Darwin's Doubted Idea:
The Cognitive Contours of Evolutionary and Religious Thought

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Introduction

Daniel Dennett (1995) has described the theory of organic evolution by natural selection, widely accepted within biology and the sciences, as "Darwin's Dangerous Idea." Just as surely, biological evolution might also be called Darwin's *doubted* idea. Ever since the idea that living things and living kinds could develop, change, or even arise by natural, physico-causal means and mechanisms was first proposed and articulated, most famously and most forcefully by the English naturalist Charles Darwin, throughout its history and continuing today, organic evolution has been a much challenged, criticized, doubted, and rejected theory. The result is a fair amount of "evolutionary disbelief" (disbelief in explanations of "natural" processes of biological and species development) as well as, more strongly than disbelief, a robust "antievolutionism," amongst individuals and groups over time.

This work asks why. An answer is approached from a cognitive perspective, where "cognitive" denotes how human minds process and represent information. Thus, this work considers the relevance of how human minds process and represent information, namely information about the origins and development of living things and species, for understanding why we have and arrive at the beliefs, and disbeliefs, that we do.

The seeming motivations and reasons proffered for doubting Darwin's idea are many, categorically spanning science, epistemology and philosophy; religion, theology, and spirituality; and ethics and morality. Some claim the necessary evidence is lacking; others, that naturalistic evolution is incompatible with religious doctrine. Some fault the inductive, speculative method Darwin employed; others, that evolution has dire social and moral consequences.

Much thought and writing has approached this topic, broadly on the merits of evolution by natural selection in itself, and more specifically in dialogue with religion, theology, and morality. Many works take a position within such dialogue, arguing for or against some interpretation or articulation of some version of evolution or creationism. The issue is often framed or self-referred as the "evolution-creation debate," although this and related characterizations can be overly polarizing, when in fact there are a great many positions held, with many seeing compatibility rather than mutual exclusion (between forms of evolution and religious narratives and theological doctrine). This work, however, does not take up these epistemic questions, of what theories or explanations for the origins of species and living things one ought to believe or is most correct.[1]

Other writers and scholars have approached the topics of the reception and responses to organic evolution and of evolution-and-religion (and more broadly, science-and-religion) from and with historical and sociological perspectives and methods. Some of the most respected and influential scholars include Edward Larson, Micheal Ruse, Ronald Numbers, George Marsden, Barbara Forrest and Paul Gross, and James Moore.

1 To some extent, I wish to bracket these questions of truth, falsity, and the compatibility or incompatibility of naturalistic, evolutionary accounts and religious narratives and doctrine, and instead adopt a neutral position. However, I could only do so to a degree. For one, epistemic concern did in part motivate this research, so it would be disingenuous to fully claim neutrality. Second, I do appeal to and agree with certain authors and researchers who hold a (naturalistic) evolutionary perspective (namely, on human cognition) and make evolutionary claims, though often to support other substantive claims that could also stand on their own empirical and logical merits.

Their research and historiography is indispensable for understanding the forms and origins of evolutionary disbelief and anti-evolution activities. However, I believe the fullest understanding and explanation can be achieved by looking also, in addition to historical and cultural particularities, to the cognitive foundations of “Darwin's doubted idea.”

Robert McCauley (2011) has recently authored an analogous study of religion and science. “After more than a hundred years of books comparing religion and science,” he writes, “an author owes readers some justification for adding one more to the heap” (3). McCauley's “justification” is that his book “compares science and religion in a way that has never been done before,” for he offers “a comparison of the *cognitive* foundations of religion and science, as opposed to their metaphysical or epistemological foundation.” The title of the book points directly to its thesis: that “religion is natural and science is not.” McCauley has a particular kind of naturalness in mind—cognitive naturalness, arising from “maturationally natural” cognition—and the remainder of the book he spends delineating this naturalness and explaining why and how “religion” has it and “science” does not.

As such, the present work could well be considered part of this cognitive project, with the issue of evolutionary dis/belief one example of “why religion is natural and science is not.” My claim is that there are aspects of naturalistic, evolutionary explanations for the origins and development of life and species that are cognitively *unnatural*, that are contrary to our maturationally natural intuitions and expectations about the world, which makes evolution hard-to-think and hard-to-believe. Non-evolutionary accounts, or evolutionary accounts of certain non-natural character—of which religious and creationist narratives are prominent types—thus in contrast enjoy a certain cognitive advantage.

While I believe such cognitive foundations are salient in explaining historical and cultural events and patterns, cognitive predispositions and intuitive beliefs alone are not sufficient. It is only when situated within an individual's wider representational ecology—all the other representations and beliefs, and even values and emotions, that we have about the world, whether naturally arising or acquired throughout our learning as cultural beings—that the actual and differential distribution of evolutionary dis/beliefs can in theory be fully explained. There is, so to speak, a "missing link" between cognitive naturalness and actual patterns of belief and disbelief, between, it might also be said, cognition and culture, and I locate this link primarily in the mechanisms of cultural learning and cultural transmission. It is at that point much integration and consilience are obtained.

It is in this respect that I choose to speak of the cognitive "contours" of evolutionary belief and disbelief, rather than the cognitive "causes." If we envision these phenomena, cognition does indeed provide a certain shape or character, but it is not the whole story. This work strives to be integrative, interdisciplinary, and multidimensional, perhaps more than some sociobiological or evolutionary psychological models, on the one hand, and sociological and culturalist approaches, on the other, are wont to be. It is justified and fruitful to appeal to human cognition to explain human phenomena, but we can not stop at it. History and culture(s) did not spring forth full-born from universal human cognition, as Athena from the leg of Zeus.

The fruits of this approach are many. A primary goal, as introduced above, is to enrich our understandings and explanations of the ongoing doubt and denial of Darwinian, naturalistic organic evolution, to speak to questions of what, why, and how as regards these varied yet unified phenomena. Prominent among these, there is not only the question of why Darwin's idea was doubted, but also why it is continuously so. Many scientific theories have challenged existing beliefs. The world was once flat, once at the center of the universe—now we know it is a sphere revolving around the sun. Where once demon possession, unhappy gods and spirits, and magic and curses brought sickness, we now have conceptions of mental illness and the germ theory of disease. Evolutionary disbelief, however, may seem unusually robust and persistent. One might predict, that if evolutionary disbelief has some foundation in or element of universal, maturationally natural cognitive intuitions, then we humans may be continuously prone to doubting or at least misinterpreting Darwin's idea.

An expanded understanding and explanation for evolutionary disbelief in turn may find utility within the dialogues and so-called debates over evolutionary theory—perhaps knowing our natural epistemic tendencies has practical relevance for the "ethics of belief." While here suggested, this line of discussion is however not further pursued.

Another goal is methodological and theoretic. This work assembles a "toolkit" of concepts, models, and theories, which may be used to approach and explain psychological, social, historical, and cultural phenomena beyond evolutionary theory. As a scholar of religion, religion comes first to mind. Much contemporary, and indeed exciting, work at the nexus of "cognition and culture" pertains to or centers upon religion. However, religion scholars may be hesitant to turn to cognitive theory, while cognitive scientists may be naïve to the nuance, diversity, and richness of religion. More dialogue and interdisciplinary studies may serve as a contribution towards further fruitful (and collaborative) research.

Towards this end, part of the project is a critique of recent research and explanations already offered regarding evolutionary dis/belief, primarily from or within cognitive science. While certain works by cognitive scientists on this topic motivated and are appealed to in this work, their methods and claims merit some analysis themselves. The cognitive scientist may claim too much and move too quickly from panhuman cognition and maturational naturalness to the actual phenomena, to individual beliefs and cultural patterns.

There is, finally, a substantive goal, a positive contribution to be made to the study and theory of religion. Might a study of religion-and-evolution have anything to say about religion generally? The subjects and forthcoming discussions of teleology and of moral emotion may do so.

The remainder of the work proceeds as such:

To describe what is meant by evolution, evolutionary belief and disbelief, and anti-evolutionism and creationism, chapter 1 provides a brief history of the responses and reactions to naturalistic evolutionary theories, ending with social survey data of national and international levels and types of belief.

Chapter 2 first introduces cognitive science, with primary attention to maturationally natural cognition and to the differences between implicit and intuitive thought and belief, on the one hand, and explicit and reflective thought and belief on the other. The second part of the chapter begins to apply these concepts and models to evolution, namely by considering the role of "folk-biology" and "species-essentialism" in representing, understanding, and in turn accepting or rejecting evolutionary theory.

The third chapter focuses on the concept of "teleology," within philosophy, theology, and evolutionary theory and its responses. Evidence for a cognitively natural predisposition for teleological reasoning about (aspects of) the world is deemed pertinent, but current explanations are too far-reaching.

