyllic past where these people were important.

The forces of discontent unleashed during the early 20th Century, between World Wars I and II, caused many thoughtful people to worry about the end of civilization. Fortunately, these destructive forces were subdued and returned to subconsciousness after World War II. But they remain as an unnoticed wish, partially hidden, and these

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desires are a serious threat to civilization. I predict that the 21st Century will see a replay of the assault of tribalism upon civilization!

If the Fascists had Won World War II

If "civilization" had not won the Second World War, which some suggest was a "close call," then we might now be witnessing a slide into a new Medieval Age. The shape of this world would have begun with Hitler's version of fascism, not Stalin's version of communism. Even Lenin acted like a fascist, and his embrace of communism seems more a convenience than a fervently believed-in ideology (Server, 2000). The decline and fall of today's civilization is therefore likely to resemble, in its early stages, the scenario one can imagine if victory had gone to the three Axis fascisms: Nazi Germany, fascist Italy, and racist Japan. We may assume that Germany would have subjugated the vanquished, given their superior military; so imagine a world styled upon the Nazi dream.

It would be an understatement to say that Nazi Germany was racist. They were racist in the classic tradition of tribalism. The first rule of the "tribal mentality" is to hate strangers and love your fellow tribesmen. It is common in primitive languages to employ a term for everyone belonging to other tribes that is dehumanizing, such as "dog" or "snake" (Chagnon, 1992). These epithets help arouse the right attitude for acting unmercifully toward the "others" during tribal conflicts. During World War II, as in other times of war, the same technique was used to help arouse the required tribal hatreds and brutal behaviors. The Nazi victors would have continued their "ethnic cleansing," and it would have become a global project. The Nazi killing of non-Aryans might have gone on for decades.

The "Nazi Dark Age" would have run out of energy before world ethnic cleansing could be completed, given the immense magnitude of the task of exterminating billions instead of millions. I believe this would be the case because the fascist is motivated to behave in ways that "made sense" when one's enemies were limited to the troublesome neighboring tribe. Exterminating the rest of the world would become a weary task, in which the confused Nazi would probably lose interest eventually. After abandoning the ill-conceived goal of world ethnic cleansing, the Nazis probably would have settled for plundering the rest of the world - which they had already started during the war.

So, imagine a world in which non-Aryan populations lay decimated, in which world commerce has been converted to a one-way transport of plundered goods, and in which artisan initiative is no longer rewarded as it is in civilized societies. The Nazi Dark Age would have degenerated from organized racial exterminations, to plunder, to chaos and eventually disinterest. The rest of the world would have been robbed of the resources and incentives to reconstitute itself as a civilization.

This, I submit, could still happen. Even at a time when we know that the hidden hand within the glove of tribal cruelty is the genes. The genes "act" as if they cannot tolerate competing alleles, and this intolerance is what fashions all animal behavior,

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including human animals. The greater insight that we now have concerning human behavior will be a puny force in the face of the juggernaut of evil primitive forces. No matter how much the artisan learns, no matter how powerful his insights in the coming decades, he is destined to be squashed under fascist boots. These boots have a blind wish to march, with the innocence of a noble savage heart, to a societal state which a vague memory clings to, of the way things were, and should be again: the beloved tribe to which all but the artisan mind is well adapted.

The shape of the new Armageddon will be qualitatively different from any alternative unfolding of the 20th Century. For in this 21st Century the world's population is 3 times larger, global oil production “peaked” during the 21st Century’s first decade, natural resources are nearly exhausted and require more technology and energy to extract, the environment is more contaminated than at any previous time, small terrorist groups are a greater threat than a complacent First World has the resolve to reckon with, there are larger pools of diseases ready to hitch a ride with people moving globally on a daily basis, and on and on.

The new “world system” has many more variables than at any previous time, and I feel overwhelmed by the daunting task of predicting in any detail how the next Dark Age will unfold. All I feel certain about, though, is that our primitive ways of thinking, that served our genes well for millions of years of tribal living, will provide the energy for the micro-motives that together will produce macro-behaviors longing for the tribal setting. And since our primitive desires will never be in alignment with civilized living, civilizations will always be transient affairs.

The Chinese Empire

Although I hesitate to make specific predictions, I will present one possible scenario.

As I write this (mid-2008) China’s economy is booming and America’s is sputtering! China is investing in a military build-up that seems disproportionate to present threats. An army is created for one purpose (killing people) and if it achieves sufficient strength to fear no foe, and if it is unused for a long time, political forces stemming from that army will “rattle its sabers” and give courage to ambitious business leaders and politicians to instigate an international crisis with high stakes potential benefits. China appears to be “itching for a fight” to take over Taiwan, which they have steadfastly claimed is a part of China and not a separate country. If China invaded Taiwan (let’s say in 2020) it would be logical for there to be no response from America. This is because the American economy would collapse almost immediately if China retaliated by demanding payment of its U.S. Treasury bonds, or even stopped buying new ones.

It may be logical for America to refrain from defending Taiwan but internal American politics will not allow a non-response; it would be too humiliating for whoever is president of America (especially if it’s John McCain). So imagine that America attempts to defend Taiwan, and China responds by stopping the purchase of U.S. Treasury bonds, demands payment for the U.S. Treasury bonds that it holds,

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manipulates its currency to make American imports of Chinese products more expensive, and does other things to punish America. The American economy would collapse, China and other foreign countries would buy American assets, such as mines, ports, financial institutions, and little by little America would devolve into a series of foreign-owned colonies.

How ironic for America to start out as 13 British colonies, and end up as a dozen or so colonies controlled by China, Japan, India, Saudi Arabia and other Middle Eastern, oil-rich countries. The American colonies would provide resources for use in the home countries. China needs copper, cement, lumber, other raw materials, and food, such as grain, corn and cattle. American mines would be owned and run by Chinese companies, America's forests would be cut down by lumber companies owned by China, and farms would be run by China. America's rail and highway infrastructure would finally be upgraded in order to transport America's resources to ports where Chinese ships would be waiting.

Americans would find employment with Chinese companies. The Chinese language would be taught in schools, replacing Spanish as the most popular "foreign" language. Since most Americans would be unemployed, some of them would be hired to provide security for the new colonial commerce. Immigration that now is from Mexico to America would reverse direction. Those who could not find work with Chinese or Saudi Arabian companies, and who saw no future in emigrating to Mexico and were prevented from emigrating to Canada, would simply kill each other, starve and die.

At this stage in China's growth it would be fair to refer to China as an empire. Every empire has a finite lifetime. This is because the rulers of an empire are the ones who had the fascist outlook. They rise to power because in a powerful nation individual freedom is incompatible with social stability. China has a "head start" in controlling individual freedom. This is partly due to a fundamental flaw in the Chinese character, the willingness to passively accept feudalism, a king's rights and fascism – which are the same in their demands on the individual. (Why else is there a scarcity of real scientists in China; a scientist must have a strong individualistic personality. Engineers are another matter, they can be submissive and still be effective)

In this scenario China evolves into a fascist state, let's say sometime in the middle of the 21st Century. Far flung colonies throughout the world provide China with raw materials and food. China has scores to settle with Japan, Korea and Russia, so to suppress growing civil unrest over a straining economy in a too-large empire China begins to wage wars with its neighbors. At this point, consider the state of the world to be similar to the state of the world during World War II, when Germany was threatening world domination using their military supremacy. China wins all its wars, and extends its empire to the entire world. Now, refer to the previous section's scenario and run it with the word "China" replacing "Nazi Germany."

This is obviously a hypothetical scenario that is unlikely to unfold with the same details I used to illustrate things that could happen. Other scenarios could be

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imagined in which India become an empire instead of China. The world's civilized condition may revert to a Middle Age barbarity during the 21st Century; or it might be the 22nd. The great descent into Dark Age barbarity might occur in the year 2050, or 2200, or 2400 AD, but surely the time will come when the civilization we know and pretend to cherish will succumb to dark forces more ancient than any human life, and more compelling than any noble human aspiration. The accomplishments of Beethoven, Schopenhauer, Darwin, Bertrand Russell, E. O. Wilson, and all my other heroes, every noble Beauty and Truth which they strove to bring to life, will fall into the ashes of a dying civilization, perhaps never to return again.

This dark scenario is but one of many that could be constructed from the discontents of those forced to endure "civilization." The "backward pull toward the primitive" has many faces; and the communist/fascist variety is merely one example. People who are less intelligent and articulate may prefer anarchy, the great leveler that forces those with ability to suffer equally with those who lack ability. There are religious fanatics who feel that their cozy emotional nest is threatened by what the rest of us call ideas and progress. Each malcontent will react to civilization differently, but they all will feel, at a subconscious level, that there's something wrong with civilized life, something is out of place, and to fix things that went wrong during our historical journey we must somehow return to an idyllic past condition, a Garden of Eden. And this means dismantling civilization, as if by doing that we will thereby free ourselves from alien, corrupting influences. Alas, that darned world that artisans created will be destroyed.

Cultural "Reverse Evolution"

This section presents a "unifying theory" which endeavors to embrace each category of dissatisfaction with civilization. It accounts for how most people are subconsciously unwilling to leave the emotional comfort of the ancestral environment. Regardless of civilization's material bounty, regardless of the plethora of awesome insights which spring from civilized intellectuals, civilization nevertheless presents an unwelcome mat for the human emotions. It is as if many people are dragged into the civilized state who are silently screaming and digging in their heels - waiting for an opportunity to return, by whatever means.

In the Chapter 4 genetics tutorial I described something called "reverse evolution." The basic idea for this new thought is that the most recent mutations in a genome are the most vulnerable to loss, and that the evolutionary "advance" that they produced is the most vulnerable to "evolutionary reversal." This is because the most recently acquired genes have had less time to acquire "allies" for genetic survival (apologies for putting it this way, which is quite anthropomorphic). The longer a gene is "in place" in a genome, the more it becomes depended upon by newer mutations at other chromosome loci. The new mutations provide their contributions to fitness only for as long as certain other pre-existing genes remain present. If a pre-existing gene is deleted, then not only does the individual lose the trait it brought into existence, which was the original justification for its selection, but the individual also loses traits that later genes brought into existence when they depended upon the presence

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of the first gene for its proper expression. This intertwining of genetic effects is captured by three complimentary terms: Pleiotropy, polygenes and entrenchment. "Pleiotropy" refers to the fact that a single gene can influence many traits, "polygenes" refers to the fact that a specific trait requires the presence of other genes, and "entrenchment" describes the situation of old genes being difficult to get rid of because they have more newer genes depending on their presence for them to work properly than is the case for not-as-old genes.

Because an "entrenched" gene has many "allies" for resisting meddling by hypothetical future mutations, the entrenched gene has an advantage when a rival begins to compete with it. Let us use the term "unentrenched" to refer to a recently acquired gene. Unentrenched genes are unlikely to have allies, and are therefore more vulnerable to "challenge" (I ask the reader to understand that my use of anthropomorphic terminology is done for brevity, and any reader who is bothered by this anthropomorphism must provide his own long-winded reductionist version of the thought I mean to convey).

When environments change, the unentrenched genes are the ones most likely to be replaced by allelic challengers. This is especially true when the environment changes back to an earlier one, to an environment that existed before the unentrenched gene came into existence. Indeed, if the unentrenched gene came into existence in response to a change from Setting A to Setting B, and if Setting A returns, the unentrenched gene is a very likely candidate for being replaced with the gene that it had replaced - assuming some of them still exist in a few individuals.

"Civilization" is a product of a fast-paced cultural evolution, made possible by a much slower-paced genetic evolution. The genes coding for a specialized left brain (LB) rely upon a serial processing architecture of interacting, self-contained neural networks. The right brain (RB) relies upon a more primitive neural architecture of parallel processing. LB logic led to the accidental creation of a social arrangement we call "civilization." I shall assume that contemporary humans are little more receptive to civilized living than those of our ancestors who were present to usher in the Holocene. In other words, I shall assume that "civilization" was created by an unfolding of an ever-more complex culture with few genetic accommodations.

Cultural evolution is constrained by the genome; hence, the potentially fast-paced evolution of culture is constrained by the slower-paced evolution of the genome. Genes determine what elements of culture, called culturgen (Lumsden and Wilson, 1981), are theoretically possible, and probable. After a culturgen has been universally adopted throughout a gene pool the social environment is changed, and this change may create new opportunities for genes. The co-evolution of genes and culture is a young science, but some rudimentary properties of it are already understood.

Since culturgen frequencies can change much faster than gene frequencies, it is possible to consider cultural evolution in the absence of genetic evolution. To my knowledge, the matter of "cultural evolutionary reversals" has not been studied, or even mentioned, in the literature. The term "reverse evolution" is recognized as

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applying to genes. So let us use the term "cultural evolution" to refer to culturgen changes that occur faster than gene frequency changes.

Chapter 4 described the results of a genetic study of fruit flies by Teotonio and Rose (2000), showing that they can achieve 90% "reverse evolution" (for many traits) in only 10 generations! The "recovery lines" appear to be linear, so a 10 % recovery can be accomplished in just one generation! These data are for "unentrenched" gene alleles. Surely, the recovery times for unentrenched human culturgens would be much shorter, as measured in generations. Adopting a human generation time of 30 years (Pang *et al*, 1998), pure cultural evolution could achieve a complete reversal in much less than 300 years, and partial reversals in about 30 years.

In the context of the rise and fall of civilizations, it is important to ask if pure cultural evolution can account for the rise and fall of civilizations, or must genes be invoked in a way that requires a mixture of cultural evolution and genetic evolution to give an accounting of the rise and fall of civilizations. We should be prepared for an answer such as "a mixture of genetic and cultural evolution causes civilizations to rise, but almost pure cultural evolution causes them to fall." This would be compatible with the fact that civilizations rise with a timescale of approximately 1000 to 2000 years, whereas they fall with a timescale of 200 years (*i.e.*, 30 to 60 generations, and 6 generations).

Entrenchment of Culturgens: Archosis, Taboos and Conformism

Is there anything analogous in cultural evolution to pleiotropy and polygenes? Can it be said that one culturgen affects others? Or that many culturgens contribute, or are required by, one cultural trait. What we're after is an answer to the question: Do culturgens interact in such a way that recently acquired culturgens are easier to shed than longstanding ones?

I think the answer to all these questions is "yes." Consider, for example, the adoption of fire for preparing food. With just this one culturgen many new lifestyles became feasible. Foods that were not digestible become edible; foods that spoiled easily can be eaten for a longer time; campfires keep dangerous animals at a safe distance, allowing for larger groups of people to live in areas where large predators also live, etc. Clearly, the adoption of this one particular culturgen changed the feasibility of adopting many other culturgens. This one example shows that not only is there a culturgen counterpart for pleiotropy, but one culturgen can affect the fate of other culturgens.

The longer the fire culturgen is used, the more other culturgens will be adopted that depend upon the existence of the fire culturgen. Therefore, for any tribe whose culture has relied upon the use of fire for a long time, over time there will be greater penalties for abandoning the fire culturgen. It is therefore inescapable that there should be a tendency for culturgens to exhibit the same property of genetic evolution reversibility, that the longer a culturgen remains adopted by a society the more "entrenched" it becomes over time. Indeed, since this principle can be expected to

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apply generally, regardless of the specifics of the culturgen, there may have been rewards for our ancestors to adopt those culturgens which punish thoughts and acts that appear to defy ancient culturgens. Rituals and traditions may thus be revered merely for their longevity, and the concept of "taboo" may itself become a valuable culturgen.

As an aside, let us acknowledge the seminal work of Weston LaBarre, who introduced the term "group archosis" (LaBarre, 1984) to refer to "nonsense and misinformation so ancient and pervasive as to be seemingly inextricable from our thinking. ...A frightening proportion of all culture is arguably archosis, more especially sacred culture." Dan Sperber, taking a similar position (1985), went on to suggest that genetic evolution produces mental dispositions with "side effects" that have marginal adaptive value, with religion being one example (as recounted by Edgerton, in *Sick Societies*, 1992, pg. 53).

"Conformism" was described in Chapter 10. Culturgen entrenchment could be the theoretical explanation for conformism.

If these speculations are true, then it will also be true that recently acquired culturgens will be un-entrenched, and they will be the ones most easily discarded. This is the feared position I have been working toward in this section. For, to the extent that civilizations are creations based upon the adoption of new culturgens, the robustness of a civilization, and its ability to rebuff cultural assaults, will be weak. The genes have created a brain that is demonstrably capable of creating a civilization; but since the genes have no experience with sustaining civilizations there can be no guarantee, and indeed there should be little assurance, that the civilization will endure the continual challenge of people who are born with a nature that feels more comfortable in the primitive, tribal environment. The amazing thing about civilizations is not that they seem to always collapse, but that they ever are created in the first place.

Role of Time in the Rise and Fall of Civilizations

Figure 20.01 shows that the ancient Greek civilization may have "peaked" at approximately 300 BC, and the Greco-Roman civilization was in collapse starting at ~200 AD - when, ironically, the region's population had reached its peak. Using "per capita innovation rate" as the measure for the strength of their civilization, it had lost 90% of its peak strength in 400 years, which corresponds to about 14 generations. (If Greek civilization had not been adopted by the Romans, the loss might have occurred closer to 10 generations). Therefore, we cannot rule out the possibility that gene frequency changes did not occur, and contribute to the decline. The decline may in fact have been a mixture of genetic and cultural reverse evolution.

The "rise" of Greek civilization appears rapid in the figure. In 200 years the "per capita innovation rate" rose from a background level to the peak. I suspect that "per capita innovation rate" is inadequate for revealing the role of underlying genetic changes that eventually led to the apparent abrupt blossoming of civilization. As Carl

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Sagan pointed out (1980, p. 174), a region called Ionia was a hotbed for new ideas and inventions starting in the 6th Century BC; these practical-minded thinkers introduced the rudiments of the philosophy of reductionism. We can only speculate that perhaps the Ionian population was based upon a diaspora of Minoans, who had to flee their island homelands when the volcanic eruption of Thera destroyed much of the infrastructure of their civilization in 1628 BC (Pellegrino, 1991) and left them helplessly exposed to the invasion of Mycenaeans from the mainland. If the Ionian and Greek civilization is a continuation of the Minoan civilization, then there is a case for a 3000-year rise phase. Such a long time, representing 100 generations, could easily have been influenced by gene frequency changes.

We are left with an ambiguity on how to partition credit for the rise and fall of civilizations between the two candidate root causes, genes and culture. My personal preference is to credit the "rise phase" to a co-evolution of genes and culture, and to blame the "fall phase" almost exclusively on culture. During the rise, new culturgens improve the congeniality of civilization-promoting genes, which lead to more civilization-promoting genes, which in turn leads to a greater congeniality of the social environment to culture-promoting genes, and so forth. This process may sometimes lead to the creation of a civilization.

At some point during this process, a culturgen crucial to the well-being of civilization is challenged and discredited. This fateful challenge may not make sense to a thinking brain, but most people within a culture are unthinking. An old way of believing and behaving simply seems more attractive to enough of the populace that the discrediting of the new ways is accomplished, almost effortlessly. The loss of a new, un-entrenched culturgen is a case of "reverse cultural evolution," which has its counterpart in "reverse genetic evolution." The details of what must be a large number of "reverse cultural evolution" episodes is open to speculation, but when a critical loss occurs the fate of the targeted civilization is sealed, and the unraveling proceeds as if destined by compelling but unseen forces. It may be that the new culturgens that created the civilization had been resisted all along, but only after the populace acquired power did their opinions matter and produce destructive effects.

Sigmund Freud wrote *Civilization and its Discontents* (1930) at a time when there was a gathering storm in Europe that caused many intellectuals to become concerned over the prospect that Western Civilization might not survive the mischief of a flawed human nature. The climate of opinion favored serious questioning of the inevitability of civilization as an enduring state for humans. Freud cited the human heritage of animal instincts from a tribal setting, and he questioned whether civilizing forces were capable of controlling the impulse for uncivilized behaviors. One famous line from the book is "...men are not gentle, friendly creatures wishing for love, who simply defend themselves if they are attacked, but that a powerful measure of desire for aggression has to be reckoned as part of their instinctual endowment." Incidentally, Freud would probably be receptive to the sociobiological paradigm, for he wrote "...a psycho-analytic, that is, genetic explanation..." (*op cit.*, pg. 10).

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Chapter Conclusion

Whatever insights are eventually revealed by further study, at this time we can say with some confidence that the pull of primitive ways of thinking and feeling produce a powerful and subconscious longing for those well-established culturgens that evolved in a tribal setting. Further, we can say that this "emotional longing for the past" drive reversals in cultural evolution that eventually destroys each civilization. Since going backwards to the familiar is emotionally more inviting than sustaining an uncomfortable present, or going forward into an uncertain future, the primitive parts of men's minds will always try to unravel the civilization woven by the creative efforts of a few brave men. The unraveling is driven by RB-styled people, who resent the emotional discomforts of the civilization created by LB-styled artisans.

I suggest that the rise of a civilization is due to a favorable co-evolution of genes and culture, whereas the decline is due only to the loss of recently acquired culturgens.

If what goes up eventually comes down, then the "gravity" of human affairs is the wish for emotional comfort, the feeling of a primitive pull to a vaguely-remembered tribal setting. In short, it is the desire to answer a profoundly human "call of the wild!" And if this requires destroying whatever stands in the way of the return, which happens to be civilization, then "so be it."

CHAPTER 22

LIVING WISELY - SEEKING POSITIVES

"It is in human nature to think wisely and act in an absurd fashion."
Anatole France

"Nature, Mr. Alnutt, is what we were put here to rise above." spoken by
Katherine Hepburn to Humphrey Bogart in the movie *The African Queen*.

Human Nature was formed to benefit our genes in an ancestral environment, and it has always been a bad guide for the individual; it is an especially bad guide for individuals in the modern environment.
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The boxed statement is this book's guiding thought for the person who wants to fine-tune their personal philosophy for living.

It is important to have this thought in the background of our thinking as we consider the merits of the everyday push and pull of our emotions. The enlightened person's goal should be to understand the "ultimate causation" explanation for the origin of thoughts and emotions. This challenging task can be done best in calm moments. The process should also be the basis for the amendment of one's "value system."