Chapter 4 turns to moral psychology and the role of moral emotions in representations of evolution. While there is little inherently moral or immoral about evolution, individuals nonetheless develop or acquire moral affects towards the theory; while incorporating universal, shared human intuitions and emotions, moral judgments about evolution are however culturally shaped.

Having noted the need for culture and cultural-level analysis in previous chapters, chapter 5 considers models and mechanisms of cultural learning, cultural transmission, and cultural evolution. While proving salient for understanding particular aspects of evolutionary dis/belief, cognitively-structured cultural transmission also serves as the "missing link," as the means of providing integration between cognitive, psychological, social, cultural, and historical perspectives.

The work concludes with a brief summary regarding "Darwin's doubted idea," and "the cognitive contours of evolutionary theory."

Chapter 1
The Varieties of Evolutionary Disbelief

This chapter has three related goals: to outline the history of evolutionary thought and disbelief, to describe the nature(s) of evolutionary disbelief, and to note the scope of evolutionary disbelief. I will first give consideration and provisional definitions of the terms.

From its latin roots, “evolution” denotes “change” or “development.” Many things can change or develop, though the primary object throughout this discussion regards “organic” or “biological” evolution, the change or development of living organisms, or of kinds or species of organisms. “Species” can be an elusive term, even for modern-day biologists; traditionally (and intuitively, as will be shown) living species were understand as “natural kinds,” as categorical forms of life possessing fixed and discrete “essences” that are responsible for their nature and reproduction. Biologically, species are more like shifting abstractions from actual populations, with species often defined as groups of actually or potentially interbreeding organisms or populations (Larson, 2004: 12-13, 234-35).

Darwin's evolution accounted for “the origin of species,” (from “one or a few original forms,” he would add,) and this is organic evolution's primary focus. An extension of organic evolution can be made to the origins of life itself—of self-replicating organisms from non-replicating inorganic matter (in scientific parlance, this is called “abiogenesis”). Though not Darwinian evolution proper (evolution by natural selection), the origins of life are questions and concerns often taken up in evolutionary discussion and thought.

When speaking then of “evolution” in the shorthand, the above biological varieties are intended. A final distinction though regards two senses or applications of “evolution.” One refers to evolution as “fact,” *that* organisms or species have changed over time. Within the scientific community, evolution is a well-established fact, for there is no question *whether* organic evolution has occurred or that living things have changed and developed over the course of earth's history. The second sense of the term refers to evolution as “theory,” as an explanation for *how* species change or develop over time. Multiple evolutionary explanations have been developed in the course of history, with Darwin's account of evolution by natural selection the most famous. Modern biology continues to accept Darwinian principles, synthesized with genetics, though further details and the specifics of the mechanisms involved are continuously being researched and discussed. Certain anti-evolutionist creationists reject both evolution in fact and theory, while certain other creationist and evolutionary disbelievers would accept that some degree of evolution has in fact occurred, but dispute the theoretical naturalistic mechanisms.

Evolutionists, then, are those who accept, or “believe in,” organic evolution and some theory thereof; antievolutionists in turn reject evolution, believing it is not factual or not a valid explanation for the origins and development of life and species. One can also speak of “evolutionary disbelief” to refer to the doubt or rejection of evolutionary thought, though as shorthand it may include the somewhat more neutral “unbelief” or “nonbelief” as well. When indexing both evolutionists and antievolutionists, or evolutionary belief and disbelief, the phrases “anti/evolutionists” or “-isms” and “evolutionary dis/belief” may be employed. These attitudes range from robust hostility and explicit disagreement with theories of evolution, to more subtle and implicit skepticism and doubt about some or all evolutionary explanations. Misunderstanding or misinterpretation of evolution (compared with scientifically acceptable articulations), alongside avowals of evolutionary explanation, is also pertinent. Just as William James sought to describe and study the “varieties” of religious experience, so too I aim to delineate the “varieties” of evolutionary disbelief (in later sections).

Creationism and antievolutionism are not identical, and there are distinct types of each. In a minimalist sense, a creationist would be one who believes that there was a creation by a creator, namely, for the purposes here, of living things. Perhaps the most well-known, publically discussed version of creationism today is the young-earth, biblically-literalist, antievolutionist “Creationism” (or sometimes “Scientific Creationism” or “Creation Science”) avowed by some conservative Christians. But creationists can also be evolutionist, as for instance the “theistic evolutionist” who believes evolution occurred and occurs but that God, the creator, has some causal role in the process. As such, the theistic evolutionist would disbelieve in completely naturalistic evolution but not in evolution as such.

It may, finally, be worth touching on a definition of “religion.” I favor the neo-Tylorian perspective of the cognitive science of religion. Recalling that Tylor defined religion as “belief in spiritual beings,” the cognitive study of religion has noted the propensity for representations of counterintuitive (cognitively speaking) intentional agents within religion cross-culturally. Religious beliefs, practices, and institutions are those which reference or revolve around, in some fashion or to some degree, these representations of agents. This is not to say this is all religion is or entails; counterintutive agents may be a necessary feature, so to speak, but are certainly not sufficient. As concerns creationism, the creator is generally believed to be some such religious agent, like God. Creationism and antievolutionism are then religious when or insofar as they are situated within or stem from religious beliefs, doctrines, narratives, and institutions, or have a representational religious content.

Having briefly introduced these subjects in a formal sense, I next turn to a brief substantive history of evolutionary thought, in order to then approach a descriptive typology of evolutionary disbelief, which will then be the subject of cognitive analysis.

Part I: History

The following account centers on responses to evolutionary thinking and its development in "the West,"[1] revolving in large part around Charles Darwin's account of evolution by natural selection, and the discussions and traditions that arose in response and in reaction, and which ensue through to today.[2] Modern science, and the rise (or resurgence, if we look back to Greek thinkers) of naturalistic, scientific thinking,

1 An imperfect and overly generalizing term, more specifically referring to, generally, northwestern Europe or European countries, to later include North America as well. "North Atlantic" is probably the more geographically correct term. The salient features when speaking of "the West" often regard the intellectual products or cultural values or practices of those societies, collectively. Here, I am focusing on the "Western" intellectual tradition within which naturalistic, scientific thought developed, especially as it self-differentiated from and in dialogue with religious thought.

2 Sources for this historical summary include Bowler (2002), Forest and Gross (2004), Gillipsie (1996), Green (1959), Humes (2007), Larson (1997, 2003, 2004), Marsden (2006), Moore (1979, 2002), Nelkin (1984), Numbers (1992, 2002), Roberts (1988), Ruse (2003, 2005, 2006), and Thomson (2005). The works by Larson, Numbers, and Ruse are amongst the best and well-respected broad overviews of evolutionary theory and its interactions with religion (and religious thought) and culture. Brooke (1991) and the many selections in the Ferngren anthology (2002) also provide perspective and history on the wider context of "religion-and-science."

developed in Christian Europe, and its history is largely a religious tale. The development of evolution is one such chapter in that tale, and given the pertinent actors and events involved, specifically an Anglo-American story, though a complete history and survey of evolutionary thought and dis/belief (which of course space prohibits!) would span the centuries and the globe.

“In the Beginning”

There are two intellectual sources which might serve as “the beginning” of evolutionary thought and evolutionary disbelief. The writings of the ancient Greek thinkers serve as one important foundation of Western philosophy, as well as theology and eventually science (through a shift from “natural philosophy” to “natural science”), while the other prong of this intellectual heritage may be found in Judaic and Christian thought, in one respect with the literal, scriptural “in the beginning.” While there were, of course, many similarities between these intellectual cultures and traditions, philosopher and historian of science Michael Ruse finds that “different attitudes, different methods, [and] different goals are apparent in these two great systems of thought” (2003: 11).

The first lines of the book of Genesis, the beginning of the Hebrew scriptural canon, describes the workings of a creative God. In the first creation story (Gen 1:1-2:4a), after creating the physical world, God creates vegetation, then fish and birds, and finally cattle, “creeping things,” wild animals, and lastly humans—“man, in our image, after our likeness” (Gen 1:26). The second creation story (Gen 2:4b-25) presents a different order of creation, but special creation nonetheless.

Attention to the scriptural creation narrative highlights two important features of Jewish and Christian thought. One aspect is the revelatory foundation: God, primarily through and in sacred writings, has revealed certain truths to humankind, knowledge which might not be obtainable through human thought alone. The second aspect is that these creation narratives endow the world and its creatures—especially humans—with purpose and direction. This might be called its "teleology," its end-oriented character. One facet of this theistic teleology is eschatological, the view of humans as possessing certain duties or responsibilities and of having the possibility or promise of a life after death. Creation and history is end directed; it has a narrative structure. But theistic teleology also spans all of the natural world—the creative work of God the creator could be seen everywhere. Eventually, when philosophically articulated and argued, this view would become the famous apologetic "argument from design."