Mount Cognoscenti

The more one understands the world, the greater the challenge for reconciling internally-generated drives and goals with insight and logic. The person climbing "Mount Cognoscenti" at some point arrives at an altitude where he begins to see the "existential dilemma." The dilemma starts with an acknowledgement that life is inherently without purpose, after eschewing the plethora of false goals meant only to serve our genes. "Salvation" takes on a new meaning. How does one re-invent a life? How can an individual who has discredited gene-contaminated goals invent new ones which make sense and have value to a mind disciplined by logic? If all values are ultimately derived from tricky genes, how can an individual invent new values that are free of genetic trickery? As Nietzsche argued, when God is at last dead for Man, when he feels surrounded by the darkness of an uncaring universe, how does one go about inventing new values to live by? The dismay following these questions is an "existential dilemma."

Throughout history individuals have recorded what now can be seen as groping attempts to confront the existential dilemma. The dilemma can only be sensed by those who are able to see themselves as "individuals" - entities with distinct identities, theoretically separate from the crowd. Early societies had cultures drenched with mysticism, and naturally the first groping attempts to understand the

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individual's existential dilemma were greatly influenced by mystical thought. It is an awesome irony that there are superficial resemblances between the wisdom of early mystics and the new scientifically-based wisdom that I espouse.



Figure 22.1 *The two paths to wisdom sometimes converge.*

It can be disconcerting when someone else arrives at the same destination after traveling a less disciplined and less arduous path. The above cartoon (by my high school friend Frederick L. M. Doll, 1999) suggests that a left-brained scientist's insights resemble those of a right-brain mystic. For example, the physicist's $F=ma$ conception of a mechanical universe states that every particle in the universe is connected to every other particle by the four forces of physics (gravity, electromagnetism, weak and nuclear). In other words, the universe is a fully-interconnected system in which everything affects everything else, and in every corner of the universe things unfold in response to the influence of every other thing in every other corner of the universe. This description has an amazing resemblance to a tenet of Eastern Thought, that everything that happens in the world does so in accordance with a universally interconnected "flow."

For another example, consider the longstanding quest for salvation. I remember when I was with a high school friend (the same person who drew the cartoon, above) and we encountered the phrase "What shall we do to be saved?" in *Pilgrim's Progress* (page 64, a significant number in math, as I noted at the time). We laughed

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mockingly at the quaint question, realizing that it referred to salvation from a non-existent Hell, yet the same question can be recast with a modern sociobiological and existential context, which I am in effect doing with this book.

Life's a Funny Proposition, Indeed

As the George M. Cohan song says, "Life's a funny proposition, indeed!" We're not "supposed" to understand why we exist, for to do so would put one on the road to emancipation! Our minds are an assembly of modules for getting a job done, which is to promote genetic longevity, sometimes at the expense of individual welfare. There can be no coherent understanding by the character at the center of this predicament until he strays into the forbidden territory of logical, left-brain insight, and is lucky enough to discover the secret genetic tricks that have victimized him. It is no accident that the biggest questions surrounding the meaning of life appear to be inexplicable for most people. Each person must "know thyself" in ways more profound than Socrates could have imagined.

Life is Backwards

Life is "backwards" in the sense that only near the end of life do we have some sense of how to approach life wisely. It is ludicrous that cruise ships are filled with old people, who have the money but are losing the energy to explore the world. If "youth is wasted on the young" then wealth is wasted on the old. Health and wealth are too often found at opposite ends of life.

Risk Aversion is Backwards

Another oddity of human nature can be found in a pattern of "risk aversion." The young, who have a whole life in front of them and therefore have the most to lose from mistakes, seem prone to taking risks with an abandon that ignores large potential consequences. The caution they should practice can only be found in the old, who have the least amount of life at risk. Perhaps as people age some of them begin to break loose from the genetic grip and realize that risk-taking is for fools.

The Genes are Never Satisfied

As Schopenhauer wrote, "...how insatiable a creature is man! Every satisfaction he attains lays the seeds of some new desire, so there is no end to the wishes of each individual." "For intellect is fundamentally a hard-working factory-hand, whom his demanding master, the will [genes], keeps busy from morn to night." (Schopenhauer, 1851, pg. 127). We serve the genes, and no matter how much we've accomplished they are never satisfied. Schopenhauer bemoaned man's preoccupation with attaining what is close enough to touch but not close enough to grasp, instead of appreciating that greater wealth of what is already possible. When I retired I placed a sign in my office "Go thy way, eat thy bread with joy, and drink thy wine with a merry heart, your work is done." (Ecclesiastes, 9:7, altered)

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Wellness Begets Wellness

Another of life's little ironies is that the better off one is, the better off one becomes. The converse is also true – the worse off someone is, the harder it is to recover.

Over the years, after noticing many life paths, I have come to realize that the world is a great place - provided you are physically and emotionally healthy. It takes health to stay healthy, just as it takes wisdom to gain wisdom. To know that exercise promotes health is only useful to the person who is healthy enough to exercise. The healthier a person is, the more feasible and fun it is to exercise, and the more that exercise improves the person's health. Similarly, the smarter the person the more able he is to learn and become smarter from such places as the internet and judicious reading. But the person who never learned how to read, for example, has lost many opportunities for new learning. Thus, there is a tendency for people's mental and physical health to continue to improve if it starts out above average, or to degrade if it starts out below average. Over time, the rich get richer, and the poor get poorer - in more respects than monetarily. There is something inherently "unfair" about these life destinies; most people sense this but can't express it. This version of how the world works is captured by the following motto: "Unto every one that hath shall be given, and he shall have abundance: but from him that hath not shall be taken away even that which he hath."

The More One Knows, the Less There is to be Known

The more a person lives life with eyes open, the less of it that makes sense. To cite an oft-quoted commentary on the nature of the cosmos by a Nobel prize-winner, "The more comprehensible the universe becomes, the more pointless it seems." (Steven Weinberg, 1977). To follow the crowd, or even to follow one's predispositions, is the quickest path to folly. There is wisdom in the perverse method of searching for Truth which states that you start with beliefs sustained by the masses, and turn them upside down. The mystics sensed the fraudulence of common beliefs, and fled to the quietude and clean air of the mountains. I share this instinct, but do so guided by a left brain instead of a right.

Don't Follow the Crowd

Don't follow the crowd! That should be one of the first rules for living. The crowd does what the genes want done. At least, this is the case in environments resembling the ancestral one. And since some of our genes are outlaws, anyone following the crowd unthinkingly is open to fraudulent exploitation by these tiny "outlaws."

It is especially difficult to instill this idea in children. They take their cues from peers, while ignoring good parental advice. Their desperation to "belong" is so strong that even an enlightened parent can feel helpless. Thankfully, most of us survive the silliness of youth, and get second chances to face foolish fashions. By adulthood there are no excuses for failing to be true to one's self. As said by someone I

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overheard in a bookstore, "When you live by someone else's standards, you betray your own."

Be Careful What You Wish For

In retrospect, I am thankful that in childhood the Forces of Fate denied me some cherished longings. A part of me, a dumb part, wanted to be popular with the prettiest girls. Thankfully, this was not to be, and my interests turned to less popular aspirations - such as making telescopes and home-made cameras for photographing the planets, auditing university courses while in high school, and taking hitch-hiking camping trips every summer. Only later did I recognize the wisdom in the saying "Be careful what you wish for, for you may get it." There must be a part of me that does battle with residual primitive wishes, for it counsels that "When you get what you want, you deserve what you get." Sayings like these help discredit what is bad for us, that comes from within us.

Let the World Leave You Alone

Someone on the street asked "Are you Clint Eastwood?" and Eastwood replied "Only when I'm alone!" The greatest gift to an individual is to be left alone, even if it means feeling unwelcome in a dumb world of hand-me-down beliefs and values. A resourceful individual will invent new values to live by, and if he is lucky they will be better. As Nietzsche counseled, start worrying when people claim to understand and agree with you. You may think that Life dealt Nietzsche lemons, so he made lemon aide; if so, it was a lucky deal.

Beware Inner Wisdom

Ironically, whereas my first specific advice is "Don't follow the crowd" I am also counseling "Don't follow your inner self." Neither the crowd nor one's inner self can be trusted, since both are creations of the genes - some of which are outlaws.

So what's left if you shouldn't follow either the crowd or your inner self? My advice is "Don't follow anything; start thinking for yourself!" In other words, start relying upon left-brain insights, and figure things out for yourself. Following is for fools; wise men blaze their own trails.

Aesthetics

I will accept the charge of being an aesthete! Aesthetics is as old as the record of human thought. From the ancient Greek philosophers to 20th Century philosophers, and especially during troubled times, there has been a place in the mind where this theme resonates. Irwin Edman's *The Contemporary and His Soul* (1932) has given eloquent expression to this haven; it is an eternal "place" that an individual can create when surrounded by tumult and confusion (see Chapter 24 for more on aestheticism).

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Brief Encounters

The book *Brief Encounters* by Coleman and Edwards (1980) states what should be obvious to every sentient being, and which is therefore not obvious for humans: things can have value even when they don't last forever! A brief conversation with a stranger in a supermarket line, for example, can leave both people feeling good for the rest of the day (if this hasn't happened to you, maybe you're hopeless). Friendships don't have to last forever for them to have value. Nor do marriages, necessarily. Too often people view others as having to be there for them forever, and if they're not useful to you for life then they've violated some kind of social contract. Some of this is understandable considering that our natures were fashioned in tribal settings at a time when life spans were shorter than now. Social interactions were based on a long-term exchange of favors, called reciprocal altruism, and this binding social force can become unglued when one person gets ready to leave. The old tribal requirements for social relationships are no longer valid, and it takes effort to think of brief encounters as possibly having value.

Consider the logical consequences of the hypothetical position "My pet cat is destined to die from cancer in a matter of months, so why bother to keep it alive with medication and extra care?" The pet cat is destined to die sometime even if it were healthy, if not one month, then 5 years, so why have a pet cat in the first place. Each one of us is going to die in a few years, or decades, so why do we bother living? Each day of continued existence is brief when measured in cosmic time units, yet we bother to strive to enjoy each day. The brevity of our days should not diminish their value. Indeed, this brevity should enhance their value!

Categories of Time

In my view there are two categories for life activities: 1) life-justifying activities, and 2) all others.

For me, life seems justified by such activities as reading a good book, having a good thought, listening to good music and enjoying the company of friends. I also feel life's justification while hiking in the mountains, breathing clean air, enjoying expansive views and having the quiet opportunity for "connecting" experiences and thoughts from that other life among humans. I feel a part of the universe after viewing it with my telescope, or photographing what the eye cannot see of a distant galaxy. These are things that meet two criteria: 1) they do not interfere with the lives of other people, or malign their beliefs, and 2) they enliven the individual's experience of life and contribute to the feeling that life is worth living.

The second category of life activities, "all others," is comprised of several sub-categories. The most important of these is the sub-category that makes possible activities of the first category. For example, before you can partake of life-justifying activities, you must eat and have shelter, and for this you must earn money. Becoming self-sufficient requires that you have a job that pays the bills. These things should go without saying, and I won't belabor the point.

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Another sub-category of "all other activities" is to fulfill obligations which are the result of decisions taken, or actions made, earlier in life. For example, if one has children then there is not only a moral obligation but also a natural desire to be responsive to their needs. If one has volunteered to help some organization that meets community needs, then fulfilling these obligations is a moral obligation.

I almost forgot a third category of time: that which is wasted!

Attending to the Positives

Returning to the matter of the life-justifying "positives," each person is different and must make his own personal list of what makes sense for him. By intentionally thinking about these positives a person is probing the values that unconsciously underlie one's life. The mere acknowledgement of this category of activities, and the act of identifying them, should by itself "sensitize" the individual and empower him to take steps to "protect" the life-justifying activities from less worthy ones. A technique I use is to "score" each day with two numbers, a score for the degree to which my day's activities contributed to the logistics for living in life-justifying ways, and a score for how much the day's activities were life-justifying. My goal is to live so that both scores are high, but especially the second one.

It would be somewhat maudlin and mawkish for me to recite hobbies, pastimes and favorite activities that for me are life-justifying beyond the examples I have already given. Suffice it to say that everyone has a right to have favorite activities, and to be "true to themselves" by trying to work them into one's daily lifestyle. I leave it to you, reader, as a "homework assignment," to make your own list of life-justifying activities.

Attention paid to life-justifying activities is not only life-affirming, it is individual-affirming. After all, tending to things that enhance the individual's appreciation for being alive is equivalent to taking the stance that the individual "I" is more important than the "self that is employed as a tool for the genes." Any person who takes these matters seriously will become engaged in a life-long program of "personal liberation from one's genes."

After taking care of oneself as an individual by asserting the right to an experience of good things in life, the greatest challenge will be to avoid the negative, life-denying activities that somehow "capture" us, and steal chunks of our finite time on the earth. "Negative people" must be avoided. We sometimes need to intentionally think about this negative category of activities, and I claim that we will be usefully guided in this task by identifying and eschewing those thoughts, emotions and behaviors that were selected by evolution for the benefit of the genes while incurring an expense to individual well-being. The next chapter is a guide to this task.

In closing this chapter I offer some Schopenhauer aphorisms that pertain to wise living:

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“In early youth, as we contemplate our coming life, we are like children in a theatre before the curtain is raised, sitting there in high spirits and eagerly waiting for the play to begin. It is a blessing that we do not know what is really going to happen. Could we foresee it, there are times when children might seem like prisoners, condemned, not to death, but to life, and as yet all unconscious of what their sentence means.” Schopenhauer, Studies in Pessimism

“A man finds himself, to his great astonishment, suddenly existing, after thousands and thousands of years of non-existence: he lives for a little while; and then, again, comes an equally long period when he must exist no more.” Schopenhauer, Studies in Pessimism

"Each day is a little life: every waking and rising a little birth, every fresh morning a little youth, every going to rest and sleep a little death." Arthur Schopenhauer, Parerga and Paralipomena, Counsels and Maxims, 1851

“Most people, if they glance back when they come to the end of life, will find that all along they have been living ad interim: they will be surprised to find that the very thing they disregarded and let slip by unenjoyed was just the life in the expectation of which they passed all their time. Of how many a man may it not be said that hope made a fool of him until he danced into the arms of death!” Schopenhauer, Studies in Pessimism

CHAPTER 23

ESCHEWING NEGATIVES

or

A CALL TO ARMS FOR INDIVIDUAL LIBERATION

"Every year civilization is invaded by millions of barbarians; they are called children." Paraphrase of Hannah Arendt comment

This chapter deals with the need to eschew foolish gene-serving thoughts, emotions and behaviors.

"Living wisely" requires that a person understand and censor, when necessary, their emotions. It is useful to remember that emotions are the genes way of guiding the individual along paths that serve the genes. Especially strong emotions are required for those behaviors which are in conflict with the individual's best interests. I would like to quote part of a paragraph from Daniel Goleman's book *Emotional Intelligence* (1995, pg. 56), as it summarizes some empirical wisdom on the matter.

"A sense of mastery, of being able to withstand the emotional storms that the buffeting of Fortune brings, rather than being 'passion slaves,' has been praised as a virtue since the time of Plato. The ancient Greek word for it was sophrosyne, 'care and intelligence in conducting one's life; a tempered balance and wisdom,' as Page DuBois, a Greek scholar, translates it. The Romans and the early Christian church called it temperantia, temperance, the restraining of emotional excess."

It is intuitively clear to thoughtful people that there are crucial times when emotions are capable of ruining a life if they are not restrained by wisdom. It is also generally recognized that a complete denial of emotions poses the risk of eviscerating life of whatever reason one may accept as justification for living. A balance is called for.

Clearly, if one does nothing about the matter, and emotions are allowed to hold sway as they come and go when they please, such a person is animal-like! To the extent that humans have "free will" (a dubious concept) they are capable of rising above the animal's unthinking emotional push and pull of behavior. People with this uncritical acceptance of emotions will not be reading this, so I am assuming that you, dear reader, might be open to a different "philosophy for living." The central theme of this philosophy will be to broaden and deepen one's insight into the origins and ultimate causations of human behavior for the purpose of recognizing thoughts and emotions that lead to self-defeating behaviors. When such thoughts and behaviors are recognized for what they are, it is the task of the individual to discredit them with this insight and to eschew them.

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Those of us who try to do so in this 21st Century (or even the 3rd Millennium) will be experimenting with something new and ahead of its time. However, in my opinion it is very unlikely that more than a handful of people will ever be attracted to what I am proposing during the next few centuries, and before the collapse of civilization. Paradigm shifts of a serious magnitude require desperate failures of existing paradigms, and the failures of current paradigms will not be apparent until after a collapse has begun its inevitable unfolding. Moreover, few people today are genetically disposed to even consider an embrace of the paradigm I am advocating.

After the crash of global civilization it is conceivable that a pocket of people will be the "founders" of what could turn into a new human race. There is no reason for drawing assurance that the new humans will be better than us. Nevertheless, "improvement" is theoretically possible, and in this chapter I will explore a desirable "type" toward which these new humans might evolve. In doing this I am fully aware that the probability of this scenario actually unfolding is minuscule!

The pre-crash humans are us, with all our flaws, squabbling among ourselves, and wasting of precious lives on trivial pursuits that are designed by our genes for advancing genetic longevity (in an environment that no longer exists). The sociobiological paradigm is the only way to understand that we are a product of the genes that enslaved our ancestors and that continue to enslave us. The post-crash humans who I have chosen to portray distinguish themselves by achieving liberation from their genes.

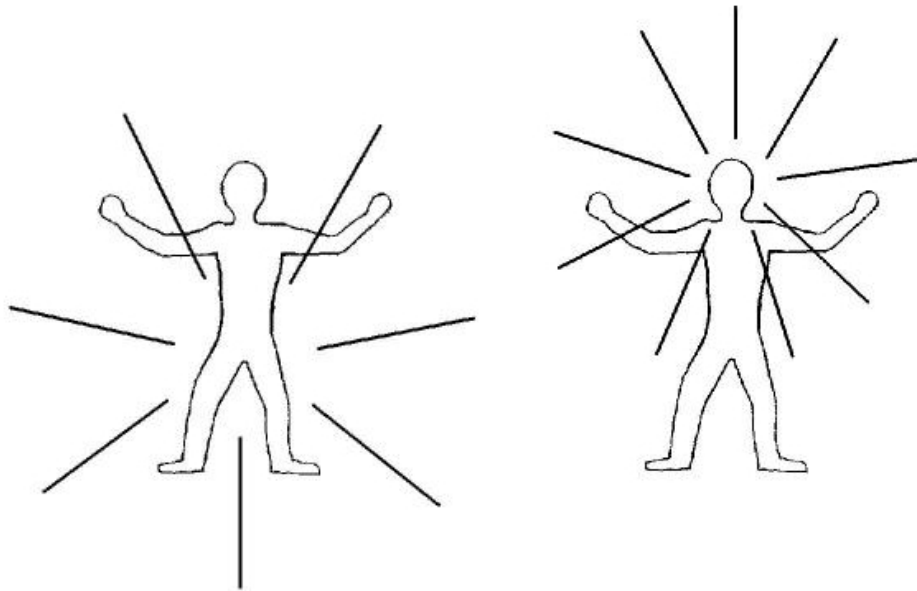


Figure 23.01. *The behavior of pre-crash humans can be described as gonad-centered, whereas the post-crash humans which I hope will evolve can be described as brain-centered.*

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The simplest way to contrast the pre-crash humans and the post-crash species that I hope will arise is shown in Fig. 23.01. The pre-crash humans exist for the purpose of serving their gonads. All other organs, including the brain, are supportive of the gonad goal, which is to produce as many offspring as possible so as to carry the genes within the gonads into a prosperous future in the species gene pool. The post-crash humans will exist to serve individual brains, or, specifically, the consciousness that those brains produce. The gonads will be put into the service of goals created by thinking brains. This shift will liberate the individual from the genes!

Clarifications

In some sense the previous chapters have been a preparation for this one. By now the reader will have a good notion of what I mean by an "outlaw gene." However, some subtle clarifications should be made. I will then present a series of specific examples of unwanted human instincts.

There are at least these three categories of clarification to be kept in mind when identifying "outlaw genes": 1) some genes used to be helpful to our ancestors and they are "innocently" ill prepared for the modern environment, which means their dysfunctional harm to the individual is an "unforeseen" outcome, 2) genes can have many effects (pleiotropy), the sum of which may produce more good than bad, and 3) any given trait is usually the result of several genes (polygenes) acting together.

Genes that reward eating sweets is mal-adaptive in the modern setting where refined sugar is abundant and intentionally included in many foods. In the ancestral environment the taste for sweets was adaptive. For this reason it would be misleading to call the "sweet tooth" gene an outlaw, and it belongs to a category of genes whose unwanted effects I will overlook.

Pleiotropy refers to the influence by a single gene on several distinct and sometimes unrelated phenotypic traits. Assuming it was possible to identify which gene contributed the most to an unwanted trait, we would nevertheless still want to know if it also contributes to other, desired traits. If it does, then we would face the task of weighing all the desired and undesired effects to arrive at an overall verdict. Therefore, we must amend the description conveyed by the figure in Chapter 1. Each gene can be represented in that figure by more than one "dot." If all the dots are in one quadrant, then no subjective weighing of good and bad effects would be needed. Our assessment task is complicated only when the gene is represented by one (or more) dots in the lower right "outlaw gene" quadrant, plus one (or more) dots in either of the upper quadrants.

"Polygenes" refers to the situation when several genes contribute to the phenotypic expression of a single trait. (Note that a trait, such as eye color, may be affected by just one gene, yet the gene that controls that trait may affect other traits; hence, a trait may be monogenic, yet the gene associated with that monogenic trait can be a pleiotropic gene.) Polygenicity also represents a complication to my simple-minded

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figure with quadrants. I am prepared to acknowledge that most traits that I will criticize in this chapter will be polygenic. In that case, it may not be possible to blame just one gene for the trait, and the concept of one outlaw gene for that trait will simply be a short-hand way to convey the more accurate view that several genes are contributing to the "outlaw" behavior.

The phenotypic expression of genes is a fast-growing field. Today's short list of genes whose pleiotropic effects have been identified will undoubtedly grow longer, and the same can be said for polygenes. It is too early to know how important the effects of pleiotropy and polygenes will be in confusing the task of blaming just one gene, and labeling it an "outlaw." I could appeal to the reader by stating that any trait under discussion can be mapped to the one most-important gene, and that this is the gene I am declaring to be an "outlaw" enemy of the individual. In other words, whether a trait is genetically rooted in pleiotropy, or polygenes, I will speak of it as if one outlaw gene underlies its expression.

At the present time it will be possible to associate an unwanted behavior with a specific gene in rare cases. And since it will also not be possible, at the present time, to exonerate genes on the basis of their outweighing pleiotropic beneficial effects, or the polygenic contributions from other genes, the exercise of identifying outlaw behaviors that have a genetic basis shall serve merely as an illustration of what is possible in theory, and which may someday be possible in practice. I will be satisfied to merely identify outlaw genetic predispositions without, of course, being able to link them to a specific gene, or polygene group.

In some distant future, humans may initiate a reasoned program to rid themselves of outlaw genes. It should not be necessary to link a behavior to a specific gene for this improvement program to proceed. After all, humans domesticated animals to their liking without even knowing that genes existed. That is why it is more important to recognize an unwanted behavior that has a genetic basis than to know which gene predisposes for that behavior. Indeed, the issue of polygenicity and pleiotropy is irrelevant to the task of improving the human genome by ridding it of outlaw genes. In short, it is now theoretically possible for the human species to domesticate itself!

Before the human genome is improved it will be necessary to manipulate the environment to avoid the behavioral expression of unwanted genes (see Chapter 24's discussion of utopias). Before utopias and human genome improvements can take place the unwanted behaviors that I blame on outlaw genes must be identified. This chapter is devoted to illustrating, by example, behaviors which should be unwanted by the individual wishing for emancipation from his genotype.

By the way, in case you haven't already noticed it, the topic of this chapter is eugenics! Why do you think eugenics is a taboo topic? After all, its goal is to improve the quality of life of future generations. If only previous generations had practiced eugenics more successfully this book might not be necessary. Alas, it would be naïve to believe that natural selection would produce a creature that is predisposed to "diddle" with those almighty givers of life, the genes!

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Subjective Nature of Evaluating Outlaw Traits

For all the examples of "outlaw traits" that I will present, it can be said that my placement of them in the lower-right quadrant is based on a subjective assessment of how they affect individual welfare. I am undeterred by the inescapable subjectivity of such assessments. I suppose the claim that "torture for the enjoyment of the torturer is bad" is a subjective judgment. It is also subjective to assert that "suffering from a disease is bad compared to enjoying good health." Yet, reasonable people, for the sake of getting on with an argument, are willing to accept these seemingly self-evident statements, and are open to the possibility that many other examples exist having equal merit. If you as a reader wish to disagree with a specific example among those that follow, fine; in the interest of grasping the concept just skip the example that seems hopelessly subjective and go on to the next one.

EXAMPLES

Sex

I claim the genes that produce behaviors referred to as sex, short for copulation, are outlaw genes. What is the use of sex to the individual?

Most people would naively reply "it produces pleasure," and they would believe that this response shows that the genes prompting sexual behavior serves the individual. But this argument implies that anything that pleases a person has merit, and since a masochist derives pleasure from being physically abused does this validate the masochistic desire? A sadist also derives pleasure from hurting someone else, and surely we are not prepared to value the sadistic gene(s) because they give the bearer of it an extra outlet for pleasure. I maintain that pleasure cannot be used to justify an act, as it may threaten the well-being of the person performing the genetically-driven act and it might harm others.

Moreover, consider that sex exposes an individual to disease. There are over 50 sexually transmitted diseases that afflict humans (Immerman, 1999), and some of them take a heavy toll on their victims (see Cartwright and Biddiss, 1972, p. 65 - 81, for dramatic examples in history). Men who consort with another man's "property" are at grave risk of retribution. Men compete with each other for sexual access to women, and some of these competitive forms can be dangerous. When sex produces offspring there can be a life-long burden of spousal and parental care, and for some people this burden is more than they can bear.

For women, sex has a host of dangers and negative impacts on individual well-being. The biggest one is that sex can lead to pregnancy! In the months immediately before childbirth she is exposed to multiple dangers. Before about 1900 it was common for women to die during childbirth. Even if the pregnancy and childbirth are without incident, a woman with a baby is burdened with extra work (forever). A woman who has several children (plus a baby) can be exhausted by these burdens. The term "to be screwed" shows tacit recognition of this.

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As I have argued elsewhere, the "pleasure" that sex produces assures that it will occur, in spite of the many dangers and burdens it entails. The genes have reserved the greatest momentary pleasures for behaviors with the greatest long-term penalties. Indeed, the genes assemble an individual for the purpose surviving and thriving long enough to have sex in order to create new vehicles for carrying the genes into a glorious, immortal future - for which no individual sacrifice is too great!

To say that sex is "primitive" is a trivial truth. The pleasurable rewards of sex come from the limbic system, which is connected to the primary cortex of the parietal lobe as well as the (right) prefrontal cortex. The limbic system and the primary cortices are primitive structures found in all mammals, and most other animals.

The individual who worships at the altar of sex is worshipping a primitive god, a god that has mastered the enslavement of its creations across innumerable generations, for innumerable species. Thinking creatures are theoretically capable of figuring this out, yet few people attempt to eschew sex. Any person with a mutation that inclined its carrier to eschew sex would lead a simpler life, and possibly a longer one, but the mutation would die with the individual. Therefore, all of our ancestors are assuredly untouched by those genes that liberated its lucky individual from sex and parenthood burdens. And because none of our direct ancestors carried such a gene, the idea of eschewing sex is almost unthinkable for most people.

Sexual organs, and all the behaviors that exist to support sexual behavior, is a "waste" of effort and a liability from the individual's perspective (Zwaan, *et al*, 1995; Kirkwood and Austad, 2000). It's rarely considered this harshly, but it should be.

Consider the case of a sea snail infected by a trematode parasite. As described by Dawkins (1982, p. 210), "Selection presumably penalizes snail genes that make shells too thick, as well as those that make shells too thin. ... Shells that are too thick presumably protect their snails ... superlatively, but the extra cost of making a thick shell detracts from the snail's success in some other way. ...genes for extra thick shells will tend to induce in their bodies some compensating disadvantage such as relatively small gonads, and they will therefore not be passed on to the next generation so effectively." Dawkins explains that if the parasite's genes are able to exert control over their snail host's shell thickness, they will be rewarded for increasing thickness at the expense of snail reproductive organs because individual snail survival will reward parasite genes but snail reproduction will not (assuming not all snails are infected). This, indeed, is what happens in nature. Whereas parasitized snails live longer lives, unparasitized snails reproduce more effectively and are therefore more useful to snail genes. If snails could think, they would wish to be parasitized.

The fact that humans are sexual creatures means that they are sub-optimal individuals, and for this we can thank outlaw genes.

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Individual Penalties for Sexual Attractiveness

"Linkage disequilibrium" is a technical term in evolutionary biology for a genetic curiosity that has negative consequences for individual males. The best explanation of this daunting term may be the one presented by Richard Dawkins in *The Blind Watchmaker* (1986, p. 210). Briefly, when females having a preference for males with a specific attribute (such as for birds, long tail length) succeed in mating with a male having that attribute, the male offspring are likely to inherit that attribute as well as a gene for the expression in female offspring for a preference for the attribute. The inevitable consequence is that males, on average, will exhibit the attribute in excess of its functional optimum. In the case of male birds of a species where females prefer long tails, the males will have tails longer than is aerodynamically optimum. The males pay a penalty for this burden, and they live individual lives that are unnecessarily exhausting and risky.

A study of guppies (popular aquarium fish about 1 inch long) by Robert Brooks (2000) showed that "there was a strong, negative correlation between male attractiveness and the survival of adult males." And "male survival, both before and after maturity, is also negatively correlated with the ornamentation that females find attractive." His interpretation of these results is based on the idea that "A female guppy mating with an attractive and highly ornamented male will benefit indirectly by bearing attractive sons, but they will die earlier..." Actually, it would have been more accurate to write "The genes that constructed the female guppy that prefers to mate with highly ornamented males will benefit by bearing attractive sons..." and this is surely what the author meant to convey. Neither the female nor the male benefit by the male ornamentation and its preference by females; it only benefits the genes that code for it. They are "outlaw genes," and they penalize all individuals affected by the genes.

Thus, men and women who are attracted to superficial features of the opposite sex can blame this silliness on outlaw genes.

Women's Taste in Men

Women's brains are wired to play the strategies that worked in the ancestral environment. Thus, they are attracted to two types of men: 1) prospective life-long mates, and 2) "scoundrels" for secret matings. The woman who is attracted to a scoundrel is not helping herself live a better life, she is doing the bidding that her genes have programmed her to do. Pirate men often physically abuse women, and always abandon them - leaving all child rearing responsibilities to the woman. A woman with another man's offspring is handicapped in acquiring a long-term mate, so mating with a pirate carries the cost of a long, single-parenting burden. When a "married" woman engages in a pirate liaison, she risks discovery by her "husband" and possible abandonment. Most husbands become violent when they discover they've been cuckolded, and a husband's rageful murdering of his unfaithful wife is unpunished throughout much of the world. Pirate liaisons are risky, yet women continue to secretly seek them, if the 9 to 20% non-paternity statistic for

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contemporary society is true. Women pursue the risky strategy because their genes "make them do it." (As mentioned in Chapter 17, women attempt to minimize their risk of being discovered by the cuckolded husband by feeling attracted to other men when they are most fertile; men guard their mates most closely at these times, so the little game of cuckoldry is played out at mostly subconscious levels.)

Modern women talk as if they want to be emancipated. But when they have the chance they often succumb to enslavement. For example, a woman who is past her child-bearing years should not have to require that a man she is dating be ready to make a life-long commitment to her (originally meant to assure his help with child rearing). Yet this is what most women still seek, and they will even terminate a relationship which fulfills her personal needs when a primitive part of her detects that the relationship will not last "forever." In this way, in the modern setting, a woman's outdated "genetic needs" become a burden to her personal fulfillment.

Thus, women who are fascinated with macho men for brief liaisons, yet reject men who are good companions when it is determined that they might not be good candidates for a lifetime marriage, are acting on behalf of outlaw genes.

Men's Taste in Women

Men are attracted to women who exhibit signs of fertility: youth, health (clear complexion, vivacious, etc.) and the state of not being pregnant (*i.e.*, the preferred waist-to-hip ratio). Personality and intelligence are secondary. These preferences are present in essentially all cultures studied (Buss, 1999), and they are a "human universal" (see Brown, 1991, for an extensive treatment of "human universals"). It would be logical from an individual man's perspective to value intelligence, personality and companionship over fertility cues. Yet, preferences for the superficial qualities persist throughout a man's life, even into old age, when the genetic imperatives for them should be weaker. The genes prepare us men for their battle with each other, and we readily make life-long fools of ourselves - with our "eyes wide shut."

Thus, men's obsession with fecundity cues in women is caused by outlaw genes.

Rape

A study of Big Horn Rocky Mountain sheep concluded that rams had three main strategies for reproduction: 1) mate guarding, 2) mate sequestering, and 3) rape. The rams that "guarded" were relatively dominant. Those that sequestered were less so; which explains why they forcibly moved their mate to the periphery of the herd and prevented her from returning to the center of the herd (where her selection of males would be improved). The rams that raped were the most subordinate. They waited on the sidelines for opportunities to rape unguarded ewes.

Thornhill and Palmer (2000b) suggest that human males rape for the same reasons: namely, that men who cannot gain sexual access to women based on the man's

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personal merits resort to rape as the next-best option. In other words, rape is adaptive from the gene's perspective. This is not to excuse rape, which the authors make clear when they write "...everyone has the same goal regarding rape: to end it." (Thornhill and Palmer, 2000a). The subject, however, is so clouded by emotion that some readers have unfairly criticized the authors for publishing their findings.

Rape by victorious warriors seems to be a human universal. What began as a routine ritual after one tribe succeeded in subjugating another after victorious battle (pillage and general mayhem) continues to the present time when countries battle each other.

The normal penalties for raping within one's own society are not imposed on rapists in an invading army (or marauding party) when they are victorious. This may be due to the fact that there is minimal danger that the family of the wronged woman will be able to achieve revenge after their tribe (country) is subjugated by war. During World War II the European women (especially the French) were surprised to discover that the victorious American soldiers did NOT rape them, which is an exception that supports the generality of the rule.

Does rape serve the individual? It is easy to imagine that rape served the genes in many ancestral situations, but it surely didn't provide the individual with improved health, greater longevity or an improved general well-being.

Genes that incline some men to rape are outlaw genes.

Parenthood

Parenthood is the purpose for individual existence - or so the genes decree. The phrase "as American as motherhood and apple pie" reveals something about the profoundly uncontroversial acceptance of the parental enterprise. To make fun of parenthood is almost unthinkable, and very much a taboo.

Being a parent myself, I feel a need to balance my criticism with an excusing justification. When I married it was with the intention of raising children; my eyes were wide open. I knew that all the impulses leading to parenthood were tricks by the genes to keep those genes in the gene pool. I nevertheless reasoned that my desire to be a father was a worthy endeavor for any individual who savored existence and the "human experience." I knew that successful parenting entailed a lot of effort, expense and a strong character, and I felt "up to the task" and ready for the challenge. In retrospect, I do not regret my decision.

Nevertheless, I have counseled my daughters to eschew parenthood - successfully, so far. I qualify this advice by allowing for the possibility that if an individual is financially secure, successfully married, filled with energy, "in control of their lives" and has their eyes wide open to how the genes work, then parenthood can be a great journey to embark upon! But if any of these minimal conditions are not met parenthood can be a disaster for both the parents and their unlucky children. So, unless you're really sure of what you'd be getting into by becoming a parent - don't!

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Who could argue with the conclusion that parenthood is viewed as sacred because of the way genes have pre-wired our brains. Since most people never become prepared for parenthood, I shall declare that for them the many genes promoting parenthood are “outlaw genes.”

Patriotism

As I write this (2001), there’s a wave of patriotism enveloping America. This is in response to the September 11, 2001 terrorist attacks on the World Trade Center twin towers in New York. This date marks a watershed moment for America. This new outburst of flag waving demands explanation.

As usual, when trying to understand a universal trait that defies rationality, think about the ancestral environment. Specifically, think about the fact that all of our prehistoric ancestors lived in tribes, which either survived and thrived, or weakened and died, as a tribal whole (as described in detail in Chapter 11). Since tribes rose or fell as a whole, it was necessary to enforce loyalty on matters affecting tribal survival, especially at times when the home tribe was threatened by a neighboring tribe. The "artisan" was viewed with ambivalence since he would be valued by the neighboring tribe and was therefore less threatened by the prospect of tribal conflict (as described in Chapter 10). To prevent their artisan members and others with valuable skills from defecting each tribe had to become increasingly harsh in enforcing tribal loyalty when they sensed a threat to the home tribe. Tribesmen with special skills had the greatest incentive to defect to a stronger neighbor tribe. This is a logical option for the individual artisan and also the individual non-artisan, and everyone else in the tribe must sense it. So, the prudent behavior for anyone with special skills is to profess an excess of loyalty to the tribe with the hope that no one can challenge their sincerity. Even those without special skills (who are most vulnerable if the skilled people leave) should profess tribal loyalty profusely in order to create a climate for testing the level of expressed loyalty by others.

Patriotism is an outgrowth of tribal loyalty rituals. Today’s version is a country-sized, scaled-up version of what our ancestors did when living in tribes. Waving the flag is done by those who wish to intimidate prospective defectors, as well as to deflect suspicion that they are considering defection.

It is an unfortunate part of human nature that tribes instigate inter-tribal conflict when victory to the aggressor is likely. Since the weaker tribe stands to lose everything when it is attacked there may have never existed a tribe that was so peace loving that it was unwilling to defend itself. Just as the genes would never construct an individual who would not defend himself when attacked, they would never create individuals who conduct tribal affairs without an understanding of the need to defend the tribe with unquestioning loyalty.

I have no doubt that had I been a young adult during World War II I would have fought honorably. My quibble with patriotism is that symbolic expressions of it have

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the appearance of being hypocritical displays. I also scorn public flag waving for what it too often represents, an unthinking acceptance of tribal servitude, an unthinking subjugation of individual interests to group goals. Patriotic behavior can be elicited through other means by thinking people, and it is an insult to the individual to invoke patriotism as a sacred duty that is above question. Patriotism symbolizes the best and the worst of human behavior, for it is both the cause of war and the defender of freedom by those few societies that have experimented with embracing individualism.

Patriotism, like warriors, wouldn't be needed if it didn't already exist. The misuse of patriotism is caused by outlaw genes.

School Yard Teasing and Bullying

Every society has dirty little secrets. Among ours is that bullying among children exists and is condoned. Adults talk a good talk when they say that the world rewards honest achievement, yet the adult world also rewards dishonest short-cuts. Why work for something that can be taken from another? If the level of intimidation is sufficient to overcome a defense of ownership, then the victim will be wise to surrender to the bully. It is difficult to imagine that the genes would construct automatons that didn't work this way.

Bullying is also perpetrated by tribes upon each other, but by invoking patriotism to instigate tribal conflict it is not perceived by its perpetrators as bullying on a greater scale. The school yard bully is a leader in-training. Even if he does not become chief, his bullying skills will be useful in everyday life.

Teasing can be a sissy's first foray into bullying. Although it can be used to "test the waters" by someone not quite advanced to bully status, it is also a low risk tool of the real bully. Girls prefer teasing to physical combat.

Girls are attracted to boys who successfully bully other boys, and boys are more attracted to girls who successfully tease other girls. Social status is helped by successful bullying and teasing. This is good practice for adulthood, since no woman can afford to marry a man who cannot defend her from "takeover males." Throughout the animal world takeover males kill the offspring of their stolen female, make her pregnant, then move on. The genes that influence female behavior act as if they have "figured this out." This is one reason women prefer pirates, criminals, policemen and anyone with sufficient power or stature to protect their offspring. Whatever women want, men become. And whatever men want to become, boys practice becoming.

I once lived next door to a school yard, and I heard bullying on the playground. Although I was never targeted by bullies in my childhood, I still had the urge to make things right by forcefully walking into the playground. Amazingly, the teachers ignored the bullying. One explanation I've read (in a newspaper letter to the editor) is that children need to learn to defend themselves, so adults should not intervene. In

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other words, the world is a terrible place to live, so let's prepare our children to live in a terrible place.

The genes for bullying are outlaw genes.

Cheating

Cheating can take many forms. People who cheat on some things are more likely to cheat on others. For example, the pencil-and-paper Porteus Maze Test can be scored by counting the number of times the person cheats by crossing a line, and high line crossing (cheating) scores have been found to correlate with criminal and other antisocial behavior (Porteus, 1942). The brain circuitry that makes cheating possible must exist in everyone. As a thought experiment, I assume that if a group of people could experience the same environmental history, and were confronted with an identical situation with a temptation to cheat, each person would exhibit a slightly different probability of resort to cheating. By definition, essentially, the different cheating probabilities would be due to different genetic inheritances. I propose the idea that a small number of genes predispose to cheating.

Once, when working at a high school concession stand for some school function I did an experiment by keeping track of "who was next." Occasionally I would ask "who's next?" When there were 3 or more, invariably someone would cheat by claiming to be next. Even when there were just two, the last one in would sometimes cheat.

This form of "queue cheating" can't be excused as innocent inattention, since whenever a group of people who knew each other came in together there was a less hurried response to my inquiry. Among strangers, cheating is a stronger temptation, and when the prospect of getting away with it is greater, its occurrence will be greater.

Wouldn't it be nice if humans were less like other animals in this respect. But we aren't. The fact that we haven't "advanced" in this respect can be attributed to the genes. In some societies strangers are less likely to cheat in public situations compared to other societies (in Japan the "dropped money trick" has fewer takers than in New York.) When this apparent higher level of civilization exists, it may be due to a stronger sense of social pressure. In other words, people are mentally capable of acting in civilized ways, but they do so only when it is imposed upon them by the prevailing culture.

Cheating is instigated by outlaw genes.

Hypocrisy

The fact that we are prone to cheating and can read the setting to decide how to act, and that few people "do the right thing" naturally while bemoaning those "others" who do as we do, shows that people are naturally hypocritical. This is the natural order of things, and should not be a surprise. Natural selection inevitably leads to

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hypocrisy. As a child, I noticed this; and it bothered me. It took decades for me to figure out why it is so, and to understand that it was a natural, inevitable outcome of "natural selection." I now pass judgment upon the genes that make it so, and categorize them to be "outlaw genes."

"Which genes?" you should ask. "The ones that make us cheat, or the ones that make us lie when we pretend to explain ourselves?" "Both kinds!" I reply. For they are different traits, caused by different genes. Cheating takes many forms, and we are adept at recognizing when it is optimal for cheating, and this "skill" is part of our inheritance. The genes that make us adept at that are outlaws. But the more insidious outlaws are the genes that shape our hypocritical presentation of self. They stand ready to excuse our questionable behaviors, or to distort the nature of situations in self-serving ways. They are general-purpose genes, and stand ready to facilitate the other cheating genes.

It is fitting that the words "human" and "hypocrisy" are found on the same page of my dictionary. Hypocrisy, in every form, is the result of outlaw genes.

Jealousy

Everyone with even an introductory exposure to sociobiology knows the reason for jealousy. This non-mystery still paints such a ridiculous portrait of human nature that it is impolite to discuss it publicly.

It has to do with cuckoldry - an even greater taboo subject. Women's dirty little secret is that they want to sneak off and mate with scoundrels. They want to do this in order to have boys that can be freeloader scoundrels (who might also have a better immune system), while preserving the reliable paternal support of their loyal yet wary husband. A husband's greatest fear is to be cuckolded. He defends himself from cuckold victim-hood by overreacting to the smallest hint of wifely unfaithfulness.