If the Hebrew Bible represents one prong of the Western intellectual fork, Greek thought is another. Here, in fact, arose early evolutionary theories—and their antievolutionist rebuttals. Some philosophical Greeks, like Democritus and the Atomists for instance, argued that the universe is made of randomly moving, colliding, and sometimes cohering particles. Larger bodies, including organic ones, arise out of this, and functional ones would persist, and the nonfunctioning ones would not (thus not only an early idea of evolution, but of a kind of natural selection as well). They didn't, however, claim a subsequent development of kinds from more primitive forms (making them rather "proto-evolutionists"; Ruse 2003: 53) Anaximander, Empedocles, and the Epicureans likewise had "crude notions of organic evolution" (Larson 2006:12).

Plato and Aristotle found otherwise (Larson 2006: 12-13, Ruse 2003: ch. 1).

Plato's theory of the forms together with an insistence on attributing (mindful) purpose to causality precluded the flux and chance generation of living things. Aristotle by way of anatomical studies and natural observation argued species were immutable and eternal, always breeding true to type, and like Plato also rejected the randomness of the atomists and argued for "final causes" as ordering things towards their ends. Among the Greek thinkers, it was the thought and writings of Plato and Aristotle that would most strongly persist in and influence subsequent Western and Christian thought.

The Rise of Modern Science

The anti/evolutionary story really begins to take off much later, in the seven- through nineteenth centuries,[3] at first having more to do with geology than biology, or in their precursor of "natural history." The background to this story concerns the rise of modern science—of empirical methods of inquiry and naturalistic explanations.

The so-called "scientific revolution" precipitated from a number of cultural and intellectual developments. One facet regards the expansion of the realm of empirical inquiry. Through "voyages of discovery," the known world grew and widened, bringing forth to Western consciousness new lands, new creatures, and new people. Similarly, the observable world expanded in two directions; on the one hand, devices like the microscope opened up a whole new micro-world hidden within what we normally see and experience. On the other hand, instruments like the telescope expanded and redefined conceptions of the cosmos itself.

3 For this portion of the pre-Darwinian history, I look primarily to two now classic and respected texts (though not without certain criticisms), Charles Coulston Gillispie's (1996[1951]) *Genesis and Geology*, and John C. Greene's (1959) *Death of Adam*. Entries in the Ferngren (2002) anthology are also pertinent.

Methods of inquiry and explanation began to change as well. A priori, rational reflection gave way to empiricism, to a greater role for observation and experimentation. Additionally, innovation and novel inquiry began to supplant the traditional practices of reading and commenting on the works of past thinkers. There was an increasing use of and role for mathematical models in descriptions and explanations of the world, alongside a new conceptual repertoire: paramount among this was mechanical concepts, to describe and explain the workings of the natural world, replacing more traditional organic and theological metaphors.

This is not so say science was thoroughly a secular, non-religious endeavor. Rene Descartes, Pierre Gassendi, Robert Boyle, and Isaac Newton were among the "fathers" of this transition, yet their writings describe their scientific inquiry as theological reflection with religious meanings and importance. Regarding, for instance, the chemist Robert Boyle and other contemporary "natural philosophers," one historian writes that

> the practice of natural philosophy was an act of worship, since it led to greater knowledge of the Creator by directly acquainting the careful observer with God's wisdom and benevolence in designing the world. God's purposes are everywhere evident to the astute observer. (Osler, 2002: 149)

Another scholar finds that from Bacon through the 19th century, burgeoning scientists saw science as lifting the mind up to God, and there was no sense of embattlement between "science" and "religion" (Gillispie, 1996: 3).

Boyle's scientific writings and explanations included God and testified to theological importance. Regarding his corpuscularianism, for instance, he writes that God had created matter and endowed it with motion. Isaac Newton similarly appealed to God, as the force maintaining the revolution of the planets around the sun. However, with each successive generation of natural philosophers and scientific thinkers, more of the empirical world and its working came under mathematical, natural, mechanical, physico-causal explanations, and the space for God receded.

This pattern is witnessed in the developments of “Genesis and geology,” which Charles Coulston Gillispie describes as the “most significant aspect of the immediate background of the debate over evolution” (1996: xxix-xxx).[4] The landscape, types of rocks, the strata or layers of the earth's crust, and the curiosities of nature that would turn out to be fossils, all posed empirical problems for the natural historian. Why was the earth the way it was? How long and by what processes did it become this way? Some religious and theological assumptions—of a six to ten thousand year old earth (archbishop Ussher famously set the date of Creation at 4004 B.C.), a universal deluge (the Noachic Flood), and of a meaningful and purposeful geological constitution—were found difficult to align with observation. Whereas mechanical philosophy and other developments in physics and chemistry—natural science—were perhaps fairly well assimilated with theology, natural history arguably faced a rougher road.

Geology as a science was born in the late 1700s out of two competing theoretical positions, dubbed Neptunism and Vulcanism (Gillispie 1996: ch. II). Neptunists, led by Abraham Gottlob Werner in Germany, gave water the greatest share of formative power to the earth's surface; Vulcanists, such as the Scottish James Hutton, attributed it to heat within the earth and the resulting volcanic action. Neptunists argued in terms of mineral precipitation from a watery slurry, with ocean currents and changing levels (the deluge included) carving out valleys and burying fossils or carrying them to the tops of mountains. Perhaps not coincidently, Neptunists often made a point of showing how

4 Similarly, Greene contends that “the breakdown of the traditional view of nature and the rise of evolutionary concepts [can] not be understood by concentrating on biology alone, but must be studied across the whole range of the sciences...astronomy...geology...biology...anthropology” (1959: preface).

their view was in line with scripture; the initial formative aquatic conditions, for instance, were perhaps “the deep” over which the spirit of God originally flowed. (This is not to say, however, that Neptunists necessarily adhered to a young-earth or six-day creation.) Vulcanists, on the other hand, looked to the ongoing forces of geologic heat in uplifting strata and volcanoes in creating mountains and rock, with perhaps less scriptural overlap.

The geologic debates raised religious questions over God's place in nature and the formation of the earth. If the formation of the earth was the result of natural, lawful processes—if the universe was self-sufficient—what place was there for God, other than as a first cause? Concerned Christians, like Joseph Townsend, believed God was and must be a direct participant in natural history (Gillispie 1996: 95). Others, however, were able to see compatibility, and even evidence for God's beneficence and contrivance of the earth. Were not, for instance, England's great reserves of coal beneficently, designedly placed for her people (Gillispie 1996: 104-5)?

The debates between Neptunism and Vulcanism gave way, by the 1820s and 30s, to opposition between the catastrophism of Georges Cuvier and the uniformitarianism of Charles Lyell.[5] Cuvier saw the earth as attesting to great cataclysms and upheavals, with destruction and re-creation of the earth each time (the most recent catastrophe, perhaps, was that preceding the Genesis creation, or was the Noachic flood). Cuvier's catastrophism was popularized, and theologized, by the English professor William Buckland. Opposing Cuvier, Lyell argued instead for the slow but cumulative power of ordinary, common geologic forces (such as erosion and uplift) as accounting for the shape

5 While Vulcanists were perhaps more uniformitarian than Neptunists, each did not genealogically develop into the other. Additionally, while Lyell was a historically important uniformitarian, uniformitarianism in fact goes back to Comte de Buffon and predates the Neptunism/Vulcanism controversy.

and changes of the earth. Throughout the geologic debates, Gillispie notes that the Noachic Flood was always assumed and never questioned; what was questioned was its scope and efficacy, at which Lyell was gradually able to chip away, and eventually reduce it to a minor geologic agency. The geologic uniformatarian principles would in turn inspire and support evolutionary theory.

Geology thus helped set the tone for evolution in two ways: one, as just discussed, as regards issues of nature or physical laws and their relation to the causative and providential force of God; and two, as regards fossils, the development of paleontology from geology. That is, an understanding of fossils as the remains of living things, not as "formed stones" or "nature imitating art" (Thomson 2005). William Smith, a drainage engineer, at the end of the eighteenth century saw that particular fossils were found only in particular strata, thus correlating fossils with periods of time (deeper strata were older, those nearest the surface more recently formed; Gillispie 1996: 84). Older strata, moreover, contained fossils of species that were not known to currently exist, nor were contemporary species found in the older strata. This too raised theological questions: when and why had God created these no longer living kinds? Why and how did He allow species to become extinct?