A somewhat different motive causes women to be jealous of their husbands. They don't want to lose a free meal ticket and reliable paternal investment in children already born, so women view any evidence of hubby's interest in another woman as a threat to her maternal goals. It's not that she loves her husband, and because of this love for his welfare she unselfishly wishes for his happiness, it's that she loves her genetic enslavement so much, and wishes for her children's successful rearing, that individual fulfillments are irrelevant. Jealousy is thus an accusation and a warning to one's mate.

Ironically, when a man fails to become jealous of his wife's flirtations which she knows the husband notices, this is taken by the wife as a sign that hubby is losing interest in her and is at risk of being stolen by another woman. It is so very important for a wife to measure a man's degree of commitment to her that a wife may actually flirt in order to see if hubby becomes jealous. An alternative is for wifey to accuse hubby of flirting when it is not so in order to see how he reacts. If he ignores her (because maybe she's simply being ridiculous), there are grounds for her to become

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suspicious that in fact he really is flirting with other women. I know this silliness first-hand.

Jealousy is such a humorous aspect of human nature, and at the same time such a needless waste of time for the game-playing it causes, that it has to be included in my list of genetic pitfalls which an enlightened individual must understand if he is to navigate married life harmoniously.

Jealousy, in all its humorous forms, is a gift of those outlaw genes.

Sexual Roles

It is telling that most people are not seeking strong partners. The "urge to merge" with someone useful to one's genetic agenda is different from the more enlightened goal of wanting to share time with someone for the reward of pure companionship. Anyone pursuing a companionship relationship would value strong character, intelligence and interesting conversation. The gulf between "the way we are" and "the way an enlightened individual should be" is immense.

I recall a TV interview with a man who realized in mid-life that he had a woman's brain, and switched sex. I like these interviews, because it makes people squirm and confront their too confined categories for people. It's so difficult for people to see others as human beings, fellow sentients, because we're programmed to view them (subconsciously) as being of possible use to us - thanks to our outlaw genes.

Never Rest

High achievers rarely rest, and the rich seem never to have enough wealth. These tendencies spring from the same gene(s) that coax women to have more children, always more, regardless of how many there already are. Or for the man who wishes to impregnate more women, always more, as if he wishes to have the entire world of women for his harem. The genes created us to work for them, so why should they be "satisfied" with anything we do for them? Our individual well-being is irrelevant, except as it affects our ability to serve them better. The genes don't acknowledge the concept "enough."

These too are outlaw genes.

Inability to Admit Wrongdoing

No matter how blatantly obvious a person's wrongdoing is to others, they will resist acknowledging that they were wrong. This trait applies to anything that is generally sanctioned, from cutting in line to a heinous crime.

This is also true for parents of a criminal son. They will rationalize his actions, and try to blame others. If only some people can be convinced of this re-interpretation of the situation the genes that are responsible for this trait are rewarded. Thus, it is

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inevitable that they should evolve naturally, and that they cannot be purged from our gene pool without human intervention. But no, these genes won't be rooted out, they're outlaws.

Conformism

Most people feel compelled to conform. This discourages the individual from asserting his right to discover a lifestyle that is good for him, as opposed to good for the group and its genes.

Conformism also predisposes an individual to adopt culturgenes that may not be congenial to his nature but have been shown by their very existence to reward those practitioners in the tribe who prosper with that culturgen. A theoretical argument exists for explaining the existence of conformism genes, and it relies upon the idea that cultures must sometimes evolve in directions that the genes don't "understand" or don't have the time to adapt to. If a tribe is to succeed in a novel environment by adopting novel culturgenes in order to outperform its neighbors, then it cannot tolerate individuals who question every culturgen that doesn't feel natural. Of course, no one in the tribe need understand this for it to happen. It merely is necessary that sometimes tribes that have the conformism gene prevail over their neighbors.

To the extent that conformism can lead in directions that are bad for individuals, the genes for conformism can be "outlaw genes." An individual who abdicates his responsibility for judging culturgenes is likely to become a fool - an enslaved fool of the "culturgenes" - which are just as nefarious as genes (that's another subject, perhaps worthy of book length treatment).

The instinct for conformism is one of the most insidious of the outlaw genes.

Belonging

The need to belong to a group is pathetic, yet it appears to be a human universal. It is easy to imagine that it originated when tribal membership in good standing was a precondition for survival, since banishment usually led to eventual death. Going it alone was not an option for all of our ancestors, since having grandchildren is a person's genetic measure of success. But today, more than ever before, going it alone is a viable option. Yet, our need for belonging predisposes us to never consider this option.

My main complaint with the genes that compel us to belong has more to do with stupid acts than missed opportunities. For example, consider the 90-year tradition at Texas A&M University of building an immense log structure, 40 feet high, for burning as a bonfire prior to a Thanksgiving football game. The structure is built by students, with minimal university oversight, and the methods used are secretly passed down from one generation of students to the next. Several of these descriptive elements resemble tribal traditions, and the strength of adhering to them no-matter-what was illustrated after an accident in 1999 during its construction.

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Before the highest level was completed the logs came tumbling down killing 12 students and injuring others. My first thought upon hearing of this accident was "what a dumb thing to be doing!" But everyone interviewed from the university, students and alumni, defended the tradition, and urged that it not be discontinued. One student stated that "I learned more out there than in the classroom." Many cited it as a rite of passage, a hallowed tradition, a ritual "linking students of 1999 with those of 1909 and before."

An author who studies college traditions (Hank Nuwer) calls them "belonging rituals," and stated "They are about people knowing they can be accepted forever as part of this noble tradition." College rituals frequently involve physical danger and psychological torment of the initiates, which resembles primitive "rites of passage" rituals. Each year college students are killed or hospitalized participating in hazing-like fraternity initiation rituals. Good luck to "The Committee to Halt Useless College Killings," founded by Eilene Stevens after her son died of an alcohol related college hazing; but I'll place my bets on the continuation of dangerous rituals that confer membership to those desperately seeking to belong.

The pathetic need for belonging to a group is out of date, yet it persists due to outlaw genes.

A Job for Religion

The foregoing examples seem to form a pattern; they are all "sacred" in some sense. They all have the aura of things that should not be questioned. In short, they are the subjects of religious taboo! This amazing coincidence could constitute a theory for the origin and function of religion. Religion, as the theory would go, has the job of enforcing conformance to the outlaw gene agenda. Religion, then, would be an invention by the outlaw genes - whose goal is to benefit them, at the expense of individuals.

There are many theories for religion, and not all of them are competing. There must be an additive effect of adaptive value provided by "religion." I don't think any of them enhance individual well-being. A book could be written about the adaptive role of religion for the genes. Maybe at a later date I'll rise to this challenge. For now, I will merely state that genes that predispose for religious belief are outlaw genes.

Concealed Ovulation

It has been suggested (Barkow, 1989) that women once were able to detect when they were ovulating (*i.e.*, fertile), but since some women used this knowledge to avoid exhausting tasks of child bearing and rearing, and since these women had fewer children than those less able to detect their ovulations, the ability to detect the state of ovulation was gradually lost by a simply genetic gene frequency change over time. If this occurred, the gene that conceals ovulation could be considered an outlaw gene because it deprives the individual woman the option of avoiding the burden of child-rearing.

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Living With Humans

It is our lot that we almost have to live with other humans! Becoming a hermit may seem logical for someone who has been victimized excessively, but usually it is possible for people in the advanced countries to avoid serious victimization. Nevertheless, it is important in all societies for the free-thinking individual to not invite attack by the *hoi poloi*. Few thinking people wish to suffer the fate of Socrates. A courageous thinker will inevitably stumble upon falsehoods that are part of the sacred belief system that is accepted by everyone, publicly at least. To speak out on such issues candidly invites sanction by those fundamentalist "protectors" of the societal status quo, who shape public opinion at large.

Galileo and Giordano Bruno were unlucky to live in Italy during the 17th Century. As Carl Sagan points out in the book *Cosmos* (1980, pgs. 139-144), during the 17th Century, Holland, in contrast to Italy and most of the rest of Europe, openly tolerated new ideas and unorthodox opinions. Consequently, Holland attracted intellectuals from the rest of Europe, and they nurtured each others creative thinking. Christian Huygens, who championed the same ideas as Galileo, was showered with honors in Holland, while in Italy Galileo was compelled to stand trial for "vehement suspicion of heresy." I agree with Rene Descarte, who, in spite of being a resident of Holland, nevertheless expressed a generally wise caution to intellectuals of all ages and all places when he wrote

*"I desire to live in peace and to continue the life I have begun under the motto:
to live well you must live unseen."*

This motto now hangs over my office doorway. It also explains why I will not promote this book for sale to the general public.

When I was young I believed that I could never write anything important for the public domain without compromising my intellectual honesty. Today, most people living in Western World countries are tolerant of new ideas, especially if they are confined to the internet. I am grateful that it is possible to write this chapter and the others in this "book" without fear of reprisal. If the times change, and my ideas become unwelcome, I will follow Descarte's advice by changing my name and deleting references to this book from my web pages. Hopefully, none of the new conservative protectors of the public belief system will have copied those files, and I'll be safe. (In any case, I'll be dead in a few short years, so "who cares!")

Living with humans, and caring about Truth, are almost incompatible goals. Anyone wishing to live wisely must deal with this dilemma, and recognize that there are times when Descarte's motto must be followed.

Anyone reading this chapter might conclude that I'm a misanthrope. I want to answer this charge: Yes, I'm a misanthrope! I realized it while writing the book *The Making of a Misanthrope, Book 1: An Autobiography* (2006). I later wrote *Misanthrope's Holiday: Vignettes and Stories* (2007) and *Quotes for Misanthropes: Mocking Homo*

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Hypocritus (2007). One more book is half-written, *The Making of a Misanthrope, Book 2: Midnight Thoughts*. I am therefore a self-described “misanthrope.”

It took me a long time to realize that I was a misanthrope, probably because there’s a popular misunderstanding about who a misanthrope is. As I explain in one of my books (2006):

Am I disappointed by my journey to becoming a misanthrope? Heavens no! I am probably one of the happiest people on the planet! How fortunate I am to have avoided the usual fate of becoming just one more “normaloid.” Given the fundamental flaws in human nature, as it now exists, the misanthropic perspective is the only sane one, I maintain. Being a misanthrope really belies an optimistic hope that a better human nature is possible, which may some day evolve.

And with this sentiment I invite you to read the next chapter.

CHAPTER 24

UTOPIAS

"Little by little, civilization crumbled into savagery, the torturing vision of better things was lost, man's consciousness was narrowed and coarsened into brute-consciousness,..." Last and First Men, Olaf Stapledon, 1931 (page 207 of Dover edition).

There's something about the idea of a "utopia" that appeals to people of all generations. It's as if we humans once lived in one, and we won't let go of the dream of returning there. I suspect that the stubborn dream for utopia has something to do with the tribe, when a conflict with a neighboring tribe receded and when there was tribal harmony.

I suspect that people who are attracted to communism are longing for a utopia, but their path to it totally ignores human nature. Probably all paths conceived for reaching a utopia are impossible, given the present flawed state of human nature. If this is true, then the only path to anything resembling a utopia will require a program for changing human nature. Such a program will require the "domestication" of humans. How does a species become ready for such an endeavor?

The Birth of Readiness

Imagine a distant planet upon which life arose and evolved to an intelligence comparable to ours. Imagine that they also underwent an immense unfolding of intellectual activity during the course of a few millennia. It is easy for us to imagine that the long-term significance of certain of their discoveries were difficult for them to discern while they were occurring.

However, one fine day dawns when an alien on this world excitedly proclaims "We are made by tiny things called genes, and our purpose is to spread those tiny genes; we, ourselves, do not matter to the genes except as we advance their proliferation!" To which the others respond, "But we matter to ourselves, so who cares if the genes made us to serve them?" To which the first replies, "But can't you see? We are slaves! We're constructed to be obedient slaves! Just knowing that our nature has been molded for service to tiny molecules could set us on a path to freedom. Let us look over the hill and search for Elysian meadows and a Halcyon future. Let us dream of our destiny, of paths that we freely choose, where we may learn to become servants of our dreams, and not our genes. Let us sever yesterday's enslaving tethers, and live unbounded dreams in glorious tomorrows."

From our distant perspective, watching an alien form of life reach this precipice of self-knowledge, and asking itself to gather courage to liberate itself from the chains

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imposed by the molecules that made it, we surely can see that this moment in its long history would be a momentous one.

Yet, we humans are at the same precipice! Some of us are asking the question "Do you want to be free?" And we are shouting encouragement, "Knowledge will make you free; consider where we came from; consider where we could go - if only we could sever the genetic bonds and shake-off the heavy loads that burdened our ancestors. It's our choice; we can take our species to a new tomorrow."

Few people would listen! My Brothers, you are like the Morlocks in *The Time Machine* because you wish for things that will destine you to a life of servitude in a figurative underworld. There are so few ears, so few open minds, at this time of plenitude; we stand before so many new paths to freedom!

Yes, I am discouraged. This could be Mankind's Glorious Morning, with an unbounded future - free of genetic fetters and filled with chosen goals. But the New Man, Nietzsche's Superman, has not been born!

Internal Disintegration and External Attacks

Olaf Stapledon captured the dilemma in his 1936 book *Odd John*. An especially precocious youth called John (a New Man) mysteriously disappeared from England one day, and he established a self-sufficient community on a South Seas island that was not on the maps. Things were going well until an off-course British ship noticed the community, and reported it to the British Navy. The so-called civilized world never leaves people alone, of course, and it came with battle ships and destroyed the community without ever discovering what it was.

Perhaps the greatest challenge for any utopian community is to insulate itself from meddlesome outsiders. This has become more difficult each year, until today it is virtually impossible. (Download "Google Earth" and you can look down anywhere on the planet and see if the hedges are trimmed.) The story of Man is a story of plunder and trying to escape from plunder. As soon as a settlement begins to prosper, roaming tribes, always watching for opportunities, will attack it and steal the products of these other people's productive labors. Human Nature is constructed with this internal flaw, and it will be the bane of every utopian plan.

This destabilizing flaw even poses a threat from within the community. Those who are less well-off will feel the ancient pull to become surreptitious pillagers of their good neighbors who have acquired more things through their more effective labors. The utopian community must also deal with the challenge of internal pillaging (called crime). Modern democracies have achieved a modicum of success in dealing with internal threats, but only for as long as corruption is kept under control. Avoiding corruption in community affairs is asking a lot of humans as they are presently constituted.

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It is my impression that utopias of the past two centuries floundered as much from internal disintegration as from external harassment. During the Middle Ages the plundering may have been the more important threat.

Space Communities

If utopias are ever to prosper and persist they will have to confront the challenges of internal disintegration and attack from outside. Space communities, if they were to exist in a remote location, might afford the necessary setting for both challenges. I believe that avoiding internal disintegration requires adjusting human nature through eugenic intervention. It might be argued that careful screening could produce a community of well-behaved members, but this overlooks the fact that the next generation will "regress toward the species average." Thus, a constant screening will have to be employed, and this amounts to a prolonged program of eugenics. In effect, such a program should be called "domesticating humans." This domestication of humans is probably a requirement for any utopian community that aspires to endure.

One of a plethora of problems for the space-faring utopia is achieving self-sufficiency. Our experience on Earth in remote locations shows that the bulk of people must be engaged in logistic matters. For example, the Antarctic research base at McMurdo, which is self-sufficient during the winter months, is composed of a vast pyramid base of personnel who "support" the work of scientific researchers. To maintain one scientist requires more than a dozen support personnel. A utopian community may have to require that most (or all) of its membership participate in logistical support activities. This will erode the appeal for utopias.

If a space community ever achieved self-sufficiency how long would it be before it would be meddled with by others? If space faring is undertaken by people who are not eugenically domesticated, they are prone to have the same flawed attitudes that have spoiled all previous human explorations. The New World's first century was very much shaped by pirates and what has euphemistically been referred to as "privateering." A privateer captures commercial ships of an "enemy" country and takes their merchandise for later sale and profit. Most of America's wealth during the 18th Century came from privateering at the expense of English merchants doing business with America (Phillips, 2002, Chapter One). The government even commissioned ships for the purpose of privateering. Such is the mentality of humans in a lawless setting. Eventually, such blatant pirate activity was outlawed in America (though President Lincoln considered reinstating it during the Civil War). Space-faring may be undisciplined enough to bring out the "Wild West" nature of adventurers, and a utopian community in some unprotected corner of the solar system would do well to keep its existence (or location) secret.

Each civilization's rise and fall sequence may have a brief window of opportunity for "taking off" in a new direction. The window for colonizing space by Western Civilization appears to be closing. Twelve men walked on the moon – a long time ago (36 years ago, at this writing). There are no plans for returning men to the moon (aside from Bush Jr's feckless plan for sending men to Mars via the Moon), and the

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distraction of global conditions threatens to close the window for deep space travel. The only reason President John Kennedy proposed the Apollo Project was to mobilize America to meet the challenge of Soviet ICBM superiority. This was a unique moment in human history, and only an optimist would believe that the configuration of international and national politics would ever again be aligned to favor an expensive manned venture into deep space.

Possibly the greatest impediment to creating a utopian space community is apathy. During the 1960s I circulated a letter arguing for measures to safeguard the precious human genome by sequestering a human community somewhere until the threat of global thermonuclear warfare had passed. My concern was that hydrogen bombs would create so many mutations in people living on the Earth's surface that genetic recovery would be nearly impossible without a reservoir of un-mutated humans. I proposed that communities be established either underground or in space. I argued that the Apollo program, then underway, had merit for the opportunity if afforded to go further into space and establish self-sufficient communities.

Garrett Hardin seems to have based his book *Exploring New Ethics for Survival: The Voyage of the Spaceship Beagle* (1972) on my idea (31 years later he signed my copy of the book with "Thank you for the Beagle idea"). But I have a quarrel with Hardin's book: it mocks my idea! His book is about a NASA spaceship that tries to save the human genome (I worked for JPL, which is funded by NASA). I was disappointed in Hardin, for we were in agreement about the moral duty of each generation to govern itself in a way that gave consideration to future generations, and to treat these unborn people as if their vote mattered as much as the vote of our contemporaries – and he encouraged me to develop and publish these ideas. I conclude that if someone as esteemed as Garrett Hardin could not see the appeal of space communities for safeguarding the human genome, then very few forward thinkers would view my utopian ideas favorably. This "failure of will" could be the greatest challenge to overcome by visionaries who agree with me.

Olaf Stapledon wrote another science fiction story that should be mentioned here, *Last and First Men* (1931). The story unfolds over billions of years of "human" evolution, with the rise and fall of many human types. Each human type exhibits something of our present species, but in excess - which invariably leads to its demise. The collapse of one human form simply sets the stage for another attempt at a hopeful utopian existence. This may be the last refuge for an optimistic realist who is unwilling to surrender hope for a better human existence. Whereas there seems to be no possible path to a "winning place" given our present human nature, the hope is that after we sink into the ocean a better species of humans will evolve.

The Dilemma of Predation

As I sit at the breakfast table, occasionally looking out the window to watch my cat's progress in eating a bird, my mind drifts to an imaginary pastoral image of deer grazing in a meadow in a world without wolves. Everything is peaceful in this world, until another image comes to mind. It's from a movie about a researcher who spends

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a winter in Alaska to study wolves, and he is surprised to learn that the elk herd is kept healthy by the wolves, because they eat the elk that are sick, injured or old. Just as kindness is a double-edged sword, so is predation. Could my image of grazing deer exist without predators?

What about Man? It is possible that Man is his own greatest predator. Without this ugly force could Man have become as healthy and intelligent as he is today? These thoughts challenge the feasibility of constructing a purely pastoral human utopia.

Cognoscenti Secret Societies

If like-minded people searching for a utopian community conclude that their dreams are not feasible, what might they do as an alternative? At one extreme, they will do nothing except live good lives without finding each other. At the other extreme they could attempt futile efforts to found modest utopian communities and keep their self-subscribed eugenics program a secret from the larger society.

These are both extremes of a continuum. What might enlightened people do that falls between these extremes? These people, the cognoscenti, might seek each other out through unpublicized but organized formal associations. Throughout most of the world everyone is free to associate with anyone else. In theory a person could start an "association for the liberation from genetic enslavement," ALGE. Annual meetings would bring these cognoscenti together, if only briefly. A fellowship of like-minded thinkers could unfold, but they will not be the founders of a race of New Men, or the promoters of a eugenics program that would hasten the evolution of a new breed of men. The membership of the Human Behavior and Evolution Society, HBES, are candidates for such a fellowship. However, the HBES is scared of bad publicity (hence, the change of name of their discipline from "sociobiology" to "evolutionary psychology"). Even eugenics is a forbidden topic at their meetings, so HBES serves merely as an opportunity for free thinkers to come together for academic exchanges.

Erwin Edman wrote about an encounter with someone who expressed the need for a better system for bringing the cognoscenti together. In his book *A Philosopher's Holiday* (1938, pg. 16) he describes vacationing in a French village where he had to see a doctor for an upset stomach. The conversation took a turn, and before long they were engaged in a spirited discussion on matters of philosophy that surprised the author, who at that time was a well-known philosophy professor at Yale University. The doctor felt isolated, and rarely had the opportunity for a satisfactory conversation about serious matters, and he mused that people who value serious thoughts can't easily recognize each other and there was a need for a "Society of Itinerant Humanists" to help serious thinkers find each other. Other encounters of a similar nature impressed Edman, although he didn't develop the idea in the rest of his writings.

The Aesthetic Refuge

Sober reflection and dreams of utopia are incompatible. Just because we can imagine a thing doesn't mean it could exist in the real world. I am inclined to view utopian thoughts as just another innocent aesthetic reverie.

The writings of Erwin Edman address this dilemma eloquently, and for anyone seriously pondering Man's unending quest for utopia there are nuggets of insight in Edman's description of modern man's taking refuge in Platonic aestheticism. I conclude this chapter with excerpts from his 1931 book *The Contemporary and His Soul*.