Scientific questions—What counts as evidence? How we are to draw conclusions? What kind of laws or forces explain the natural world?—and theological questions—How does observation and explanation fit with scripture and revelation? How are God's activities and purposes reconciled with a nomological understanding of nature?—arose in discussion of geologic natural history, and these would carry over into discussions of biological natural history (and in many respects any area of natural science). While religious and scientific questions overlapped, the developing question of "religion and science" was *not*, as Gillispie and others have noted, one of religion *versus* science, but one of religion *in* science (1996: xxix), at least for the scientists involved. The difficulty was in navigating a shift from a Baconian view of science—whereby science seeks to discover a rational universe ordered by God, to understand the will of God and glorify God, and in doing so appealing to final cause and divine teleology in its explanations of the natural world—to a more secularized, self-standing notion and pursuit of science, using empirical methods and rational inquiry to observe and explain a secularized, nomological natural world, with increasingly practical and nonreligious goals. As Greene describes the shift from a "static view of nature," it was not just "facts in themselves" that were responsible, but rather facts in light of an "incipient counterview, the concept of nature as a law-bound system of matter in motion" (1959: preface).

The same kinds of challenges that natural history faced in the areas of geologic theory were and would be faced also by biological theories, namely evolution.

Evolution Evolves

Evolutionary theories do predate Charles Darwin. In the latter half of the eighteenth century, the Comte de Buffon, in his search for materialist explanations of the earth, arrived at an evolutionary account, by describing the spontaneous generation of life from matter, and subsequent degeneration into different species from a singe ancestral type due to environmental pressure (Larson 2006: ch.1). His was a limited evolutionism, with developments occurring within or according to "internal molds" which guided but also constrained what types or forms of life would or could develop or degenerate.

Buffon was challenged by Cuvier, the foremost naturalist of the time and long influential. Cuvier argued on one front that all the different parts and organs of an organism were in a delicate and necessary relation—a change in one respect (say, the development of teeth for eating meat) would be useless or even detrimental without changes in all related organs (a carnivorous digestive system or a predatory body structure suited for catching prey). Cuvier was an essentialist about species, a special creationist, and a catastrophist. An expert on the fossil record, he read the distribution of fossils as testimony to a succession of catastrophes, each followed in turn by the sudden appearance—by inference, the creation—of new living types. There were no transitional forms in the fossil record, only procession by jumps (not the gradual development in the structures of kinds that would be expected with, or required by, evolution). Cuvier was rather quiet on the religious aspects of his catastrophism, but similar creationist perspectives on the geologic column can be seen in the work of Adam Sedgwick and William Buckland, who explicitly accredited the appearance of new species to the beneficent work of God.

The most well-known and influential evolutionist before Darwin (though much of his influence would actually come *after* Darwin) was Jean Baptiste de Lamark. Like Buffon and other materialists he attested to a form of spontaneous generation, but his influence lies more in his transmutation hypothesis. There are a few primary elements: one, environmental stimulation, paired with use or disuse of organs, can encourage their development of degeneration (the lengthening of the giraffe's neck in its reach for food is the classic example); two, these acquired characteristics are inheritable. But Lamark also saw and posited and internal drive towards complexity—all organisms, that is, feel or exert an internal impetus towards progressive development. Together, these introduced aspects of will, effort, and progress to evolution. The influential Cuvier however raised against Lamark those same criticisms raised again de Buffon, and Cuvier's position remained the most accepted.

The similarity of species across place and time would continue to exert attraction for the few early evolutionists. Robert Chambers, in his *Vestiges of the Natural History of Creation*, (published anonymously in 1844, with the author unknown until 1884) took up the task, presented to Lyell by Adam Sedgwick and the catastrophists, of explaining “the progression of organic forms in view of the uniformitarian requirement of an unvarying natural law” (Gillispie 1996: 149). The result was an evolutionary theory:

> that the simplest and most primitive type, under a law to which that of like-production is subordinate, gave birth to the type next above it, that this again produced the next higher, and so on to the very highest, the stages of advance being in all cases very small—namely from one species to another; so that the phenomenon has always been of a simple and modest character. (emphasis removed; Gillispie 1996: 149)

Chambers hoped his “development hypothesis” would prove to be as lawful and binding as gravitation (Gillispie 1996: 153), but only with time and with Darwin would this come to be. While master of literary style and countless illustrations, Chambers was sometimes short on logic and understanding; his theory was in respects more description and assertion than explanation. In addition to the past repertoire of criticism, theological opposition was amongst the most influential. For instance, for Hugh Millers, the issue was not about final causes or the argument from design, but rather about immortality, soteriology, and morality—the “development hypothesis” would make Christianity “an idle and unsightly excrescence” (Gillispie, 1996: 175-7).

The fact of and explanation for organic evolution would eventually be scientifically acceptable only after Charles Darwin developed and published his theory of natural selection. Despite forerunners like Lamark, and even his own grandfather Erasmus, Darwin's evolutionary thinking can more aptly be understood as arising (though not wholly) from Lyell's uniformitarianism; while previous evolutionists may have given him the idea of transmutation, it was not their arguments that he followed.

Darwin came to think "on the origins of species" through a love of natural history. It was a winding road that brought him there: having shirked the medical career of his father, he studied theology at Cambridge in preparation for a country parsonage. Unexceptional, he muddled through his studies, acquiring a skill and fondness only for the "natural theology" of William Paley. However, while at Cambridge he also developed a keen interest in natural history, collecting plants with the botanist Henslow and accompanying Adam Sedgwick on a geology trip in the field. With a recommendation to serve as captain's companion aboard the *Beagle* on its five year "voyage of discovery," and his father convinced of its merits, Darwin set off to discover new places, new organisms, and also a new book—Lyell's *Principles of Geology*, a copy of which he had been given before his departure. These together would prove formative of Darwin's thought.

From the examination of island strata, to coral reefs, to the first-hand experience of an earthquake, all around Darwin found himself able to account for things in the uniformitarian terms of the progression of perpetually active natural forces. Lyell had not applied his uniformitarianism to biology (before Darwin convinced him otherwise, he too was antievolutionist), but Darwin would—though slowly and hesitantly, if not fearfully.

Evidence of geologic continuity was paired with biological continuity. The volcanic islands of the Galapagos, for instance, contained vastly similar but slightly different species from its neighboring continent of South America, and yet vastly different species from geologically similar islands off the coast of Africa. There were, furthermore, multiple vastly similar (but distinct) species within the Galapagos islands—fourteen kinds of finches, for instance. These were curiosities under a special-creationist framework, and it was here that Darwin saw the explanatory virtues of his developing hypothesis, approaching a natural, physico-causal explanation.

One crucial component to Darwin's thought and theory came with reading Thomas Malthus's *Essay on the Principle of Population* after returning home from the voyage. Here Malthus made a simple observation: species (humans included) reproduce at an exponential rate—a rate which proves unsustainable. More offspring are produced than can survive, primarily due to food constraints, under the pressures which Darwin would collectively call the "conditions of life" and the "struggle for existence."

A second crucial component came with observation that organisms exhibit seemingly random but heritable variation—this was perhaps best seen in the breeding of domestic plants and animals. Many novel forms (though not yet species) of pigeon, for instance, had been developed through the human selection and breeding of certain traits over others. While humans could select for any end or purpose they desired, in nature, within the "struggle for existence," it would be those traits that were most suited for an organism's survival (and in turn reproduction) which would be (most often, on average) passed on. While the change in any one trait might be small, over time such gradual changes could accumulate, and in turn lead to whole new varieties, or species (no longer taken to be static.) Darwin now had his theory of Natural Selection.

Darwin was well aware of the theological implications of his theory. His "development hypothesis" could do away with God as the immediate originating cause of species, as well as God as the end or purpose to the character of the natural and biological world—the world could proceed simply by mechanism, without intention and teleology. With such concerns in mind, although he formed and drafted his theory by 1838, he kept it private for twenty years. Sharing his theory with only a few close friends (namely Hooker, Lyell, and Gray), in the meantime evolution—and its criticisms—was in the air due to the stirrings of Chamber's *Vestiges* and Herbert Spencer's philosophical evolutionism. A good deal of antievolutionism stemmed from the theory's (inferred) association with revolutionary, progressive, liberal, and/or radical politics, due to the (perceived) progressive nature of each.

Darwin's decisive impetus for coming public happened only when he received an essay from Alfred Russell Wallace presenting in essence the very same theory. In consultation with Wallace and his friends, Darwin presented to the Linnean Society his earlier "sketch" along with Wallace's essay, as well as an earlier private letter from Darwin to Hooker (to thereby establish Darwin as the first author or discover). What would prove to be a cogent and convincing natural explanation of evolution thus entered the world, followed the year after by Darwin's *On the Origin of Species*.

Responses and Reactions

Historians and commentators present somewhat mixed opinions on the immediate reception of Darwin. Some suggest there was little opposition or stir, while a popular picture is one of robust skepticism and attack. Many are familiar with what has turned out to be a largely mythologically epic confrontation between T. H. Huxley and bishop Samuel Wilberforce during a public debate on evolution. Various accounts give the winnings to various parties, while at the time it was probably more inconsequential than later people, like Huxley himself, made it out to be. Whatever the exact nature of that event, what is certain is that then and in all responses to Darwinian evolution there was a diversity of views and opinions. While there were the staunch and vocal polarized positions like that of Huxley and Wilberforce, there was also much philosophical and theological dialogue and grappling in between.

There were a few substantial—empirical and scientific—challenges to natural selection. One issue concerned "inheritance blending": if, as it was presumed, traits inherited from parents were blended in progeny, ultimately novel variations, however advantageous, would be diluted. Variation would always regress to the mean, meaning new varieties could not develop. Furthermore, no one had ever witnessed new varieties or species arising, and those that came closest to being novel types, for instance hybrids like the mule, were generally sterile. Similarly, while there was a plethora of fossils, of diverse and extinct types, there seemed to be too great of gaps between types, "missing links" or absent transitional forms, that would be required by a slow, gradual evolution. Another challenge concerned the necessary span of time needed for evolution by natural selection to work, based on Lord Kelvin's estimate of the age of the earth (of a few hundred thousand to perhaps a million years). In time these challenges would be met,[6] though Darwin himself felt their pressure; while never abandoning natural selection, throughout revisions of the *Origins* he did gradually cut back the scope of natural

6 It would largely take the (re)discovery of Mendelian genetics in the 1930s to resolve concerns over trait blending, and with the discovery of radioactivity in the earth, Kelvin's age of the earth was extended to grant ample time for evolution to work.

selection, and more and more allowed for Lamarkian processes to be involved. Still, Darwin's (or Darwin and Russell's) achievement of proving the fact of evolution is crucially important nonetheless.

By some fifteen to twenty years after Darwin published the *Origins*, evolution had become a credible and accepted theory by the majority of scientists—and Christians too (Moore 1979, Roberts 1988). To return to an earlier distinction, by around 1875 to 1880, *that* evolution had occurred (fact) was by and large no longer doubted amongst the scientific community;[7] *how* it occurred and operated (theory) was still being worked out. Darwin's mechanism of natural selection ranged from being considered the most important process, to a minor, almost negligible factor—Ruse locates the majority opinion with the latter, writing that "people overwhelmingly rejected" natural selection as the mechanism of evolution (2006: 17).

Two of the most prominent evolutionary alternatives to Darwinism evolution can be seen in neo-Larmakism and in theistic evolution. Established and promoted by the Americans Hyatt, Osborn, and Cope, neo-Lamarkism (with its emphasis on the inheritance of acquired characteristics and internal forces of development) allowed for the evolution of species, at a comparably faster rate than that of natural selection, while also retaining a teleological character. Relatedly, a theistic evolution—such as that favored by Darwin's foremost American defender, Asa Gray—was teleological as well, allowing God to participate in the process by introducing variation or selecting those traits that would be passed on.

Theologically, many Christians had immediately perceived evolution and

7 The most prominent exceptions among scientists being, as Larson points out, "adherents of German idealism rather than biblical literalism," a remainder of a Platonic essentialism that species were "ideal types," and thus immutable (2006: 111).

Darwin's hypothesis as contrary to Christian tenets, although, as Jon H. Roberts (1988) discusses in his treatment of American Protestant reactions to Darwinism, they did not immediately consider or deal with it in a theological fashion. Rather, they first rode on the coattails of scientific criticism and earlier antievolutionist arguments, somewhat casually dismissing evolution on its lack of scientific merits. Enamored with Baconian fact gathering, systematization, and induction as the model of science, Darwin's hypothetico-deductive method seemed low on facts and high on speculation. They were quick to praise any scientist opposed to evolution (like the Platonist, Louis Agassiz) and quote any scientific questioning or criticism of the theory (of whatever form, even if it simply was meant to push for further inquiry). By around 1875 however, once American Protestants realized that evolution had become accepted orthodoxy within the scientific community, they had to grapple with evolution's, or Darwinism's, theological challenges and implications. Simply arguing that because it conflicted with Christianity, then it must be wrong, did not go very far for very long. With scientists now on board with evolution, few skeptics still argued on the basis of natural history (as the later-to-come "creation scientists" would do), and instead dealt in philosophy and theology.

James R. Moore's (1979) study of the "post-Darwinian controversies" highlights the diversity of Christian positions; Moore categorizes the major parties as Christian Anti-Darwinists, Christian Darwinists, and Christian Darwinistics. The former, Christian Anti-Darwinists, were opposed primarily on the philosophical issue of design or teleology. A paradigmatic example is the eminent Princeton theologian Charles Hodge, one of the few to competently understand and consider Darwin's theory, but who still rejected it on the basis of its ateleology. While the Calvinist Hodge was one of the

Darwin's greatest theological critics, on the whole it was precisely Calvinists who were able to accept Darwin's account of evolution, as “Christian Darwinists.” Moore credits the predestinationism of Calvinism as creating less dissonance and more compatibility between that version of Christianity and evolution by natural selection. They disdained of the interventionist God who may create a variation now and then, which implied that God, if sometimes active in creation, was sometimes absent as well; evolution by natural selection may instead be more favorable for the Christian because it implies the immanence of God in nature (Moore 1979: ch. 11). Finally, Moore's somewhat awkward “Darwinisticism” intends to reference those Christians avowing acceptance of Darwinism, but who were evolutionist only because they misinterpreted Darwin or made extra-Darwinian (such as Lamarkian) additions. That is, Chrisitians who were “Darwinisitic” or “Darwin-like,” but not fully “Darwinist” or “Darwinian.”

Worth noting explicitly, religious concerns with evolution primarily and initially were not about an apparent conflict with a literal reading of Genesis, as one familiar with the contemporary antievolutionary creationism of some conservative Christians might expect[8]. It proved not too difficult for some to replace special creation with a progressive creation or theistic evolution, though these were not without challenge from Darwinian principles either. Intentionally or not, Darwin had turned William Paley on his head, dealing a blow to both the apologetic tradition of natural theology and the theological search for teleology and (God's) purpose in the world (hence Hodge's verdict on Darwinism, that “it is atheism”). Philosophically, Darwin had done away with “final

8 On the one hand, there is a long tradition within Christianity of reading the scriptures allegorically and nonliterally, and arguably a complete biblical literalism is the more recent perspective. On the other hand, to some degree, the earlier religious and theological dealings with the advances in geology already had paved the way towards a nonliteral reconciliation of natural history and Genesis.

cause," and this had concerned scientist and religious alike. Organisms did not evolve towards some preordained end (hence something "final" also being a "cause"), but rather due to "blind" mechanism and chance. Organisms were, under natural selection, thus not divinely created and beneficently fitted with adaptation to their environment; development even proceeded through and with death and cruelty. Natural theology and the teleological argument had been arguably the "bulwark of Anglo-American apologetics" (Roberts 1988: 8), hence the religious concern over evolution. (A fuller discussion of teleology and teleological concerns over evolution will be presented in chapter 3.)

Another religious concern pertained to humans and evolution, and the social, ethical, and religious implications thereof. While speculation on the impact and relevance of evolutionary thought for human origins was present to a small degree in and with the *Origins*, it was brought into the limelight with Darwin's treatment of the matter some twenty years later in the *Descent of Man* and *The Expression of the Emotions in Man and Animals*. Were humans but evolved monkeys, apes, animals—brutes? What of human intelligence? Morals? Spirituality? What of Adam and Eve, (original) sin, the soul, salvation? There was no dearth of cartoonists' caricatures of Darwin as an ape or monkey, perhaps as if to draw all such concerns into one recurring image.

In addition to what evolution may have suggested about the origins or nature of spirit and morals, there were concerns about its consequences. True or not (perhaps), explanations without God and implying humans were animals, it would surely lead to atheism and immorality. Many saw Darwin's own life as testament to this, with his gradual slide from a confident faith to resigned agnosticism. While Darwin himself was regarded as a kind, charitable man, supporters like Huxley or social thinkers like Spencer, both whom embraced evolution, explicitly and robustly challenged Christianity, while avowing agnocisticm or atheism, not to mention radical, liberal politics contrary to the established social order. These falls from grace seemed to prove the point: Darwin's "evolution" was a dangerous idea indeed. (These moral issues and concerns are the topic of chapter 4.)