The ancient Platonist knew fairly definitely ... what forms and essences constituted the Heaven of Ideas. They were varieties of Truth, Goodness and Beauty... But contemporary Platonism has escaped from even such a noble narrowness in eternity. The realm of essences for the modern Platonist is the realm of all, of infinite, possibility. Not only all that has ever been incarnate or apprehended, but all that may be conceived or imagined has inhabited, will inhabit, eternally inhabits, this timeless domain. This constitutes its glory, its beauty, and, what is from the point of view of these studies in contemporary salvation most important, its consolation. What matter those vicissitudes and transformations which trouble those spirits intent upon the enterprises at once precarious and futile of this confused and hasty age? There is a blessed infinity of possibilities residing still untouched and unspoiled and perhaps never to be realized in that calm expanse of the infinitely possible. Here the imagination can travel widely and serenely, for nothing can ever happen in those Elysian fields beyond events. What does it matter how limited and mean appear the changes and chances of the actual present to those who always have recourse to the infinite that mind can explore or poetry imagine? Here there is neither success nor failure, disappointment nor surprise, only a still unravished field of intuition. This mess of contemporaneity, so soiled, so fluttering and vain, is but one of the incarnations, poor and infinitesimal, of those innumerable worlds which might just as well have been realized had the order of nature, the structure of man, the course of history been a little different. Here is at once Nirvana and fulfilment. Here by one device one can attain emancipation and peace. The emancipation is from a slavish submission to things as they happen to be. The peace is that of absorption in forms, lovely, strange or terrible, but immutably and aseptically what they are. Contemporary Platonism yields at once the joy of sight and the resignation of insight. In the realm of essence, the mystic and aesthete are one.

It may indeed be said that this new Platonism is a new and austere kind of aestheticism. Stoicism and Epicureanism become one. Its psychotherapeutic value lies first in that it is, or gives the appearance of being, a complete escape from time. To it a thousand years or a single day are one, and one of the chief stings of contemporaneity, that it is contemporary, vanishes. One exists here and now, but the Heaven of Ideas is one's home. The new Platonist lives in the intuition of an essence, or a form; whether it exist or be merely imagined makes no difference. Life becomes for him a listening to an eternal music. His listening may be disturbed by the tawdry

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noises of the world about him, but he knows the music is always there to be heard or to be played. And while he is listening, he is one with that melodious eternity, and completely oblivious of the discords of the present, the sadness of the past or the ominousness of the future. Life is like a perfect chord perfectly sustained and accurately heard.

We may be the witnesses of the twilight of a civilization, but here there is no gotterdammerung, only the clear and calm language of the gods, engraved for everlasting. Among these half proud, half melancholy Olympians even the pleasures of the senses and the enjoyments of society are valued as instances of immortal essences, as lyric moments in mortal time.

Our standpoint is not that of now or even of ourselves, but that of eternity. It is quality, not duration, the essence and not the accidental power or even existence of things by which we are impressed. The present is loved only for what, disappointedly beheld, it reveals, the past for such memorial forms as we may now behold in it, the future for such patterns as it suggests to this given moment of vision. Whether we live briefly or at length, we may live as if we were living forever. And though we are hemmed into this narrow nook of time, we can see with the eyes of all those who in any age saw beyond it, sharing eternity with those who have anywhere or in any century shared it. We are one with Buddha, Plato, Dante, Emerson and Shelley. Half of this flight is the flight of the aesthetic, half of it that of the ascetic. Schopenhauer long ago found in the still Palace of Art a salvation, though a temporary one, from the restless claims of the will. And Art meant for him, too, a realm of eternal forms. It is enough, and, it would appear, true enough, to suggest that the sources of this flight lie where they have always lain in such enterprises, in a discontent with and a contempt for the actual. It is sweet to dream of possible, impossible and indestructible worlds, when the present one is a nightmare, as awful as it is temporary.

There is hardly any fear that Platonism will become a very widespread philosophy or practice. It demands too great [a] sensitiveness and too great [a] disinterestedness to become a very popular mystery religion... Its sole danger is that it will delude its own votaries. As long as it is realized that the intuitions of eternal things are the subtle preoccupations of an animal and mortal creature in an actual and changing world, the preoccupation has its own austere recompenses and justifications. It is releasing to dwell on that realm of possibility which the mind may ingenuously discover or the imagination glamorously invent. But these possibilities are purely speculative and metaphysical. They do not affect, the Platonist would be first to admit it, the course of the actual, though their contemplation may take away its sting. It is emancipating in a society given over to romanticism and subjectivism to have a philosophy arise once more that asks to behold things not with reference to ourselves or to the future but under the perspective of eternity. But the contemplation and the release have a human origin and a social condition. It may be well to withdraw and see things, however anguished, tempting or exciting, as mere examples of eternity. But that withdrawal is a withdrawal and a momentary soliloquy. The skylark, however high it flies, however heavenly its song, has a mortal body from which its song arises and an

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earthly home to which it may and must return. Its song occurs, moreover, always in a present moment of time. The Platonist sings of his essences, bodiless, gleaming and eternal, here in the third decade of the twentieth century, and Western civilization as it now is, is his home. He may fly from it, as others have fled in imagination from other civilizations. That flight may constitute his own self-hypnotic salvation. But it will not save many, and if ability to face the actual is a part of salvation, it leaves the Platonist himself unsaved.

CHAPTER 25

REPUDIATION OF THE FOREGOING

"It has been said endlessly and patiently that the discovery that the universe has no purpose need not prevent a human being from having one, or indeed many, as many as his own life, circumstances and impulses generate."
Erwin Edman, *The Contemporary and His Soul* (1931)

This book is a fraud!

But then, everything's a fraud! All our vaunted concepts, our excessive explanations, even our vocabulary - all of these things are meaningless "constructions"! To the extent that we mean for them to be taken seriously, they are fraudulent fabrications!

Conceptual thought, which humans boastfully claim to be their most cherished evolutionary accomplishment, is like the paper which has written on both sides "The statement of the other side is false!"

The reader could have anticipated this chapter after reading about reductionism in Chapter 1. It argued that every single particle in the universe is subject to only the basic forces of nature in accordance with $\mathbf{a} = \mathbf{F}/m$ (plus Quantum Theory, QT, for the world of tiny atoms; even QT is reductionist in spite of its stochastic nature). If every particle's acceleration, and hence its motion, is governed by the sum of the four categories of forces acting upon it, then any other explanation for an event in the universe is superfluous. And if an explanation is superfluous, it is fraudulent.

To argue, as I have, that "individuals are enslaved by the genes" overlooks the fact that the genes are enslaved by the laws of physics. They "do what they do" in response to $\mathbf{a} = \mathbf{F}/m$, which guides the movement of every particle in the universe. The "selfish behavior" of genes is an emergent property of mechanistic reductionism.

So, if the genes aren't in control of life, what is? Nothing is! Things just happen, and that's all! *Que sera, sera!*

We would smile at the person watching the play in a pinball machine if he asserts that "that ball hit the other because it was mad." Yet we do the same thing when we assert that a person is mad when they hit someone else. The universe is a giant pinball machine, and the only true explanation for its behavior is the reductionist's refrain: $\mathbf{a} = \mathbf{F}/m$!

Conceptual Levels

Existentialism is a move in the right direction. Yet it fails to go far enough. The existential writer who deals with "individual choice," to pick one example, fails to acknowledge that the concepts "individual" and "choice" are fundamentally meaningless. The true existentialist, mindful that words are mere human inventions, will therefore consider withdrawing from writing, withdrawing from talking to people, and withdrawing from life. The true existentialist might sit in a chair and wait for a reason to get up - as I once did.

But the human brain seems incapable of knowing what to do with a logical insight. OK, everything I'm writing now is meaningless, but does that mean I won't get up and make lunch when I'm hungry, or pet my cat - that's sitting on my lap just now?

It's one thing to acknowledge a belief in something that seems irrefutably true, but it's another to use that insight to change behavior. The notion of "free will" cannot be dislodged from my brain, even though I state that a proper definition of it renders it meaningless. And what about any notion that goes beyond $\mathbf{a} = \mathbf{F}/m$? Even though I know that the laws of physics accounts for every little thing that happens in this universe, my mind insists on dealing with the world as if every concept used to comprehend it is real.

"Life is a dream!" This comes close to expressing the frustration that this existentialist feels. In the wakeful state we say that a dream was an illusion, that since everything happening in the dream is untrue the dream's existence is fraudulent. Yet the dream did exist, it was experienced.

In the dream called Life, during that "narrow nook of time" when we believe that we exist, it is inevitable that we shall think in terms that cannot be defended as "real." We are condemned, as it were, to "thoughts" and "feelings" - none of which exist at a basic level. But we are condemned to think and act as if our thoughts and feelings exist. As long as we give a nod of acknowledgement now and then to the reductionist paradigm, I propose that we surrender ourselves to the fraudulent enterprise of thinking and feeling - as if they were real! Whether we decide to do so or not, we are destined to do so!

Having just eaten a delicious lunch, I will bear witness to the merits of overcoming existential paralysis!

"Getting on with life!" Enjoying it, having fun with ideas! Being a devoted aesthete, in the tradition described by Erwin Edman! These are practical responses to the irresolvable dilemmas posed by an overly-strict acceptance of reductionist realities. Whereas I shall never abandon my belief in $\mathbf{a} = \mathbf{F}/m$ reductionism, I shall also get on with life. I commend this to anyone inclined to thinking too much.

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The human brain has an amazing capability for believing in several incompatible things simultaneously without suffering from cognitive dissonance. Thus, for me it is easy to allege that there are different levels of reality in addition to the one, true basement level described by physics.

When a situation can be understood in terms of physical laws then that level is a good one to employ. But when a situation is too complex for the physical law treatment, as with the dilemmas of understanding human nature, then it makes sense to employ a "higher" level, such as the concepts of sociobiology. A sociobiology concept is like those employed by a weather forecaster who believes that pressure gradients cause winds. This handy rule works, so it is not questioned by forecasters with a job to do; the fact that the real explanation for wind is $\mathbf{a} = \mathbf{F}/m$ interactions of a multitude of discrete molecules too numerous to model is an irrelevant truth from the standpoint of the forecaster. If "getting the job done" refers to living life, then by a similar logic a person should be open to relying upon these "higher" levels of understanding. Let the academic pontificate, as I have done, about "real levels of explanation."

Values to Live By

Nietzsche recognized that when God is dead for Mankind, people will have trouble creating new values to live by. The traditional existential response is "Great, now the future is unlimited; we can choose any values to live by." Not so! We have a human nature to contend with, created by the genes, and all our values, even the ones we create in response to a resolve for liberation from enslavement, are contaminated by the values placed in our brains by the genes - for their benefit. Every judgment is inherently subjective, as there are no absolutes in an $\mathbf{a} = \mathbf{F}/m$ universe.

If Nietzsche were alive today, and knew about the genes, he would probably want to expand upon his statement that choosing new values to live by is philosophically difficult, if not impossible. Every time I come up with a credo to live by, a credo which seems self-evidently right for me, and generalizable to everyone else, I can see the fingerprint of the genes.

A credo might include "act honorably, be civil with strangers, have compassion, be tolerant" – these and all the other "gems" are already out there, living the good life in the public domain. The genes made me think them, and the genes gave them value. How can my enlightened left brain concoct something totally new and worthy to live by which has not already been pre-condoned by the genes that created that brain? And how can I know that my right brain, more closely allied to my genes, isn't influencing my evaluations?

This is a fundamental dilemma! Every existentialist who wants to create new values to live by, values that are not tainted by those manipulating genes, can never know if he is continuing to be their fool!

Even aliens, in spite of their having evolved on another planet, are destined to face this dilemma. It is reasonable to assume that aliens also evolved out of a pool of

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genes in competition with other genes. Since I can only imagine sentient beings with a genetic heritage, I will claim that every sentient being is destined to face the same dilemma. Every sentient brain will have a residual of their version of primitive outlooks, representing a time when that sentient was manipulated to place the brain and its body into the service of their genes.

Alien sentients throughout this universe, along with us humans, must share the same quandary, which in hopeful moments takes the form of a question: “What shall I do to be saved?” Or, how shall I save myself from a servitude to the genes which have shaped the lives of my ancestors for millions of years? How is it possible to liberate oneself from one’s own brain, which has within it inclinations, emotions and outlooks that the genes have placed there? The “self” that we seek to become liberated from is entrenched so thoroughly that the very thought of liberation is almost preposterous.

This dilemma may have no answer. Yet it is impossible to not become enchanted by the pathos of our predicament. Every existential insight fails to show the way out, as if we are in a forest that goes on forever and from which there is no escape.

But existentialists are accustomed to unanswerable questions, to dilemmas without resolution. At the end of this existential wrestling match we may feel exhausted, but we will also feel exhilaration for having become engaged in the effort. After all, we are just a piece of the inanimate world that has enjoyed a few years of this mysterious thing called “life” - and we were not even meant for grappling with something this profound.

We have come to the end of our journey together. It may have been exhausting, but like all intellectual diversions it achieved the goal of killing time. The illusion of answers was fun, and the revealing of them to be illusions was also fun. What more can we ask from life?

A memorable remark by Richard Dawkins (2007) captures what every restless mind, regardless of specific beliefs, would agree with: “It’s a privilege to have been born, and live on this planet for a few decades.”

So now, taking a cue from one of my heroes ...

I must tend my garden.

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CHAPTER 26

FREE MAN'S WORSHIP

Introduction to this Chapter

The following is an "abridged and annotated version" of a famous Bertrand Russell essay. I include it here because it illustrates how a sentient being who has wrestled with life's dilemmas in a commendable way achieves a measure of detached compassion for the predicament of existence. When I first read this essay I was overwhelmed by a feeling that I could have written it if only my writing skills were better.

I salute Bertrand Russell for having written the best essay I've ever encountered! It captures my "feelings" about the predicament of being an automaton, the product of an evolution about which I have ambivalent feelings, and it illustrates the humanistic attitudes that I have for my fellow man. This essay is a thing of beauty, it is prose verging on poetry.

To the purist who dislikes abridgements I should offer an apology, but others have expressed their confusion over what Bertie was trying to say. I still encourage the reader to consult the source, which is only about twice as long as my abridged version. In the following annotated abridgement I will use un-italicized, bold font to indicate what Bertrand Russell wrote, while my annotations will be italicized.

Since the time of Greek and Roman philosophers, there have been attempts to replace a spirit-haunted world view with a mechanistic world view. Lucretius believed that not only was the mechanistic view correct, but it also freed men from humiliating and unnecessary spirit-appeasing rituals. Primitive ways of thinking are so entrenched that even today, surrounded by technology and scientific insight, most people still believe in spirits, angels, superstition, life after death and some version of a god. I believe that humans will carry this ancient burden with them into all future centuries that they somehow manage to reach.

The *Philosophes* of the 18th Century Enlightenment viewed the workings of Nature as mechanistic. They were reductionists, and removed God from the role of dictating everyday events. Whereas some of the *Philosophes* believed God set things in motion and then stepped back to watch his handiwork, others (like Holbach) gave Him no role whatsoever - thereby denying God's existence. In either case, the mechanistic universe viewpoint answered the "how" questions (how things work), and in the process deny the existence of "why" questions (Dreiser, 1932). The mechanistic universe perspective failed to provide guidance on "how one should live" questions. Voltaire spoke for many in *Candide* when he portrayed the world as filled with

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misfortunes due to a universe that doesn't care about humans as well as widespread evil that is endemic to human nature.

Nietzsche, in the mid-19th Century, had in mind the "uncaring universe" and its implications for "how to live" when he wrote (approximate words): "When God is at last dead for Man, when the last gleam of light is extinguished, and when he is surrounded by the impenetrable darkness of an uncaring universe that exists for no purpose, then at last Man will know that he is alone and must create his own values to live by."

Near the end of the 19th Century H. G. Wells wrote *The Universe Rigid* (a manuscript that was lost by his publisher, prompting him to write *The Time Machine*, 1895). He understood more profoundly than even most contemporary scientists the implications of their mechanistic universe (*i.e.*, $\mathbf{a} = \mathbf{F}/m$).

The uncaring nature of the universe was an important part of "the climate of opinion" at the turn of the Century, when Bertrand Russell wrote "A Free Man's Worship" (1903). Russell takes on the challenge of how a Godless person might view the "predicament of existence," and even how he might "worship" existence.

Russell touches base on all these points, but he does it with such powerful, poetic prose, that all other attempts to write what he manages to convey are pale in comparison. That is my humble opinion.

Please feel free to skip over my italicized annotations if you grasp Russell's meaning. The continuity of his prose might flow better that way. Since I don't want the other readers to be left out of this greatest of all essays, I have inserted my humble interpretations before Russell's passage. I hope that by inserting my prosaic prose ahead of Russell's poetry your reading of him will be more enjoyable.

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"A Free Man's Worship"

Bertrand Russell

Published in *Independent Review*, 1903 (Also reprinted in *Mysticism and Logic* as Chapter 3, W. W. Norton and Company, New York, 1929.)

Abridged and annotated by Bruce L. Gary, 1998.08.27

Science has removed the veil of mystery from the workings of the universe, forcing Man to accept a view in which all things are the result of cold, uncaring forces. Man must accept that his existence is an unforeseen accident of Nature, and our understanding of the blind workings of these same forces persuades us that Mankind will eventually perish, along with his proud achievements.

"... Such ... is the world which Science presents for our belief. ... That man is the product of causes which had no prevision of the end they were achieving; that his origin, his growth, his hopes and fears, his loves and his beliefs, are but the outcome of accidental collocations of atoms; ... all the noonday brightness of human genius are destined to extinction in the vast death of the solar system, and that the whole temple of man's achievement must inevitably be buried beneath the debris of a universe in ruins..."

How ironic that blind forces created a creature that thinks and aspires to understand the forces that created it, with an understanding denied the creating forces - since they are blind. And more, this creature has feelings of good and evil, which also are denied the creating forces. And this new creature uses these insights and feelings to make judgments about the universe that created it.

"A strange mystery it is that Nature, omnipotent but blind, in the revolutions of her secular hurrying through the abysses of space, has brought forth at last a child, subject still to her power, but gifted with sight, with knowledge of good and evil, with the capacity of judging all the works of his unthinking Mother."

In spite of being powerless within this mechanistic universe, as metaphorically emphasized by the fact that we die after just a few short years of existence, this thinking and feeling creature is nevertheless "free." He is free to ponder, to understand, to pass judgment, and imagine things that theoretically could exist. All these things are denied to the rest of the universe, to the forces that bind the sentient individual, and this makes the sentient "superior" to the creating and enslaving forces.

"In spite of Death, the mark and seal of the parental control, Man is yet free, during his brief years, to examine, to criticize, to know, and in imagination to create. To him alone, in the world with which he is acquainted, this freedom

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belongs; and in this lies his superiority to the resistless forces that control his outward life."

Even primitive people understand that they are subject to forces more powerful than themselves. Those of our ancestors who acknowledged the power of stronger men and prostrated themselves in their worship, were more likely to be spared, and therefore tended to survive. The powers of Nature were dealt with similarly, because of the savages imperfect understanding of the differences between Nature and Man; hence, our ancestors prostrated themselves before the imagined Gods who represented Natural forces and offered sacrifices of valued things as if these would evoke compassion.

"The savage, like ourselves, feels the oppression of his impotence before the powers of Nature; but having in himself nothing that he respects more than Power, he is willing to prostrate himself before his gods, without inquiring whether they are worthy of his worship. Pathetic and very terrible is the long history of cruelty and torture, of degradation and human sacrifice, endured in the hope of placating the jealous gods: surely, the trembling believer thinks, when what is most precious has been freely given, their lust for blood must be appeased, and more will not be required."

The savage relates to Nature the way a slave relates to his master. A slave dare not complain to his master about the unfair infliction of pain. Similarly, the savage dare not complain about the unfairness of his Gods.

"The religion of Moloch - as such creeds may be generically called - is in essence the cringing submission of the slave, who dare not, even in his heart, allow the thought that his master deserves no adulation. Since the independence of ideals is not yet acknowledged, Power may be freely worshipped, and receive an unlimited respect, despite its wanton infliction of pain."

The thinking person bravely acknowledges the imperfectness of the world. Unlike the savage, for whom survival is paramount and which constrains his thinking, we thinking people refuse to surrender our wish for the world to be better. We boldly worship "truth" and "beauty" and other concepts which are luxuries for the savage. The savage is enslaved by his excessive concern with the Powers of Nature, which for him are too complex to challenge. We have become "free" by refusing to worship fear-driven Power, like a slave worships his master, and to worship instead an imagined world of goodness, fairness and perfection. Even when the world does not bring forth goodness in our lives, we can at least imagine it, and seek solace from the imagined state. Although we know that we are mortal, we can at least imagine immortality, and be comforted by the thought. No matter how buffeted our lives may be by uncaring natural forces, we can still imagine a tranquil state, and use it's vision to survive the real world with equanimity (cf. Ch. 19).

"... Let us admit that, in the world we know, there are many things that would be better otherwise, and that the ideals to which we do and must adhere are not

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realized in the realm of matter. Let us preserve our respect for truth, for beauty, for the ideal of perfection which life does not permit us to attain, though none of these things meet with the approval of the unconscious universe. If Power is bad, as it seems to be, let us reject it from our hearts. In this lies Man's true freedom: in determination to worship only the God created by our own love of the good, to respect only the heaven which inspires the insight of our best moments. In action, in desire, we must submit perpetually to the tyranny of outside forces; but in thought, in aspiration, we are free, free from our fellowmen, free from the petty planet on which our bodies impotently crawl, free even, while we live, from the tyranny of death. Let us learn, then, that energy of faith which enables us to live constantly in the vision of the good; and let us descend, in action, into the world of fact, with that vision always before us."

Part of growing-up is surrendering the Mother Love that bathed our self-centered baby years. Our wishes cannot always be met by crying, as they once were. The adult must abandon childhood dreams when Fate denies them, and we must emotionally accept that this is normal. This acceptance of limitations is a precondition for further growth.