Later Developments

In many respects, the variety of responses to Darwinian evolution and the kinds of evolutionary disbelief present in the first decades after Darwin published the *Origins*, through to the scientific acceptance of evolutionary fact and theory, persist and recur in and throughout the following decades. There are perhaps three primary evolutionary and antievolutionary items to add.

First, while it was noted that evolution came to scientific acceptance by around 1875, it was also noted this acceptance was not uniformly Darwinian. Natural selection would, however, resurge as the primary mechanism and cause of biological evolution following the (re)discovery of Mendelian genetics, the subsequent development of population genetics, and in turn the "neo-Darwinian" or "modern synthesis" within Biology in the 1930s and 40s.

Second, as systems of state-sponsored education developed, evolution began to be taught and presented more and more to the general public. This teaching, and evolution itself, would in turn be challenged by skeptics and concerned disbelievers, in speeches, writing, and legal battles alike. Arguably the most famous instance was the Scopes

"Monkey" trial in 1920s America, with other major court trials occurring each decade beginning in the 1960s. As a centerpiece of this portion of evolution's history is, I argue, moral concern, I will save a fuller historical summary and discussion of these events for chapter 4, along with that of the third item, the development of a robust, antievolutionary creationism.

Part II: Scope

Having touched on the historical development of evolutionary thought, and its scientific and public acceptance and responses, I next consider some survey data in order to present the scope—contemporary and primarily American—of evolutionary acceptance and dis/belief.[9]

Gallup has been polling the American public acceptance of evolution nine times, beginning in 1982, and has shown fairly high consistency of results in those twenty-eight years. The poll asked Americans which of the following statements "comes closest to your views on the origin and development of human beings":

1. Human beings have developed over millions of years from less advanced forms of life, but God guided this process,
2. Human beings have developed over millions of years from less advanced forms of life, but God had no part in this process,
3. God created human beings pretty much in their present form at one time within the last 10,000 years or so.

Agreement with the first option has ranged from 35-40%, with the second option 9-14%, and with the third 43-47% (5-9% give no opinion). Thus, almost a half of all surveyed

9 A number of online resources provide this information. Gallup: http://www.gallup.com/poll/21814/evolution-creationism-intelligent-design.aspx; Religioustolerance.org: http://www.religioustolerance.org/ev_publi.htm; Pew Forum: http://pewforum.org/Science-and-Bioethics/Religious-Differences-on-the-Question-of-Evolution.aspx; National Center for Science Education: http://ncse.com/rncse/24/5/creationists.

reject the evolution of humans. Additional questions were also asked in various years. For instance, 2007 asked about certainty of belief: 39% said that Creationism is "definitely true," and 27% "probably true" (which interestingly when combined is 66%, while agreement with option 3 option was only 43%, suggesting that "Creationism" is not restricted to the young-earth variety); for evolution, only 18% say it is "definitely true," and 35% "probably true" (53% combined—which, similarly, highlights that evolution can be accepted in both naturalistic and theistic varieties). Answers to a 2005 question have 41% of the polled claiming they have thought about "these different explanations" a "great deal," and 35% a "moderate amount." Relatedly, on "how much does it matter to you which of those theories is correct," 40% say a "great deal" and 26% a "moderate amount." The 1991 poll also collected variables of sex, education, and income level: for instance, 25% of college graduates accepted the Creationist option compared to 65% of those without a high school diploma, and 29% of those with income over $50,000, compared to 59% of those with income under $20,000. A 1997 poll compared professional scientists' opinion with the general population, revealing nearly opposite numbers: only 5% accepted the young-earth Creationist position, 40% the "God-guiding" option, and 50% the non-God-guided position.

Polls and numbers like these say something, yet do not speak for themselves nor unambiguously. Compare for instance Gallup and Pew Foundations polls. A 2005 Pew poll found that 42% believe that "humans and other species" have "existed in present form only"; 26% that they "evolved via natural processes"; and 18% that they have "evolved with God's guidance." One commentator on the poll (religioustolerance.org) notes that while the Gallup questions mentioned God from the start, the Pew pollster first asked whether humans and species existed in present form *or* if they evolved over time, and only *then* asked whether that was a natural or a God-guided process. This may account for the comparatively higher acceptance of the natural evolution position, since Gallup asks the question in a somewhat "anti-God" fashion.

Pew research has also collected opinions on evolution correlated with various religious affiliations. Agreement "that evolution is the best explanation for the origins of human life on earth" ranges from 81% of Buddhists, steadily down through Hindu, Jewish, Unaffiliated, Catholic, Orthodox, Mainline Protestant (closest to half, at 51%), Muslim, Historically Black Protestant, Evangelical Protestant, Morman, to 8% of Jehovah's Witness. One study also correlates increasing acceptance of Creationism with a literal interpretation of the Bible and church attendance, respectively, which suggests either that other beliefs may be associated with evolutionary disbelief, or that certain sets of beliefs are part of cultural complexes or cultural identity (an issue further discussed in in chapter 5). Creationism also varies geographically, strongest in the American south (the "Bible belt"), and acceptance lessening as one moves west and northeast.

Similarly, the U.S. is not representative of the world at large. One study (Miller, Scott, and Okamoto, 2006) collected and compared data from the U.S. with 31 European countries, as well as Japan and Turkey. In the ranking by country of the level of acceptance of evolution, the U.S. ranked second to last (after only Turkey), with the lowest acceptance of evolution (deeming it "true"). The highest, most accepting, were Icelanders at 85%, with a steady decline through the countries in between.

While the distribution and patterns of belief do vary internationally or cross-culturally, the data should suggest that evolutionary disbelief is, still, a formidable phenomena worthy of research. While such studies are helpful in showing the scope of evolutionary acceptance, of belief and disbelief, they are not able to approach the details and nuances of these beliefs. To this I turn in the final section, as I strive to dissect the blanket phenomena of antievolutionism and evolutionary disbelief into a few central, foundational, and recurring types. These varieties are distilled from the history and the historians, from sociological and psychological studies, and above all from the accounts of evolutionary disbelievers themselves.

It is worth briefly noting that evolutionary disbelief is not restricted to western countries or Christian groups or cultures. Islam, for instance, hosts a share of antievolutionists, and one writer predicts that “the next major battle over evolution is likely to take place in the Muslim world” (Hameed, 2008: 1637). Muslim creationists and antievolutionists tend to share much with their Christian counterparts, seeing evolutionary theory as atheistic and materialistic, for instance, and contrary to Islam. Some explicitly borrow from Christian Creationisms, as for instance the prominent Adnan Oktar, “Harun Yahya,” who channels much from the American Institute for Creation Research and the Intelligent Design movement into Islamic countries.

One study of data collected in six Muslim countries from 1996 to 2003 (in Hameed, 2008) gives a sense of the patterns of acceptance and rejection of Darwinian evolution. Of the six countries surveyed, Egypt had the lowest level of acceptance, with only 8% agreeing that Darwin's theory of evolution was true or probably true. 11% of Malaysians, 14% of Pakistanis, 16% of Indonesians, and 22% of Turks avowed likewise. Additionally, in these five, over 50% believed that Darwin's theory “could not possibly be true.” (This data, interestingly, fairly well matches the results of the Gallup polls, above.)

The former soviet Kazakhstan had significantly more acceptance (about 35%) and far less rejection (only 28% thought it was probably false or could not be true).

Philosopher Robert Pennock, in his analysis of teaching creationism, also discusses a case of a discovery of a human skeleton in Kennewick, Washington, that sparked a controversy with a coalition of Northwest Indians, who believed it was an ancestor and wanted it immediately buried. In response to scientists wishing to study it (believing it looked more Caucasian than Native American), to learn something of early human history in that area, a tribal leader "said his people were not interested in the scientists' views: 'We already know our history. It is passed on to us through our elders and through our religious practices.' Their history says that their God created them first in that place" (Pennock, 2002: 116). "Many Amerindian tribes," notes Pennock, "have origin stories that, on their face, are antithetical to evolutionary theory and other scientific findings." Indeed, there are many religious narratives of creation, and so potentially many conflicts with naturalistic evolutionary accounts, as the above instance illustrates.

Antievolutionism need not, however, be traditionally religious. Pennock also briefly discusses the "Raëlian Movement" which started in 1970s France. "Raëlians," Pennock explains,

> reject evolution and believe that life on earth is the result of purposeful, intelligent design, but they also reject creationism, in the sense that they believe the creator was not supernatural. Instead, they believe that life on earth was genetically engineered from scratch by extraterrestrials. (2002: 116)

For these Raëlians, then, evolution is also an insufficient explanation, but on the face of it their opposition is not religiously inspired. This and the other examples help highlight the international and cross-cultural scope of evolutionary disbelief, which spans not only

North-Atlantic countries and Christian cultures, but also Islam, Native American, and Raëlian, and indeed antievolutionary beliefs have been expressed by Jewish, Hindu, and Mormon peoples, and certainly in degrees within many other cultural traditions as well.

Part III: Varieties

I believe that a distillation and dissection of the doubts and rejections of Darwin's idea of organic evolution by natural processes yields the following topical core types, based on certain categorical reasons or concerns, which, notably, may or may not be explicit or consciously held. These revolve around:

- The fixity of biological species;
- Teleology, or purpose and design (or, partly the converse, chance and randomness);
- Implications for human nature, morality, and social order;
- Conflict with the bible (or scriptural or religious narrative); and
- Proper science and epistemology.

I will discuss each in turn.

The fixity of biological species. The idea here is simply that species are fixed, immutable kinds—species are not, that is, the kind of things that can change or transform from one kind into another. Direct, everyday observation and experience of reproduction within the biological world, the seemingly punctuated nature of the fossil record, the philosophical positions of Aristotle and Plato, and also a traditional interpretation of the Biblical creation narrative all seem to support this ontological, essentialist view of species as unchanging natural kinds. Since organic evolutionary theory is first and foremost about the transmutation of species, a belief in the fixity of species is in a way the most central point of doubt and critique. I will argue, in the latter part of chapter 2, for species essentialism as a maturationally natural intuition, part of a broader "folk-biology." Intuitive beliefs in the fixity of species is perhaps a more minor cause for evolutionary disbelief, yet it is a persistent undercurrent, relevant on the one hand for explaining misinterpretations of Darwinian evolution, and on the other hand as an intuition appealed to in, and thereby supporting, antievolutionist arguments and rhetoric.

Teleology. Darwin's theory of evolution by the natural selection of variations (seemingly arising by chance) is by and large not a teleological account. It does not appeal to, and in fact excludes, direction, progressivism, purpose, or intentional design. Rather, biological evolution results from the regular mechanical properties of matter, and there is no need to appeal to any "final cause(s)" to explain this causality.

The issue of teleology proved a sticking point for many—scientifically, philosophically, and religiously. This, perhaps, is where the naturalistic aspects of Darwinian evolution most come to the fore, and hints at if not declares the "cognitive unnaturalness" of "naturalism." Concerns over teleology show in the skepticism and rejection of evolution on the basis of final cause, and to retain or appeal to alternatives that included this. Religiously, the argument from design and purposeful divine creation represent favored teleological alternatives. Explicit neo-Lamarkism, as well as implicit Lamarkian, teleological interpretations or understandings of organic evolution, also demonstrate a preference for or tendency towards teleological explanations. Relatedly, some skeptics doubt or reject evolution of the basis of, purportedly, being just “chance.”

The subject of teleology—philosophically, theologically, evolutionarily, and cognitively—and of teleologically-related evolutionary disbelief, is the focus of chapter 3.

Human nature and morality. A cluster of concerns over biological evolution revolves around the perceived implications for humanity or human nature. That is, what does evolution imply for human uniqueness and exceptionalism, as a species or an ontological category? Our place in nature? What of human intelligence? Morality?

There was little dearth of concern about relating humans with monkeys, apes, or “the beasts.” Evolution's suggestions of human animality was taken by many Victorians as a blow to human dignity. On matters of intelligence, art, and sympathy, it was difficult for many to comprehend how humans could be descended from a “lower order” of animal. Even for those who accepted and accept evolution of all other life, human evolution can be a sticking point. Co-discoverer of natural selection, Alfred Russell Wallace, himself eventually rejected the possibility of human evolution by natural selection alone, invoking instead a kind of spiritualism.

Relatedly, questions, concerns, and inferences about human nature seems to impinge on understandings of morality and moral values. What kind of meaning do moral and ethical values have in light of evolution? Is human goodness still good if it is an evolved trait, present only because it enhanced human survival? Are social norms not “right” in themselves? Many were concerned about what evolutionary theory—namely, as regards humans—when taught and promulgated as scientific fact, would do to individuals and society. Many inferred that evolution licensed or led to social and moral values and behaviors counter to the traditional, established order—be that in regards to society, nation, civilization, or religion. For insofar as right living and right belief (orthpraxis and orthodoxy) was believed to be connected with one' spiritual salvation and future, especially that of children and youths, and insofar as evolution seemed to compromise or endanger that morality or spirituality, then evolution became a object of concern, and actions taken against its teaching or promulgation.

Antievolutionary activities, well illustrated in the American crusades against teaching evolution in the schools, represent these moral and religious concerns, which are the topics of chapter 4.

Conflict with scripture. Modern day Creationism or creation science tends to be aligned with a conservative Christianity that holds the positions of plenary inspiration and literal interpretation towards the bible. Evolution is taken as contrary to, and conflicting with, the creation account of Genesis, as well as claims about human nature and future (which gets into other concerns discussed above). Note also though, that scriptural conflict is not limited to ultra-literalist conservative Protestants; the Catholic Church, for instance, holds the position that evolution is acceptable to believe, and is a well-supported explanation, but the theological importance of Original Sin has led the Church (in Pope Pius XII) to state that while God created humans through the infusion of a soul, we are descended only from two parents, Adam and Eve—which scientifically is not substantiated and is very unlikely.

This issue quickly moves into questions of *science and epistemology* as well.

There is conflict when two seemingly incompatible options (representations) present themselves for belief. This then raises issues of the sources of these beliefs, the motivations for them, and justifications of. The issues with and concerns over a conflict of evolutionary theory with scripture are part of a larger clusters of epistemological questions and the ethics of belief, which includes, more broadly, the epistemic place and role of the general categories of “religion” and “science.” Historically, evolution was and is critiqued on its lack of scientific merits, for instance, whether it has enough evidence or of the right sort, whether it is well reasoned or overly speculative, whether the theory is motivated by non-scientific concerns or agendas, and the like. However, very often, these professed epistemic, scientific concerns mask or accompany some of the other categorical concerns discussed above. This itself then raises (meta-)epistemic questions.

Somewhat indirectly, chapter 5 takes up these issues, after arriving at the theoretic need to consider (the level of) “culture” in explanations of evolutionary disbelief.

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In all of these cases, something cognitive is afoot. Whether understood or misunderstood, and believed, doubted, or disbelieved, whether passively, mildly, or robustly pro- or anti-evolutionist, central to all these phenomena is Darwin's *idea*, a (cognitive) representation of what species are and how they developed. Hence the pursuit of the cognitive foundations and cognitive contours of evolutionary and religious thought.

The remainder of this work dually moves through these issues of evolutionary disbelief , while simultaneously working through and developing concepts, models, and explanations from cognitive science. Together, these tasks develop an empirical explanatory study of Darwin's doubted idea, while also approaching a theoretic model of cognition and culture, applicable to the study of a wide range of human thought, behavior, and culture.

Chapter 2
The Essence of Evolutionary Disbelief

This chapter seeks two related goals, by pursuing double meanings of the "essence" of doubt, disbelief, and denial of Darwinian evolution. It first introduces more fully cognitive science and the cognitive perspective here employed, primarily focusing on the categories of "thought" and "belief." This chapter assembles a conceptual, theoretical, and explanatory "toolbox" of sorts, drawn from research and theorizing in cognitive science, to use and apply to the study of Darwin's doubted idea. Insofar as "belief," of various sorts, is the "essence" of the phenomena here studied (as I will argue that in important respects it is), the first part of the chapter considers the "essence" of evolutionary belief and disbelief in the formal sense, while the second part considers "essence" in a substantive fashion, in pursuing the argument that a natural, intuitive "essentialism" towards biological species biases people against evolutionary belief. In regards to aspects of our universal "folk-biology," Darwinian evolution is counterintuitive.

At the heart of this cognitive framework is what has variously been called a "dual process" model or "two-systems" approach to human cognition—two systems for, and two ways of processing, thought and belief. The core distinctions center on implicit and intuitive processes on the one hand, and explicit and reflective processes on the other. The upshot of this dualist model is a veritable explosion of categories for thinking about evolutionary dis/belief and anti/evolutionism, allowing for a novel and enriched explanatory repertoire for theorizing "Darwin's doubted idea."

Part I: A Cognitive Framework

What is a Science of the Cognitive?

Cognitive science is the multidisciplinary study of the human mind, drawing from the fields of psychology, neuroscience, linguistics, anthropology, philosophy, and artificial intelligence, as well as evolutionary theory, ethology, and education.[1] The term "cognitive" indexes how information is represented and processed by the mind (or mind/brain)[2]—these terms, however, are far from unambiguous or philosophically unproblematic.[3] Thankfully though, there is an empirically supported and well accepted conceptual and theoretical foundation from which to begin.[4]

The mind is understood to be a sort of information processor. Perception, memory, thought, learning, language use, conceptualization, belief, logic and reasoning, affect and emotion, and decision making and behavior all involve some sort of cognitive

1 Consequently, diverse methodologies are employed, included controlled psychological laboratory experiment, neural imaging, computational modeling, and anthropological field study.