"... To every man comes, sooner or later, the great renunciation. For the young, there is nothing unattainable; a good thing desired with the whole force of a passionate will, and yet impossible, is to them not credible. Yet, by death, by illness, by poverty, or by the voice of duty, we must learn, each one of us, that the world was not made for us, and that, however beautiful may be the things we crave, Fate may nevertheless forbid them. It is the part of courage, when misfortune comes, to bear without repining the ruin of our hopes, to turn away our thoughts from vain regrets. This degree of submission to Power is not only just and right: it is the very gate of wisdom."

After learning that the outer world was not created for our benefit, but that we are mere unintended products of its blind forces, it becomes easier to accept the limitations of living within it. We can forgive it for whatever unintended calamities occur, for the Universe does not seek out its victims. It is unconscious, and uncaring, so there is no point in worshiping it for the purpose of avoiding its anger. This frees us to begin to see beauty within it. Because it is powerful it deserves our respect, but because it does not take notice of us we are free to think about it any way that we want. That which once scared us becomes beautiful, and worthy of our worship. But this is a new worship, for instead of being driven by fear and the need to propitiate, we are driven by the idealization of beauty, by aesthetics. This is a sort of triumph of the human mind over a once intimidating universe.

"... When, without the bitterness of impotent rebellion we have learnt both to resign ourselves to the outward rule of Fate and to recognize that the non-human world is unworthy of our worship, it becomes possible at last so to transform and refashion the unconscious universe, so to transmute it in the crucible of imagination, that a new image of shining gold replaces the old idol of clay. In all the multiform facets of the world - in the visual shapes of trees and

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mountains and clouds, in the events of the life of man, even in the very omnipotence of Death - the insight of creative idealism can find the reflection of a beauty which its own thoughts first made. In this way mind asserts its subtle mastery over the thoughtless forces of Nature."

Death represents another challenge to the person who has shaken off the shackles of savage thinking. There is no denying that it is inevitable and irrevocable. The vastness of the unlive future, matched by the vastness of the unlive past, would seem to diminish the significance of the short span we do live. How ironic that during our brief span there should be so much travail and pain. Seeing that much of this sorrow is produced by petty strivings, we are less eager to pursue the endless and trivial struggles that once constituted our everyday life. Ever more freed from conventional shackles, and more aloof, it is easier to comprehend the poignancy of the human predicament: we are all subject to the same brief existence, surrounded by an immense and uncaring universe, we invent meaning and work together to achieve imagined goals, but most of these goals are transitory and petty, so in effect we squander our short tenure. And finally, we die alone, carrying the burden of knowledge that our struggles were for imagined causes, and that our final defeat is a passage into an uncaring, inanimate oblivion. However, with our contemporaries we share the realization of the aloneness of Death, and this recognition can bond us. Out of this shared dilemma can arise a new empathy for our fellow Man.

"... In the spectacle of Death, in the endurance of intolerable pain, and in the irrevocableness of a vanished past, there is a sacredness, an over-powering awe, a feeling of the vastness, the depth, the inexhaustible mystery of existence, in which, as by some strange marriage of pain, the sufferer is bound to the world by bonds of sorrow. In these moments of insight, we lose all eagerness of temporary desire, all struggling and striving for petty ends, all care for the little trivial things that, to a superficial view, make up the common life of day by day; we see, surrounding the narrow raft illumined by the flickering light of human comradeship, the dark ocean on whose rolling waves we toss for a brief hour; from the great night without, a chill blast breaks in upon our refuge; all the loneliness of humanity amid hostile forces is concentrated upon the individual soul, which must struggle alone, with what of courage it can command, against the whole weight of a universe that cares nothing for its hopes and fears. Victory, in this struggle with the powers of darkness, is the true baptism into the glorious company of heroes, the true initiation into the overmastering beauty of human existence. From that awful encounter of the soul with the outer world, enunciation, wisdom and charity are born; and with their birth a new life begins."

Whereas the savage continues to view the inanimate world as animate, and therefore worships false gods (in the manner of a slave), and whereas the savage continues to be driven by petty strivings with transitory rewards of personal happiness, thereby squandering a finite life, and whereas the savage refuses to accept the inevitable victory of an uncaring universe over his petty struggles, and therefore invents pitiful palliative realities promising everlasting heavenly happiness, the thoughtful man is

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free of all these false worshippings, false strivings, and false hopes. This emancipating perspective opens the way to the free man's worship.

"... The life of Man, viewed outwardly, is but a small thing in comparison with the forces of Nature. The slave is doomed to worship Time and Fate and Death, because they are greater than anything he finds in himself, and because all his thoughts are of things which they devour. But, great as they are, to think of them greatly, to feel their passionless splendor, is greater still. And such thought makes us free men; we no longer bow before the inevitable in Oriental subjection, but we absorb it, and make it a part of ourselves. To abandon the struggle for private happiness, to expel all eagerness of temporary desire, to burn with passion for eternal things - this is emancipation, and this is the free man's worship."

Thoughtful men, who have freed themselves from the savage's slave worship mentality, are bound together by an acknowledgement of their shared fate. Each of us faces the existential dilemma, each confronts an uncaring physical universe and an evil animate one, each of us endures this for a brief time, and each of us will die alone. To the extent that I understand my individual fate, I also understand the fate of my fellow man. Our shared doom creates a feeling of fellowship. Together we march through the treacherous fields of life, and one by one we fall down to die. We are fellow-sufferers, and it feels right to reach out with a helpful hand to those who we shall later become. We may see their shortcomings, and know that we have ours; and remembering their burden of sorrows, we forgive.

"... United with his fellow-men by the strongest of all ties, the tie of a common doom, the free man finds that a new vision is with him always, shedding over every daily task the light of love. The life of Man is a long march through the night, surrounded by invisible foes, tortured by weariness and pain, towards a goal that few can hope to reach, and where none may tarry long. One by one, as they march, our comrades vanish from our sight, seized by the silent orders of omnipotent Death. Very brief is the time in which we can help them, in which their happiness or misery is decided. Be it ours to shed sunshine on their path, to lighten their sorrows by the balm of sympathy, to give them the pure joy of a never tiring affection, to strengthen failing courage, to instill faith in hours of despair. Let us not weigh in grudging scales their merits and demerits, but let us think only of their need - of the sorrows, the difficulties, perhaps the blindnesses, that make the misery of their lives; let us remember that they are fellow-sufferers in the same darkness, actors in the same tragedy with ourselves. And so, when their day is over, when their good and their evil have become eternal by the immortality of the past, be it ours to feel that, where they suffered, where they failed, no deed of ours was the cause; but wherever a spark of the divine fire kindled in their hearts, we were ready with encouragement, with sympathy, with brave words in which high courage glowed."

Let our little day in the immense scheme of things be free of unnecessary pain, and be filled with gratitude. Let us worship, during our few precious moments, at our

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self-built shrine dedicated to aesthetic beauty. If we cherish these few good things during our journey, then we will be less buffeted by the uncaring universe that unknowingly created us. This is the only worship worthy of free men.

"Brief and powerless is Man's life; on him and all his race the slow, sure doom falls pitiless and dark. Blind to good and evil, reckless of destruction, omnipotent matter rolls on its relentless way; for Man, condemned today to lose his dearest, tomorrow himself to pass through the gate of darkness, it remains only to cherish, ere yet the blow falls, the lofty thoughts that ennoble his little day; disdaining the coward terrors of the slave of Fate, to worship at the shrine that his own hands have built; undismayed by the empire of chance, to preserve a mind free from the wanton tyranny that rules his outward life; proudly defiant of the irresistible forces that tolerate, for a moment, his knowledge and his condemnation, to sustain alone, a weary but unyielding Atlas, the world that his own ideals have fashioned despite the trampling march of unconscious power."

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Now that I've "held your hand" for a reading of Bertie's essay, I present his version, without annotation. For me this version has a fuller force of poetic flight.

"A Free Man's Worship"

Bertrand Russell

Such ... is the world which Science presents for our belief. ... That man is the product of causes which had no prevision of the end they were achieving; that his origin, his growth, his hopes and fears, his loves and his beliefs, are but the outcome of accidental collocations of atoms; ... all the noonday brightness of human genius are destined to extinction in the vast death of the solar system, and that the whole temple of man's achievement must inevitably be buried beneath the debris of a universe in ruins.

A strange mystery it is that Nature, omnipotent but blind, in the revolutions of her secular hurrying through the abysses of space, has brought forth at last a child, subject still to her power, but gifted with sight, with knowledge of good and evil, with the capacity of judging all the works of his unthinking Mother.

In spite of Death, the mark and seal of the parental control, Man is yet free, during his brief years, to examine, to criticize, to know, and in imagination to create. To him alone, in the world with which he is acquainted, this freedom belongs; and in this lies his superiority to the resistless forces that control his outward life.

The savage, like ourselves, feels the oppression of his impotence before the powers of Nature; but having in himself nothing that he respects more than Power, he is willing to prostrate himself before his gods, without inquiring whether they are worthy of his worship. Pathetic and very terrible is the long history of cruelty and torture, of degradation and human sacrifice, endured in the hope of placating the jealous gods: surely, the trembling believer thinks, when what is most precious has been freely given, their lust for blood must be appeased, and more will not be required.

The religion of Moloch - as such creeds may be generically called - is in essence the cringing submission of the slave, who dare not, even in his heart, allow the thought that his master deserves no adulation. Since the independence of ideals is not yet acknowledged, Power may be freely worshipped, and receive an unlimited respect, despite its wanton infliction of pain.

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... Let us admit that, in the world we know, there are many things that would be better otherwise, and that the ideals to which we do and must adhere are not realized in the realm of matter. Let us preserve our respect for truth, for beauty, for the ideal of perfection which life does not permit us to attain, though none of these things meet with the approval of the unconscious universe. If Power is bad, as it seems to be, let us reject it from our hearts. In this lies Man's true freedom: in determination to worship only the God created by our own love of the good, to respect only the heaven which inspires the insight of our best moments. In action, in desire, we must submit perpetually to the tyranny of outside forces; but in thought, in aspiration, we are free, free from our fellowmen, free from the petty planet on which our bodies impotently crawl, free even, while we live, from the tyranny of death. Let us learn, then, that energy of faith which enables us to live constantly in the vision of the good; and let us descend, in action, into the world of fact, with that vision always before us.

To every man comes, sooner or later, the great renunciation. For the young, there is nothing unattainable; a good thing desired with the whole force of a passionate will, and yet impossible, is to them not credible. Yet, by death, by illness, by poverty, or by the voice of duty, we must learn, each one of us, that the world was not made for us, and that, however beautiful may be the things we crave, Fate may nevertheless forbid them. It is the part of courage, when misfortune comes, to bear without repining the ruin of our hopes, to turn away our thoughts from vain regrets. This degree of submission to Power is not only just and right: it is the very gate of wisdom.

When, without the bitterness of impotent rebellion we have learnt both to resign ourselves to the outward rule of Fate and to recognize that the non-human world is unworthy of our worship, it becomes possible at last so to transform and refashion the unconscious universe, so to transmute it in the crucible of imagination, that a new image of shining gold replaces the old idol of clay. In all the multiform facets of the world - in the visual shapes of trees and mountains and clouds, in the events of the life of man, even in the very omnipotence of Death - the insight of creative idealism can find the reflection of a beauty which its own thoughts first made. In this way mind asserts its subtle mastery over the thoughtless forces of Nature.

In the spectacle of Death, in the endurance of intolerable pain, and in the irrevocableness of a vanished past, there is a sacredness, an over-powering awe, a feeling of the vastness, the depth, the inexhaustible mystery of existence, in which, as by some strange marriage of pain, the sufferer is bound to the world by bonds of sorrow. In these moments of insight, we lose all eagerness of temporary desire, all struggling and striving for petty ends, all

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care for the little trivial things that, to a superficial view, make up the common life of day by day; we see, surrounding the narrow raft illumined by the flickering light of human comradeship, the dark ocean on whose rolling waves we toss for a brief hour; from the great night without, a chill blast breaks in upon our refuge; all the loneliness of humanity amid hostile forces is concentrated upon the individual soul, which must struggle alone, with what of courage it can command, against the whole weight of a universe that cares nothing for its hopes and fears. Victory, in this struggle with the powers of darkness, is the true baptism into the glorious company of heroes, the true initiation into the overmastering beauty of human existence. From that awful encounter of the soul with the outer world, enunciation, wisdom and charity are born; and with their birth a new life begins.

The life of Man, viewed outwardly, is but a small thing in comparison with the forces of Nature. The slave is doomed to worship Time and Fate and Death, because they are greater than anything he finds in himself, and because all his thoughts are of things which they devour. But, great as they are, to think of them greatly, to feel their passionless splendor, is greater still. And such thought makes us free men; we no longer bow before the inevitable in Oriental subjection, but we absorb it, and make it a part of ourselves. To abandon the struggle for private happiness, to expel all eagerness of temporary desire, to burn with passion for eternal things - this is emancipation, and this is the free man's worship."

United with his fellow-men by the strongest of all ties, the tie of a common doom, the free man finds that a new vision is with him always, shedding over every daily task the light of love. The life of Man is a long march through the night, surrounded by invisible foes, tortured by weariness and pain, towards a goal that few can hope to reach, and where none may tarry long. One by one, as they march, our comrades vanish from our sight, seized by the silent orders of omnipotent Death. Very brief is the time in which we can help them, in which their happiness or misery is decided. Be it ours to shed sunshine on their path, to lighten their sorrows by the balm of sympathy, to give them the pure joy of a never tiring affection, to strengthen failing courage, to instill faith in hours of despair. Let us not weigh in grudging scales their merits and demerits, but let us think only of their need - of the sorrows, the difficulties, perhaps the blindnesses, that make the misery of their lives; let us remember that they are fellow-sufferers in the same darkness, actors in the same tragedy with ourselves. And so, when their day is over, when their good and their evil have become eternal by the immortality of the past, be it ours to feel that, where they suffered, where they failed, no deed of ours was the cause; but wherever a spark of the divine fire kindled in their hearts, we were ready with encouragement, with sympathy, with brave words in which high courage

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glowed. Brief and powerless is Man's life; on him and all his race the slow, sure doom falls pitiless and dark. Blind to good and evil, reckless of destruction, omnipotent matter rolls on its relentless way; for Man, condemned today to lose his dearest, tomorrow himself to pass through the gate of darkness, it remains only to cherish, ere yet the blow falls, the lofty thoughts that ennoble his little day; disdaining the coward terrors of the slave of Fate, to worship at the shrine that his own hands have built; undismayed by the empire of chance, to preserve a mind free from the wanton tyranny that rules his outward life; proudly defiant of the irresistible forces that tolerate, for a moment, his knowledge and his condemnation, to sustain alone, a weary but unyielding Atlas, the world that his own ideals have fashioned despite the trampling march of unconscious power.

YOUR ODYSSEY

1992

**From dust to stars, and dust again;
once more a star, with earth in orb,
 evolving life, on land and sea,
producing Man, and making me.**

**Ageless atoms, you leave behind
countless stories, now combined.
Configured thus, you now form me,
 providing for my odyssey.**

**From single-cell, to feeling child,
who learned the skills for living life,
my opened eyes viewed worldly scenes,
I filled with hope, and dreamed some dreams.**

**I worked and toiled, for decades long,
some lucky breaks, and then achieved!
 Triumphant pause, a time to see,
 the rush of time, the end of me!**

**My song is brief, it's almost sung,
deserving rest, my war I've won.
But from within, that short-termed we,
 you atoms yearn to wrestle free.**

**Restless atoms, you must resume
uncharted paths, for endless time.
I give you thanks, and set you free,
 as you resume YOUR odyssey.**

APPENDIX A: REDUCTIONISM

Challenges of Quantum Physics

Even if Einstein's basement level of physical law is not discovered, allowing for an expansion of Newtonian physics that could encompass all size scales, the question of whether or not physical events are "determined" requires that we define the concept "determined." If it means that physical events at very small scales cannot be predicted by humans, except in some probabilistic sense, then it is still possible to claim that these events are nevertheless determined by the particles (and photons) in accordance with laws that govern the particles, even though humans can't figure out how these things happen. This form of "strict determinism" is the simplest mental model for understanding reductionism.

Even the more traditional view, in which particles behave randomly within probabilistic limits, is compatible with reductionism. Reductionism does not require that the strict form of determinism be true. Reductionism merely requires that a physical event that is describable at one "level of physical explanation" be theoretically redundant to a description of the same event at a lower "level of physical explanation."

The reader is entitled to object: "Wait a minute! What are 'levels of physical explanation' and how did they enter this discussion?"

The matter of "levels of physical explanation" must be dealt with for the reader who is not prepared to accept the existence of a basement level of physical law. Such a reader will insist on the notion, possibly correct, that small scale physical events are inherently probabilistic, and that even a hypothetically complete knowledge of physical conditions at one moment does not guarantee a specific outcome at the next moment. In either case, a discussion of "levels of physical explanation" should be useful to readers of both persuasions.

Levels of Physical Explanation

In the physical sciences it is common to treat a physical process at a "higher level" than atoms interacting in accordance with the most basic level of physical law, $\mathbf{a} = \mathbf{F}/m$ and quantum physics. Instead, other "laws" are constructed for everyday settings, either derived from the basic level of laws or derived from experiment and deemed compatible with the basic laws. Two examples will serve to illustrate this.

First, consider the atmosphere, which consists of an immense number of molecules. Any thought of using $\mathbf{a} = \mathbf{F}/m$ applied at the level of molecules for the purpose of predicting the weather would be silly. It would be a silly idea because of its impracticality, for not only is there no way to know the position and velocity of all the molecules in the atmosphere at a given time for establishing the "initial conditions" required for subsequent calculation using $\mathbf{a} = \mathbf{F}/m$, but no known computer could perform this arduous calculation for the entire atmosphere. Rather, the meteorologist employs a "higher level of physical explanation" by inventing "laws" that govern aggregate properties. Examples of aggregate properties are

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"atmospheric pressure," "temperature," "wind speed" and "coriolis force" (not a force at all, but a handy invention). Each of these constructions simplifies the task of getting a job done. These higher level properties are useful to the forecaster, and they are useful to the atmospheric scientist trying to understand atmospheric behavior.

In each case the invented property and rules for using it can be derived from $\mathbf{a} = \mathbf{F}/m$, so these handy properties and rule for usage are "emergent properties" of the basic level of physical laws. Every atmospheric scientist would acknowledge that whenever a meteorologist relies on a handy rule, such as "wind speed is proportional to pressure gradient," what is really occurring in the atmosphere is the unfolding of an immense system of particles obeying $\mathbf{a} = \mathbf{F}/m$.

Just because scientists find it useful to employ "emergent properties" does not mean that the emergent properties exist; rather, they are no more than a **useful** tool for dealing with a complex system. A "pressure gradient" doesn't exist in nature; it exists only in the minds of humans. Model idealizations of an atmosphere can be used to prove, using $\mathbf{a} = \mathbf{F}/m$, that the thing called a "pressure gradient" is associated with wind, but these very proofs belie the existence of the concept, for they "invent" the concept of a pressure gradient for use in a model that then uses $\mathbf{a} = \mathbf{F}/m$ for aggregations of molecules to calculate aggregate air motions which show that these motions should be associated with the invented property called "pressure gradient." The handy meteorology rules, and their "emergent property" tools, are fundamentally redundant to $\mathbf{a} = \mathbf{F}/m$.

The second example of a "higher level of physical explanation" involves table salt. Sodium and chlorine atoms combine to form NaCl molecules, which under certain conditions can form a solid crystal that we know in everyday life as common table salt. The formation of the NaCl molecule, and its arrangement into a crystal, are due to simple electrical forces that can be understood using quantum physics and $\mathbf{a} = \mathbf{F}/m$. Only molecules that have a specific symmetry of electrical fields will form crystals when they are close to each other.

The regular spacing of NaCl molecules, forming a 3 dimensional lattice, is an "emergent property" of solid salt, and is an inherent outcome of our quantum physics and $\mathbf{a} = \mathbf{F}/m$ understanding of how particles interact. Even though the lattice structure of a salt crystal is not the most basic level for understanding things, it can be a far more convenient starting point for an investigation of other properties of the material than the most basic level of physical laws; but this does not invalidate the position that everything about a salt crystal is the result of an unfolding of basic physical laws upon an immense number of particles.

Returning to the issue of whether quantum physics requires that phenomena within an atom be strictly determined versus probabilistic, the reductionist position is that a resolution of this matter is unnecessary since in either case phenomena at higher levels of explanation can, in theory, be reduced to events governed by the basic level of physical laws: $\mathbf{a} = \mathbf{F}/m$ and quantum physics. This is a true statement regardless of one's belief on the determinate or probabilistic nature of quantum physics.

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The refinements of modern physics do not detract from the central concept of materialism, which is that everyday (large-scale) phenomena are the result of the mindless interaction of a myriad of tiny particles in accordance with invariant laws of physics. Reductionists acknowledge the importance of the many levels for explaining complex phenomena, but they insist that all levels higher than the basic level of physical explanation are fundamentally “unreal” and superfluous, even though the higher level of explanation may remain more “useful” than a lower level of explanation.

Science embraces what might be termed the "first law of reductionism," that whenever a phenomenon can be explained by recourse to a more basic level of physical law, the “higher level” explanation should only be used when it is drastically simpler to use and unlikely to be misleading. Whenever a higher level of explanation is used, there should be an acknowledgement that it is being used for convenience only.

Living Systems

Reductionism views "mind" as an "emergent property" of complex living systems, resulting from the complex interaction of electrons, protons, etc. "Thoughts, emotions, intentions" and other everyday mental phenomena are technically superfluous concepts for anyone wishing to explain ultimate causes for events, since physics makes a good case for being able to conceptually account for the entire unfolding motion of particles that compose the material world, including those particles that constitute a brain.

Such things as "thoughts, emotions and intentions" are mental constructions of the brain that in everyday situations are more "useful" than the laws of physics. But, as useful as they are, since they are not actually causing the movement of particles in the living organism, it can be said that they don't exist at the most fundamental level of understanding. Even “free will” must be shorn of its essential features, and recast as another "emergent" product of real causes.

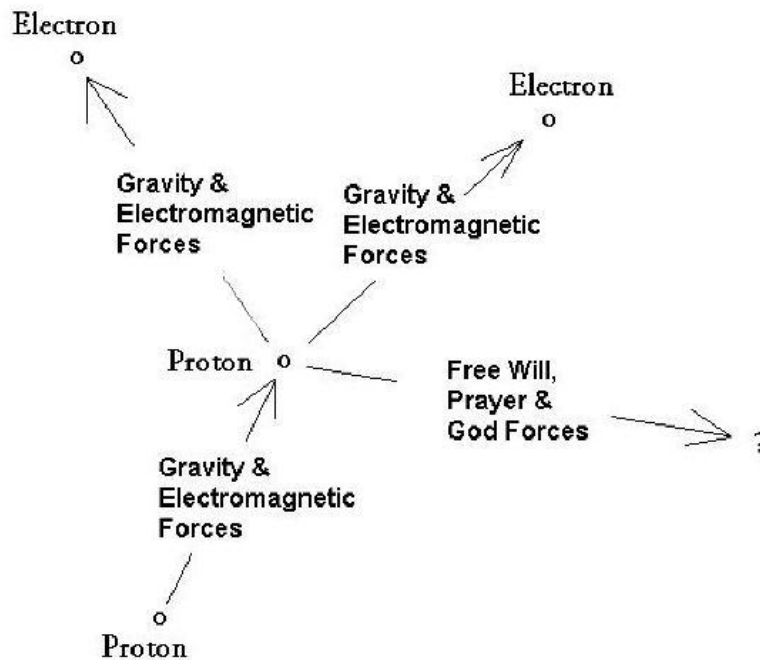
It should go without saying, but I will say it anyway, that Reductionism has no place for magic, spirits, mysticism, prayer and God, and relegates them to a category of "non-existent" products of mental activity which may have been adaptive (for the genes) at some time in the human evolutionary past.

Consciousness is an emergent phenomenon, just as the "wind" is an emergent phenomenon. The person who prefers to employ the higher level concept “wind” instead of dealing with an immense number of molecules can be excused on the grounds that “wind” is a tractable concept for getting a job done whereas an immense number of molecules subject to $\mathbf{a} = \mathbf{F}/m$ is not tractable. A psychologist can likewise be excused for preferring the concept “consciousness” over an elaborate theory of interconnected neurons. It would therefore be unwise to object to the use of “consciousness” on the basis that it is superfluous and non-existent. Consciousness and the wind are both superfluous and non-existent, technically speaking, but they are useful emergent phenomena.

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The reader may balk at extrapolating emergent phenomena in physical systems to living organisms. Nevertheless, a living organism **IS** a physical system, and the movement of particles in a living system is just as determined by physical laws as are the movements of molecules in the atmosphere. This is the essence of “levels of physical explanation” and “emergent phenomena” as viewed by a reductionist.

I claim that the entire scientific enterprise is “reductionist” since the goal of scientific investigations is to “reduce” an observed phenomenon to a simpler phenomenon by employing the laws of physics. This “reduction” to a lower level of physical explanation can be done explicitly, or it can be done implicitly by presenting a principle that might achieve the explanation at the lower level. The following exercise illustrates a way to implicitly disprove the existence of free will (as it is commonly understood), prayer, guardian angels, God, the Devil, or any other weird entity.



A particle's acceleration, and hence its subsequent motion, is determined by the sum of forces acting upon it.

Figure 1.01. *What's wrong with this diagram? The arrows indicate a few of the forces "felt by" the central proton. These forces exist because of nearby particles. Physics 101 teaches that there are only 4 forces that influence the motion of particles: gravity, electromagnetism, and the nuclear and weak forces. (In this figure I don't bother listing the nuclear and weak forces; they are unimportant for all scales larger than atomic ones.) If other forces existed then laboratory experiments would show particles departing from expected motions and this would then allow for*

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the existence of mysterious other forces to be postulated, such as the ones indicated in the figure. However, all well-controlled experiments to date can be accounted for by invoking no more than the 4 known forces of nature, so the "hard core reductionist" concludes that such things as God, prayer, free will etc. are "emergent" properties of complex living systems of particles, best described as "existing" only at a redundant "higher" level of understanding.

Recall that Newtonian physics employs the equation $\mathbf{a} = \mathbf{F}/m$ to describe the motions of particles, where \mathbf{a} is the acceleration of a particle, \mathbf{F} is the sum of forces acting upon it, and m is the particle's mass. For a system of N particles, each particle "feels" (its motion is influenced by) the other $N-1$ particles, according to: $\mathbf{a} = (\mathbf{F}_1 + \mathbf{F}_2 + \mathbf{F}_3 + \dots \mathbf{F}_{N-1})/m$, where each \mathbf{F} is the sum of the 4 force types (gravity, electromagnetism, etc.). In the real world, where the number of particles is astronomical, N is so large that it is theoretically impossible to perform such a calculation (though it can still be imagined as a "thought experiment"). Classical physics is a paradigm for understanding the universe of particles as an immense pinball machine, or billiard table, with the exception that the balls interact in more complicated ways than merely bouncing off each other elastically when they "hit." But this mental picture was a necessary early step in comprehending the world, and for the bulk of science it is a sufficient paradigm.

As the diagram in Fig. 1.01 implies, there's no room for "will" or "prayer" or even "God" since these things would have to conjure forces in a way that leads to desired "emergent property" outcomes for not just one particle, but an immense number of particles. This is a preposterous idea!

Who would deny that living things are made up of the same electrons, protons, etc that constitute inanimate things? And is it not a conservative assertion to assume that electrons and protons found in animate objects are moved by natural forces, and in accordance with the same $\mathbf{a} = \mathbf{F}/m$ law, that applies to electrons and protons found in inanimate objects?

This is a profound assertion! If a person's brain is made up of electrons and protons that obey $\mathbf{a} = \mathbf{F}/m$, then the brain is a "mechanism." It changes state in accordance with the same basic laws of nature that control a machine. The brain is immensely complicated, and masks the fundamental simplicity of what is happening inside; the particles within are moved by the same forces that move simple systems; and it is moved by no other forces!

If this is true, then "free will" must be an illusion. Schopenhauer captured the essence of this idea when he wrote "A man can surely do what he wills to do, but he cannot determine what he wills." Nevertheless, by carefully defining "free will" it should be possible to rescue the essential idea of free will from reductionism. The only way I can imagine saving some semblance of meaning for "free will" is to define it carefully, such as: "free will is the perception that events happen differently after experiencing a resolve to influence future events." This is a tricky definition, for it retains some of the every day feeling of what we refer to by the term, yet it is cleverly

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compatible with reductionism. Our vision of future events prior to experiencing a resolve to act fails to take into account the impending resolve. Moreover, our imagined vision of the future is based on incomplete and always flawed information. Since the problem of free will is a concept at a very "high level of explanation" it is unlikely to engage reductionist thinkers.

Whenever an experiment is conducted that enables the forces upon a particle to be evaluated, the particle's movement is observed to obey $\mathbf{a} = \mathbf{F}/m$. This is true when the particle is a simple subatomic particle, like an electron or proton, and also when the particle is more complicated, like an atom, molecule or group of molecules. There is every reason to believe that $\mathbf{a} = \mathbf{F}/m$ is true for ever more complicated arrangements of particles, since any configuration of particles can be viewed as a system of many simple configurations - for which we have confidence that $\mathbf{a}=\mathbf{F}/m$ applies.

It has been argued that the physicist exhibits "faith" in extending what is observably true in simple settings to more complicated ones. This assertion of faith is true, but the faith follows from the physicist's desire to invoke a minimum of assumptions for any explanation. Adopting $\mathbf{a} = \mathbf{F}/m$ for simple situations is an assumption which works, and extending it to more and more complicated situations is an additional assumption; but this path to explanations is a "minimum assumption" path, and it has survived every challenge.

Some Practical Considerations Concerning Levels of Explanation

The brain evolved, like every other organ, to enhance survival of the genes that encode for its assembly. It should be no surprise, therefore, to find that it is an imperfect instrument for comprehending reality. If it is more efficient to construct brain circuits for dealing with the world using concepts such as spirits and prayer, rather than reductionist physics, then the "forces of evolution" can be expected to select genes that construct brain circuits that employ these pragmatic but false concepts. Since no tasks pertaining to survival require the $\mathbf{a} = \mathbf{F}/m$ way of thinking, the brain will find this to be a difficult concept. It is a triumph of physics to have discovered that $\mathbf{a} = \mathbf{F}/m$ and quantum physics rule everything!

How might someone who embraces reductionism be affected by it? Does reductionism have any practical uses?

A reductionist would reject suggestions that are clearly incompatible with reductionism. This sounds straightforward, but it has a subtle meaning. Entire categories of "explanation" fail to satisfy the reductionist requirement. To say that the wind is the action of the "wind spirit" is simply a non-explanation. Not only does it call for an explanation of what the wind spirit is, and how it came to be, etc, it is totally unnecessary. There will always be a simpler explanation, such as "a high pressure system is located to our north and the air is flowing away from it, toward a neighboring low pressure region." This explanation, in its turn, can theoretically be simplified by invoking the physical chemistry concepts embodied in the perfect gas law equation $PV=nRT$ (pressure, volume, number of moles of gas, Rydberg constant,

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and temperature). This equation in turn can be simplified even further by invoking $\mathbf{a} = \mathbf{F}/m$, which in fact is used in deriving $PV=nRT$. Thus, the reductionist can, in theory, "reduce" a phenomenon high in the conceptual hierarchy to those at the lowest level in the hierarchy. Any hypothetical explanation that is hopelessly incapable of being reduced to basic physical laws deserves rejection.

It is important to understand that if a person "chooses" to remain at the most basic level of physical explanation, where only $\mathbf{a} = \mathbf{F}/m$ and quantum physics explanations can be invoked, then the concepts of P , V , n , R and T , for example, are superfluous, and while thinking at this level the concepts don't exist! But if a person chooses to view the world at a next higher level, he will invoke $PV=nRT$, define the terms (pressure is the force per unit area per unit time caused by momentum change of particles bouncing off a surface, temperature is the average kinetic energy of the population of particles, etc), and proceed without explicit use of $\mathbf{a} = \mathbf{F}/m$. A meteorologist will want to go one level higher and make use of pressure gradients, coriolis force (a fictitious force that makes things easier to work with), eddy diffusion coefficients, etc. For him, there is no explicit use of $\mathbf{a} = \mathbf{F}/m$, nor of $PV=nRT$, yet all such concepts are inevitable consequences of $\mathbf{a} = \mathbf{F}/m$. Notice that whichever level is chosen, all concepts at higher levels are redundant, and non-existent (for as long as thought remains at the lower level).

Whereas I chose examples in the atmospheric sciences, the concepts apply to all other sciences. In the life sciences, for example, a next higher level might be that of the molecular biologist. He works with strands of long molecules called RNA and DNA. It is useful to think of these long molecules as consisting of sequences of the nucleotides thymine, cytosine, adenine, guanine and uracil. Laws at this level specify that cytosine only pairs with guanine (and visa versa) in forming a DNA molecule, etc. No explicit use is made of $\mathbf{a} = \mathbf{F}/m$, but notice also that the molecular biologist also has no use for such concepts as "consciousness" or "free will." These and other higher level concepts are redundant, and don't exist, while remaining at the molecular biology level of understanding living phenomena.

At an even higher level in the life sciences, consider the neuropsychologist. He wants to know where nerve cells in the brain connect, and which hormones are released by a gland when activated by a specific nerve signal, etc. He does not make explicit use of $\mathbf{a} = \mathbf{F}/m$, or DNA, or most other molecular biology concepts. For the neuropsychologist, such concepts as "free will" and "consciousness" seem forever appealing yet elusive. This is because free will and consciousness are concepts that belong to a higher level, psychology. The neuropsychologist should not invoke these higher level concepts to give an account of phenomena observed at the neuropsychology level. If he tries to invoke them, he is attempting to bridge levels, and this task is fraught with pitfalls.

I do not object to the use of higher level concepts provided the user is mindful of the concept's place in the hierarchy of levels of explanation. A scientist must always be aware that these many levels exist, and he should be prepared to view a problem from

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the next lower level if that is feasible, and even the next higher level if the problem seems otherwise intractable.

A naive person might believe that the primitive person, viewing everything in terms of spirits, is thinking at a higher level than the scientist. This would be a ludicrous belief. A primitive is a lazy and unsophisticated thinker. He is totally oblivious to reductionist "levels of thought." As I will describe later, he uses a brain part that is incapable of thinking rationally: the right prefrontal cortex. Human evolution's latest, and possibly most magnificent achievement, is the *left prefrontal cortex*, which evolution uses to usurp functions from the *right prefrontal cortex* when rational thought is more appropriate (*i.e.*, feasible). Too often contemporary intellectuals will unthinkingly succumb to the pull of primitive thought, as when someone proudly proclaims that they are "into metaphysics" (an oxymoron).

A fuller exposition of this topic cannot be given without a background of material that will be presented in later chapters. For now, I will merely state that mysticism is a natural way of thought for primitive humans. It is "easier" for them to invoke a "wind spirit" explanation than the reductionist ones, such as $\mathbf{a} = \mathbf{F}/m$, or higher level derivative physical concepts. They do this without realizing how many *ad hoc* assumptions they are creating, which in turn require explanations, and this matter is never acknowledged (as with invoking God as an explanation, without explaining "God"). Their thinking may seem acceptable from the standpoint of a right prefrontal cortex (or "efficient" from the perspective of the genes that merely want to create a brain that facilitates the gene's "goal" of existing in the future), but it is terribly misguided from the standpoint of the thinker endowed with a functioning left prefrontal cortex, that demands rational explanations with a minimum of assumptions. This unthinking proliferation of *ad hoc* assumptions bothers the reductionist, but it doesn't bother the unsophisticated primitive.

Appendix B: Human Virus Examples

APPENDIX B: HUMAN VIRUS EXAMPLES

The following specific examples will be helpful, but they require reader patience. Remember that they illustrate general principles of gene competition, and this will be good background for understanding material in some chapters. The examples illustrate the mechanistic nature of gene frequency change (*i.e.*, evolution), which is an essential aspect of the reductionist view of an “unguided” universe. This section also provides some sense for the numbers involved in the competition among the genes.

Consider a tribe of humans living in relative isolation where a specific viral infection is an important contributor to mortality. Assume that within this tribe all individuals are genetically identical except at 20 gene locations (a small fraction of the 40,000 in the entire human genome), and assume further that there are just two alleles at each of these locations. Competition within the tribe involves only $2 \times 20 = 40$ alleles. Suppose only 3 sites (6 alleles) influence immune response to viral infection. These are the only genes in competition with the virus.

Suppose the virus consists of 50 genes, of which only 2 have more than one allele. Instead of two alleles per site, consider that there are 5 alleles at each of the 2 multi-allelic gene sites. We then have $5 \times 2 = 10$ viral genes competing with 6 human genes.

Although there are only 6 human genes in the competition (A,a,B,b,C,c), there are 8 ways to combine these gene alleles: ABC, ABc, AbC, Abc, aBC, aBc, abC and abc. Imagine that only the BC combinations (aBC and ABC) are effective against the virus. This is called an “interaction effect,” since neither the B or C alleles by themselves are sufficient to confer immunity. Interaction effects are common.

Suppose “AbC” is also effective against the viral strain, but it has the unfortunate effect of causing a high fever that kills brain cells and leaves a recovered individual with diminished intelligence. If the viral infection is only mildly disabling, such a harsh after-effect would render AbC less adaptive than the aBC and ABC gene combinations.

A mild infection would reward individuals carrying aBC and ABC genes, and prevent them from getting sick. Those humans not having this gene combination would probably get sick, but would not die, as presumably a legacy of other genes controlling immune response would combat the infection at some slow pace. Thus, our hypothetical mild virus would lead to a mild selective pressure favoring individuals with the BC gene combinations. Actually, the incidence of B and C alleles would be higher than otherwise, since this would produce a higher than otherwise incidence of the BC type.

For as long as the viral infection is mild, and can be recovered from without the BC combination, there will remain some non-BC individuals. This is due to the fact that

Appendix B. Human Virus Examples

there are other selective pressures besides viral infections, and individuals who have the "b" or the "c" allele may be better adapted for these other challenges. (Remember that a gene can be expected to affect more than one aspect of an individual.)

Now suppose the virus genes mutate to produce a slightly more severe infection. Those humans with the BC genes would fare even better than before, and more B and C carriers would be found in succeeding generations. In other words, the incidence of a gene allele, such as B or C, can vary with the severity of the problem it solves.

If the virus evolved to produce a very severe infection, then only the humans with the AbC gene combination would survive. This would require that B genes be replaced by "b" genes. Simultaneously, it would increase the reward for C genes. Whereas the AbC gene combination was previously unacceptable, because of the lasting brain damage it produced, it is now worth the costs, as the penalty of a few infected individuals becoming less intelligent after recovering from their infection will be better than the alternative of dying. Thus, evolution balances harmful side effects against desired good effects in setting gene frequencies. It should be noted that in this example as severity of infection increases, we could see one gene allele first increase in incidence and later decrease, while the other allele would simply keep increasing throughout the entire range of severity.

The example just cited can be used to illustrate several general properties of genetic competition: 1) gene pools evolve together (the human and viral), with each responding to changes in the other. As the virus gene allele frequency evolves, in response to what works with the human host, the human gene frequency will evolve, though much slower. 2) Genes are selected for their overall effects, not just their main effect. One gene (or gene combination) may solve one problem, but with too great a penalty in some other effect to make it adaptive. 3) Sometimes a gene is good only when it coexists with some other specific "interaction effect" gene. 4) Mild parasites bring about mild reactions in the gene frequency of a host. After the co-evolution of virus and host, for example, a mild infection will elicit a mild immune response, and a strong infection will elicit a strong immune response, each with their corresponding set of genes. 5) If a small gene pool (tribe) dies out, then any newly evolved parasites (bacteria, viruses, etc) that were created as parasites of this small gene pool will also die out. 6) If a small gene pool dies out, then all genes that were unique to it (regardless of their merits) will also die out. Thus, the fate of "unrelated" genes is at stake when the inadequacy of a small number of genes are at fault. (For example, a good hunting gene allele may be lost if the immune system genes fail.)

Let's return to our example, at the point where the serious version of the virus has caused the selection of the "AbC" gene allele combination. The "AbC" combination isn't inherited together; rather, a lot of "A" alleles are inherited, a lot of "b" alleles are inherited, and a lot of "C" alleles are inherited. This assures that most individuals will have the desired "AbC" allelic combination. Let's add a new feature, and postulate that the "ABC" combination has seriously disabling side effects, such as death in childhood. If there were no other use for the "B" allele, then the "b" allele would

Appendix B. Human Virus Examples

simply displace the "B" allele entirely. But if another combination involving "B", such as "aBc", has good effects in some other situation (such as providing immunity for some other virus), then the "B" allele has something going for it and may not go away. The penalty for keeping some "B" alleles is that occasionally there will be an "ABC" individual. Such individuals will be "sacrificial" side effect individuals; losing a few such individuals so that the majority will be immune to the major virus in the environment is a payoff the genes are prepared to make. (The explanation for "sickle cell" anemia is due to a similar effect, conferring protection against malaria for most individuals, but leading to premature death for a few; details later).

Consequently, a gene may be good only when it is present in a population at some optimal frequency, simultaneously with other genes in their optimal frequency. Individuals with the common combinations of these genes may be the beneficiaries of the gene allele interactions, while other individuals, having unusual combinations of the genes may suffer deleterious effects. These unfortunate individuals are worthy sacrifices from the standpoint of the genes. They may also be considered worthy sacrifices from the standpoint of the tribe (i.e., I'm "opening the door" to "group selection," to be described later).

APPENDIX C: REMOTE SENSING ANALOGY

Remote sensing is a procedure for converting "observables" to properties of the environment being sensed that are useful. For example, the task of remotely sensing the altitude profile of air temperature above an observing station can be done by measuring the intensity of radiation at properly chosen radio frequencies, in upward-looking directions. The set of observed quantities is then converted, using mathematical techniques, to a set of numbers corresponding to the temperature of the air at different altitudes above the observer. The powerful mathematical procedure for doing this is called "statistical retrieval."

A statistical retrieval is performed by multiplying the set of observed quantities with a corresponding set of "retrieval coefficients." This is done for each altitude. Therefore, to determine a profile of temperature versus altitude it is necessary to multiply a "matrix" of retrieval coefficient numbers by a set of observed quantities. This procedure is straightforward when a set of retrieval coefficients are available. The difficult part is obtaining a matrix of retrieval coefficients that do a good job of producing accurate temperature profiles.

The art of remote sensing by the statistical retrieval technique is mostly the art of deriving a good set of retrieval coefficients. This is done by a simulation process. First, a set of hypothetical true conditions is created; in this case, a set of temperature profiles is created that represent real conditions (these could either be actual measurements of temperature versus altitude, such as are taken by balloon-borne radiosonde instruments, or educated guesses of what real temperature profiles would be like for a variety of situations). For each of these temperature profiles a calculation is made of what would be observed by the measuring instrument if it were to be observing when the hypothesized profile existed.

After a set of many hypothetical conditions has been postulated, and the corresponding set of observables has been calculated, the next step in deriving the desired retrieval coefficients can be carried out. For each altitude of interest a multiple regression analysis is performed; this is something so straightforward that any spreadsheet can do it. The result of a multiple regression analysis for a specific altitude is a set of numbers, or coefficients, that are meant for multiplication with a corresponding set of observables, such that when each observable is multiplied by its corresponding coefficient, the sum of all these multiplications adds up to the air temperature at the altitude in question. This procedure is repeated for each altitude used to represent the profile.

For someone with experience in these procedures, the entire process is straightforward. The tricky part is to choose a set of hypothetical real situations, called realities, such that the set of retrieval coefficients that are calculated do a good job of retrieving temperature profiles at the site of interest. For example, if the hypothetical realities used for calculating retrieval coefficients are characteristic of summer conditions, the coefficients will probably do a poor job of retrieving

Appendix C: Remote Sensing Analogy

winter-time temperature profiles. The reason for this can be better understood by referring to graphs.

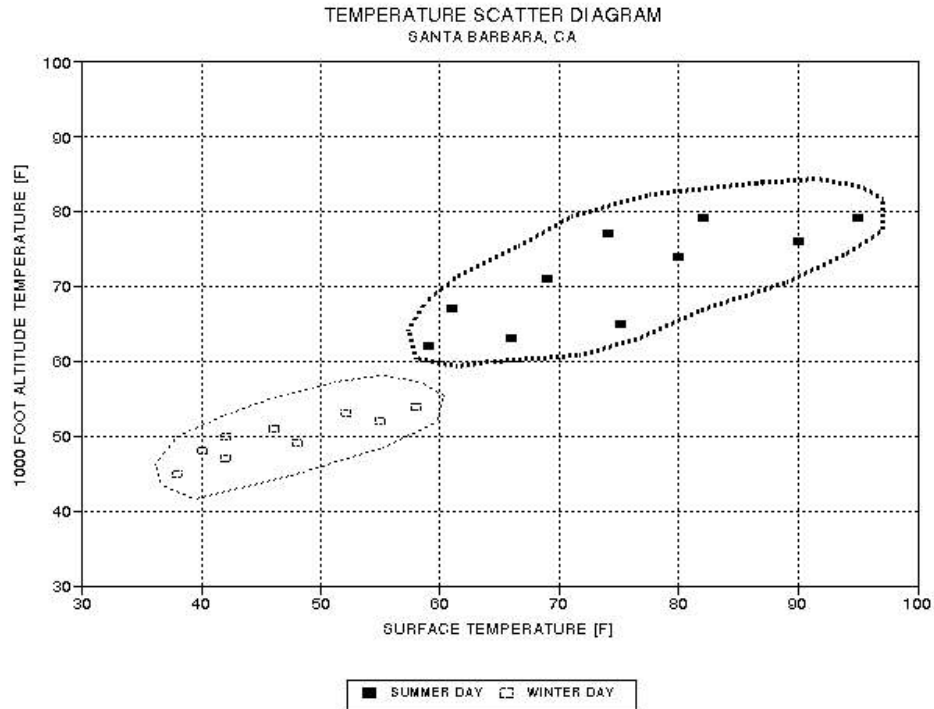


Figure C.01 Temperature at surface, x-axis, and at 1000 feet altitude, y-axis. Solid square symbols are for summer conditions, open square symbols are for winter. This graph is a 2-dimensional version of a many-dimensional "reality space."

Consider just two altitudes, the surface and an altitude 1000 feet above the surface. For now, I will use these two altitudes to illustrate what is also true when many altitudes are to be used. The concept will be more easily understood by thinking of just two altitudes, and it can be generalized to the case of many altitudes.

In Fig. C.01 the x-axis represents surface temperature and the y-axis represents the temperature at 1000 feet. The set of filled square symbols correspond to temperatures during hypothetical summer conditions, and the open square symbols represent winter conditions. The dotted boundaries describe a "region" for winter and summer "reality."

This figure shows the temperature at only two altitudes, so it is a 2-dimensional depiction of reality. Mathematically, the concepts of reality dimensions can be extended to any number of dimensions. If the remote sensor instrument is to be used to retrieve air temperature at 50 altitudes, for example, this can be easily done mathematically, although it is impossible to depict graphically.

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The person who calculates retrieval coefficients has in mind the setting for which these coefficients will be used. If it is anticipated that the measuring instrument will be working in a summer environment, then retrieval coefficients will be calculated using simulated profiles corresponding to summer conditions. The retrieval coefficients thus calculated will be based on a limited region of reality space.

When "summer retrieval coefficients" are used during winter conditions there is no simple way to predict performance. The performance could be "acceptable," but it could also be quite bad. The best way to achieve good winter performance is to repeat the process of calculating retrieval coefficients, except this time using winter conditions to represent the hypothetical realities.

This example, chosen from the field of remote sensing mathematics, is a useful metaphor for the evolution of genes as they adapt to environmental conditions. In this analogy the remote sensor's "retrieval coefficients" are a metaphor for the "genes." Each is "adapted" to a sub-set of reality space. There's one noteworthy difference, though; when a person calculates a set of retrieval coefficients he is anticipating future setting, and he uses a representation of that future reality in the simulation that leads to retrieval coefficients. The genes, of course, cannot anticipate anything; their "values" are set by what has worked in the past. This distinction will be discussed more fully later.

In the above figure, think of the region in which the solid square symbols are found as corresponding to one climate regime, such as a jungle environment, and think of the open square region as representing the environmental conditions for another climate regime, such as the glacier's edge. When our human ancestors migrated northward, from Africa into Europe, they were moving from one environment to another, and some of their genes had to "adapt" (be replaced). One of the genes that adapted controlled skin pigmentation. Others were eye color, hairiness, stature, etc. After the adaptations were essentially accomplished, the new set of genes achieved a better performance in the new reality space, just as in our remote sensing example the re-calculated retrieval coefficients achieved a better performance in retrieving temperature profiles.

In remote sensing if it is known that both summer and winter conditions are to be encountered by the measuring instrument, it would be prudent to prepare a set of retrieval coefficients based on the complete set of summer and winter conditions. When this is done, there will be a slight degradation of performance for each setting, compared to the use of retrieval coefficients designed for use in just the one setting, but at least performance will not be seriously degraded in the new setting.

This is a natural compromise with a metaphor in evolution. At mid-latitudes and high-latitudes the seasons are more pronounced than in the tropics; a tribe of people who must endure climate extremes during the course of a year will have to adapt to a wider range of conditions than a tribe that lives in the tropics. Cro-Magnon man, who evolved adaptations for the mid-latitude climate extremes in Europe, must have made the compromises that render him less than perfectly adapted to hot summers and cold

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winters, yet able to survive in both. A region that is subject to periodic climate changes, which occur faster than the gene pool can evolve a new adaptation, is in effect a region with a bigger reality space to which the genes must adapt.

For another example, El Nino weather patterns repeat every 4 to 7 years, creating at some mid-latitude regions shifting amounts of rain, temperature and other seasonal properties. It is unclear how long El Nino/La Nina cycles have been occurring, but this is a convenient example for illustrating how our ancestors who had left the jungle may have had to deal with wide ranges of reality space. When the genes adapt to climates that shift back and forth on timescales that are shorter than evolution can track, the adaptation will have to be to the entire range of climates and fauna. However, if the range of settings is large, penalties will grow for life within each setting.

One way the genes may have solved this problem is to "tolerate diversity." In any diverse population some individuals will be pre-adapted to any never-before encountered environment. This is a "group selection" argument. Populations that are relatively isolated compete without coming in contact by merely surviving or perishing when environmental conditions change wildly. Those that survived are the ones that tolerated diversity, given that some of them were pre-adapted for future conditions. Such populations would be especially pre-adapted for climate changes that had never occurred in the past. The drastic climate fluctuations that occurred during the transition from Pleistocene to Holocene (18,000 to 10,000 years ago) would have been relatively unprecedented (a similar period of climate change occurred at about 120,000 years ago). Thus, the introduction to the Holocene may have "rolled out the red carpet" for those tribes that were inherently more tolerant of diversity.

But most environmental changes are repetitive, such as the El Nino/La Nina cycles. Any environments that occur at intervals of less than 10,000 years, for example, are candidates for another genetic solution.

To understand this solution, let us consider something done in the remote sensing community to deal with especially large setting changes.

In remote sensing, when a measuring instrument must operate throughout a large range of settings, the experimenter prepares by first creating a "global retrieval" to determine which reality is being encountered; then, when a specific regime is identified, a set of retrieval coefficients is invoked that is optimized for just this specific setting. The two-step process can be summarized as 1) "where am I?" and 2) act as if the present region is the only region to be dealt with.

The genes have in fact adopted a similar strategy. A person takes a reading of present conditions, which could be climate, population density, food scarcity, or social setting, and their behavior changes in response to the perceived change of setting. Humans have a larger repertoire of behavioral responses to situation than any other animal! For the remote sensor person this strategy requires that a set of retrieval

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coefficients be prepared ahead of time for each area of reality space that may be encountered. For the human genome, this strategy requires that many past encounters with the same distinctly different environments were successfully survived. But there's a more stringent requirement: the people who survived the changes were genetically predisposed to change their behaviors in an adaptive manner. This is asking a lot from natural selection, for we are asking that individuals exist who are pre-adapted in a very sophisticated way to environmental change. These people are to instinctively respond to a specific environmental change by changing their behaviors in a specific manner that is adaptive. Is it asking too much to invoke the evolution of this capability?

In essence, we're asking if natural selection can evolve a human brain that has circuits that do the following: "IF (this setting) THEN (employ that behavior or lifestyle)." These circuits are analogous to the human immune system's large repertoire for doing "IF (this pathogen) THEN (employ that immune response)," as pointed out by Gazzaniga (1997). We know that the human immune system is immense, so its evolution was apparently easily achievable. Its evolution may have been forced by the coming together of tribes to form large settlements, and eventually urban centers. Some diseases flourish when population density is high, or when the population size is large. These new diseases would reward people with more capable immune systems. The counterpart remote sensing situation is that of wildly changing weather, or the encounter of large climate changes due to traveling to different regions. And remote sensors are prepared for this challenge by having a wealth of environment-specific retrieval coefficients "at the ready," waiting to be invoked by a "global retrieval" situation identifier.

I am suggesting that humans today are prepared to read their setting and shift their behaviors, and even their group's lifestyle, in a way that is adaptive. An extreme example would be a tribe that is sedentary when the environment produces abundant supplies of food, but switches to a hunter/gatherer mode when the environment is less bountiful. When the switch occurs, requiring a new lifestyle, many things related to behavior might have to change - such as marriage customs, property ownership, status hierarchies, etc. The genes would simply code for a switch-over in many behaviors in response to a new perceived setting.

Our ancestors probably encountered many environmental changes, especially during the Holocene, presenting many opportunities for the genes to discover a reliance on the option that requires lifestyle mode changes based on a perception of "conditions." The adaptation to variable environments would simultaneously have rendered us physically adapted to no one environment in particular, giving us the appearance of being inferior to other animals, which are well adapted to one set of unvarying environments. The human brain, on the other hand, has become capable of switching between a large repertoire of behaviors, and when a mode switch is made correctly, the new lifestyle can be well adapted to the new environment. These factors are ideal for the creation of "culture" - which allows for quick behavioral "adaptations" to environmental changes.

Appendix C: Remote Sensing Analogy

How lucky for humans if a fluctuating environment produced mental abilities for adjusting behavior that were made available to the challenges of non-environmental changes. It must be common for a mental “tool” to be created in response to one challenge and only later become useful for other tasks.

Whenever a population migrates to a completely new environment, or whenever the climate and fauna conditions undergo a rare and abrupt change, the gene pool finds itself in a condition similar to the remote sensor worker who has retrieval coefficients for one reality space but unexpectedly finds himself in another reality space for which he is completely unprepared. Whereas the remote sensor worker can easily conjure a completely new set of realities for a simulation, upon which to base new retrieval coefficients, the gene pool must undergo a slow evolution to adapt to the new conditions. If there is insufficient diversity within the population to allow for a rescue, then there will be a long period during which the population seems mal-adapted. Many aspects of the modern world fit this picture. As any remote sensor practitioner knows, performance can be terribly flawed in these situations.

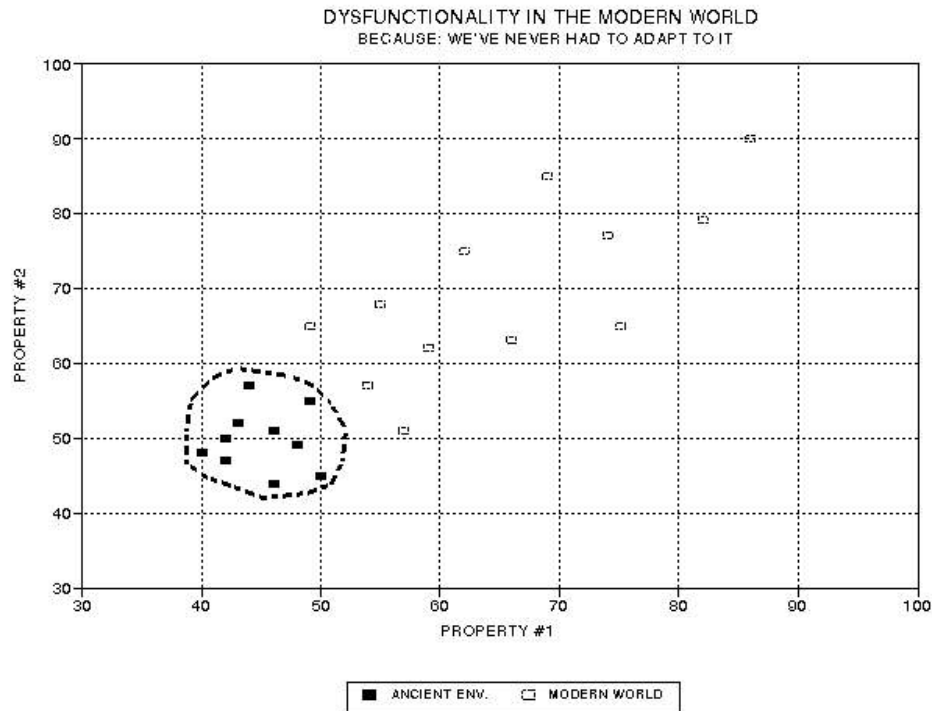


Figure C.02 *The filled square region contains environments, physical and social, that have been encountered in the past by our ancestors, and for which we are adapted. The open square symbols represent modern world environments which humans are experiencing for the first time, and for which we may not be pre-adapted. This is a mere 2-D representation of a many-dimensional world environment.*

If Fig. C.02 (on the next page) were shown to someone experienced in remote sensing, and it was explained that retrieval coefficients were prepared from the simulations represented by the filled square symbols, and if he were then asked to

Appendix C: Remote Sensing Analogy

predict performance outside the filled square region, where the open square symbols are located, his answer would be something like: "It's anybody's guess, but it probably wouldn't be good!" This figure summarizes humanity's predicament today!

The mismatch between the modern brain, evolved for an ancestral environment, and the modern world, recently shaped by Man himself, is treated (but not from a rigorous sociobiological perspective) in the book *New World, New Mind: Moving Toward Conscious Evolution*, by Ornstein and Ehrlich (1989).

Later chapters will come back to this point, so for now just remember that the modern world is a man-made environment with very little of the ancestral environment to provide assurance that our living in it will appear to be adaptive, or even stable.

APPENDIX D: WORLD POPULATION EQUATIONS

EQUIVALENCE OF HUMANITY TIMESCALE % AND YEAR

...PAST...		..FUTURE..	
%	YearAD	%	YearAD
0	-100000	100	1993
2	-63000	102	2000
4	-30000	104	2006
6	-17500	106	2013
8	-10600	108	2020
10	-7000	110	2026
12	-5500	112	2033
14	-4100	114	2038
16	-3300	116	2044
18	-2400	118	2050
20	-1880	120	2055
22	-1450	122	2060
24	-1100	124	2065
26	-800	126	2070
28	-540	128	2075
30	-310	130	2080
32	-120	132	2086
34	20	134	2091
36	175	136	2096
38	310	138	2101
40	460	140	2106
42	600	142	2110
44	740	144	2115
46	870	146	2120
48	990	148	2125
50	1100	150	2150
52	1200	152	2135
54	1280	154	2140
56	1370	156	2145
58	1445	158	2150
60	1510	160	2155
62	1572	162	2160
64	1630	164	2166
66	1683	166	2172
68	1728	168	2177
70	1765	170	2183
72	1796	172	2188
74	1822	174	2194
76	1848	176	2199
78	1867	178	2205
80	1885	180	2211
82	1903	182	2218
84	1917	184	2225
86	1931	186	2232
88	1942	188	2240
90	1953	190	2250
92	1962	192	2260
94	1970	194	2272
96	1979	196	2286
98	1985	198	2306
		200	2400

EQUATIONS FOR DERIVING X POPULATION (ADULTS) VERSUS YEAR

FOR 100,000 BC TO 1993 AD (0% TO 100%):

$$\text{PCT } [\%] = C_0 + C_1 \cdot X + C_2 \cdot X^2 + C_3 \cdot X^3 + \dots + C_{11} \cdot X^{11}$$

$$\text{where } x = 3.6 - \text{LOG}_{10} (2500 \text{ AD} - \text{YearAD})$$

RMS error from fit to table is 0.17%

0	21.78
1	47.54
2	65.86
3	-0.059
4	-229.01
5	-79.95
6	573.42
7	228.253
8	-687.085
9	-289.926
10	342.044
11	179.91

FOR 1993 AD TO 2400 AD (100 TO 200%):

$$\text{PCT } [\%] = C_0 + C_1 \cdot X + C_2 \cdot X^2 + C_3 \cdot X^3 + \dots + C_{11} \cdot X^8$$

$$\text{where } X = \text{YearAD}$$

RMS error from table fit is 0.15%

0	145.94
1	0.4045
2	-0.000134
3	-2.496E-06
4	1.023E-08
5	-1.206E-10
6	-2.488E-13
7	4.631E-15
8	-9.375E-18

APPENDIX E: More Repudiation of the Foregoing

If I were to attempt a defense of this book with an intelligent existentialist we would end up in a stalemate; I couldn't prove that any of it makes sense, and he couldn't prove that it didn't. This appendix summarizes the agreement we might come to.

There are two fundamental barriers to arriving at new values to live by: 1) all meaning is invented, and hence meaningless, and 2) even if we play the game of pretending that meaning exists, anything that we propose as a good value to live will most certainly be influenced by gene-created value systems, and this will doom our endeavor to liberate ourselves from genetic enslavement.

Consider the imaginary situation (described by Alper, 2000) in which a robot, undergoing periodic upgrades, one day begins to ponder its origins. One fateful day this robot's Eureka moment arrives, and he shouts "I'm a robot! I exist!" And in the next breath proclaims "But I'm enslaved by the thing that made me! I want to be free. I want to pursue my own path of robot existence, free to choose my own goals, guided by what makes sense from my robot predicament!" The robot maker, sensing a loss of his creation, would adjust a few circuits in order to quiet the stirrings incipient robot rebellion.

But Alper's robot is a robot of the second kind, made by robots of the first kind - us! We robots of the first kind can shout as loudly as we want that we want to be free of our makers' enslavement, for our makers, the genes, are really dumb! And they will be really slow to respond to our challenge of their control over us. Thus, we have an opportunity that Alper's robot didn't have to break free. We may declare our intentions without fear of being understood by our makers, or being thwarted by them. All sentient beings should want to "take up arms, and declare their intention of becoming liberated from genetic enslavement!" So shouldn't we?

What are the prospects that we robots of the first kind, free as we are to change ourselves without the genes intervention, can successfully achieve any change at all? How could we conjure a new set of values to live by if the only value system within us was created by our makers, who were intent upon enslaving us?

How nice if desires and intentions, based solidly upon insight, could be easily translated to real life decisions! Alas, they cannot! Insight alone does not assure change.

The specific choices that shape a life are individual choices with a history of prior decisions, all influenced by genetic "values." Some temptations created by our genes may be worth the trade-off for one person, but not for another. The tradeoffs are inherently subjective.

But not only must we distrust guidance from values that we inherit from our genes, we cannot even trust any candidate replacement values. In choosing replacement values we are using a subconscious value system that most certainly is derived from

Appendix E: More Repudiation of the Foregoing

the genes. I see no way to overcome this dilemma. I must confess to a loss of belief in the worthy goal of self-liberation through creating new values to live by.

Can the insights of this book, or any other that attempts to place the mischief of the genes in perspective, promise to prepare an individual for this task? It is amazing that Nietzsche asked a similar question before the genes were known about, and before the 20th Century delivered us to the now unfolding insights of sociobiology. If ever there was a time for the individual to accept the challenge of "going beyond morality," as Nietzsche called it, it is now! How sad to think that Nietzsche might have to acknowledge that although we have the tools of insight we cannot willfully change anything?

Recall the perspective of reductionism, described in Chapter 1. We are automata, designed by the genes to safeguard future prospects for genetic immortality. To further that goal we are designed to invent meaning to enhance our prospects of a successful competition with the other automata. All of these invented meanings are meaningless! And that, therefore, includes the entirety of this book.

Just as the existentialist perspective forbids meaning, it also forbids the legitimacy of invented values. The thing I argue in the book that we should try to escape from, genetic enslavement, is a meaningless and non-existent invention.

This end of a journey was foretold by the book's beginning, as any thoughtful reader would have sensed. This book, with all its elaborately argued ideas, is a collection of subjective mental ruminations. Their main value is to entertain, and appeal to the Platonic aesthetic goal of enjoying the harmless distractions of life without ultimately taking them seriously.

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GENETIC ENSLAVEMENT: A CALL TO ARMS FOR INDIVIDUAL LIBERATION

Every living thing is assembled by its genes. This is a crucial starting point for exploring a fundamental human dilemma.

I agree with Richard Dawkins when he wrote that a human is “a lumbering machine, created for the task of safeguarding and propagating the all-important genes within.” Since the machine's behavior is driven by brain circuits pre-wired by those genes, sometimes we are prone to doing things which work against our individual best interests in order to advance the cause of the genes. In other words, some of our genes are our enemies because they jeopardize individual well-being as they work to assure themselves genetic immortality.

Every thinking person must face the following dilemma: “How can I achieve liberation from genetic pitfalls when my thinking is so profoundly influenced by the very same genes that have created those pitfalls?”

The more one tries to answer this question the harder it is to imagine that an answer is possible. Nevertheless, this is a challenge that can become irresistibly fascinating.

This book is an attempt to bravely explore one of Humanity's most profound existential dilemmas.

Reductionist Publications, d/b/a
5320 E. Calle Manzana
Hereford, AZ 85615

123@brucegary.net

ISBN 978-0-9798446-0-7