2 "Cognitive" as used by cognitive science may not match exactly its usage in other areas. In Philosophy, for example, an account may be called "cognitive" or "cognitivist" as being intellectual, for instance as opposed to "emotivist" (as being emotional, affective, feelings-based) in moral philosophy. In the cognitive sciences, the term is broader, by encompassing nonconscious elements of "thought" as well, and indeed in many respects a cognitive-emotional divide is no longer tenable; cognition involves affective elements and emotion involves representations.

3 After noting that "The focus is on *how human mind/brains represent and process information in perception, thought, and action,*" McCauley (2011:3-4) next notes how "That sentence disguises in seventeen words hundreds of careers' worth of philosophical problems," and proceeds to identify a small collection of the general questions that may arise: "What are mind/brains?...What is the representation of information? What is the processing of information?..." Whole treatises and anthologies could be written (indeed, have been, in philosophy of mind, philosophy of language, and cognitive science) on debating the meaning of terms like mind, representation, and concepts, and the veracity of cognitive models and theories.

4 "The central hypothesis of cognitive science is that thinking can best be understood in terms of representational structures in the mind and computational procedures that operate on those structures. While there is much disagreement about the nature of the representations and computations that constitute thinking, the central hypothesis is general enough to encompass the current range of thinking in cognitive science" (Thagard, 2011: §3). See Thagard (2005) and (2011) for a general overview of cognitive science, with good attention to its philosophical history and debates.

processing, only some of which is accessible to conscious awareness. One of the most central ideas here is that of "representations." Under a minimalist conception, a (mental) representation is simply an information-bearing structure, and the mind processes and stores these representations in perception, thought, action, and memory. Representations thus "represent" something, they have some kind of "aboutness";[5] images, logical propositions, concepts, analogies, and rules are kinds of mental representations (Thagard, 2011: §3).

Cognition is also, as McCauley (2011:17) puts it, "embodied" and "embedded." Minds and brains are part of bodies, and bodies are part of physical and social environments. We should acknowledge, writes McCauley, "that every type of mentality that we can study, including our own, is embodied in material systems and that our bodily experiences shape our ideas." One line of evidence "is the pervasiveness of metaphors that appeal to the physical, spatial, and bodily when we talk about abstractions" (McCauley, 2011: 17; cf. Lakoff and Johnson, 1999, on "conceptual metaphor"). There is also a crucial link with somatic emotional states, in informing and structuring perception, thought, and action (cf. Damasio, 1994). Furthermore, "Humans' physical and social environments often play a pivotal role in their cognitive successes" (McCauley, 2011: 17). We can use and construct artifacts and symbols to augment our cognitive capacity, whether by helping us compute and reason or by off-loading information away from memory. We even manipulate our social environments and structure our social arrangements in order to construct "social divisions of cognitive labor" (McCauley, 2011:

5 The nature of "representations," and associated theories of "representationalism" and "antirepresentationalism" are a few items of philosophical debate within philosophy of mind and language. Issues of reference, truth-value, semantic properties, and the like, can however be bracketed for the basic discussion at hand.

19-20), and manipulate physical and social space to improve cognitive tasks (like making specialized buildings, placing road markers and signs, and dressing people in uniforms). While we may tend to think of cognition as occurring "in the brain," it is in fact a rather extended—embodied and embedded—phenomena.

Cognitive scientists generally hold a modular view of the mind, wherein our minds possess different systems or mechanisms performing different tasks, rather than being one "all-purpose" information processor; however, the degree of modularity of the mind, along with the degree of interconnectivity and communicability between its various systems, is more discussed with less consensus on the details. A mind loosely conceived as modular does however provide the backdrop for the discussion of "dual-processing" and the two-systems model that follows.

Along with philosophical discussion over "representation," "computation," and the like, "belief" has also come under some scrutiny, including by scholars of religion (Bell 2002; Lopez, 1998). Since I have adopted the language of evolutionary belief and disbelief, I will fittingly devote some explicit discussion to that topic—joining, as it were, religion scholar Terry Godlove (2002) in "saving belief." I will briefly introduce a cognitive perspective on belief, and later more explicitly turn to its merits in a defense of belief.

Cognitively, belief might be considered as a representation (information) towards which we hold a "credal attitude" (Sperber, 1997), a cognitive "commitment" (Barrett and Lanman, 2008). We believe something when we are disposed to treat this representation as true, accurate, veridical, and factual, and this may come in degrees. We can have many kinds of attitudes towards a representation, or represent that information in a variety of ways, “belief” being just one of many. We can also, for example, desire something or imagine something, without believing it. What this taking-true of belief entails is being disposed towards a responsive acting as if the world (that which is represented) were that way, a feeling or conviction about the appropriate kind of response. “By 'believe,'” writes Sloman, “I mean a propensity, a feeling or conviction that a response is appropriate even if it is not strong enough to be acted on” (1996: 11). “Doubt” and “disbelief” might then capture the opposite—a propensity or conviction that a response is *not* appropriate, or a that a response is appropriate for the representation's negative, or opposite, or some alternative.

For example, one is differently disposed, and probably feels differently, towards something that one believes versus something that one only imagines, even if the represented content is the same. “There are pink unicorns,” for instance, could be believed, imagined, desired, or doubted or disbelieved. Accordingly, we in turn may be more or less likely to expect to see pink unicorns, to categorize some percept as a pink unicorn, to treat other people's testimony about pink unicorns as veridical or not, and so on, varying with our credal attitude.

However, there are different ways that we can come to believe, different processes from which beliefs may be acquired or developed or in which they may function. This is the case because vast empirical evidence and sustained theorizing suggests the mind has two rather different cognitive systems.

Two Cognitive Systems

Over the past two or three decades, there has developed an arguable consensus that there are two systems of the mind responsible for distinct operations of representing and processing information, responsible for those phenomena we are wont to call perception, consciousness, thought, and belief. New life is being given to a rather old idea. The problem of explaining thought and behavior prompted, for instance, Plato to develop his threefold "chariot analogy" of the mind (or mind-soul-body). Plato saw, as we perhaps all do, that it can seem as though our selves can be "pulled" in different directions, one part thinking or wanting one thing, another part something else. This perspective in a general sense is standing up to empirical and systematized inquiry.[6]

Whereas figures like Plato and Aristotle saw clear identities and boundaries to our separate faculties, psychologists and cognitive scientists are finding the process more difficult. Pyysiäinen (2004: 128) surveys a broad collection of relevant literature, and lists twelve different but overlapping distinctions between cognitive systems or processes that have been drawn and proposed by multiple authors. These comparisons include those between: subconceptual and conceptual processes; implicit vs. explicit cognition; implicit vs. explicit knowledge; associative vs. rule-based systems; intuitive and reflective beliefs; and a reflexive and reflective system. Subtle and nuanced differences nonetheless seem to parse out onto two broad but distinct cognitive foundations. For his general discussion, Pyysiäinen terminologically settles with the simple distinction between A- and B-systems of processing. However, I will later suggest that the categories "implicit" and "intuitive," on the one hand, and "explicit" and "reflective," on

6 Sloman (1996: 3) notes that "One of the oldest conundrums in psychology is whether people are best conceived as parallel processors of information who operate along diffuse associative links or as analysts who operate by deliberate and sequential manipulation of internal representations. … An obvious solution to the conundrum is to conceive of the mind both ways—to argue that the mind has dual aspects..." Sloman does go on to note that "However, the distinction is not a panacea; it is problematic for a couple of reasons," noting that the distinctions made are not always consistent with one another, and that their "mode of interaction" needs to also be described.

the other, well capture and summarize the features of cognition that are salient for the purposes at hand. Their meanings are not however self-evident, nor are each necessarily mirror-opposites of another.

Each system can be (and has been, as in Lieberman, et. al., 2002) helpfully discussed in terms of its phenomenology, it operational characteristics, and its neural bases. I will not here much attend to the neural aspects; it is probably sufficient to note, first, that neural structures and operations are responsible for cognition, and second, that experimental evidence correlates (localizes) particular processing systems with particular areas of the brain (which in turn supports the modular distinction). I discuss the A- and B-systems respectively.

The A-System. Phenomenologically, the key features of the "A-system" is that it operates automatically and reflexively, that is, without conscious deliberation and awareness; while the representations (percepts, images, feelings, intuitions, beliefs, judgments, decisions, etc.) that are generated may be known to consciousness, the inferential processes which delivered them are not—a crucial difference between the A- and B-systems. "When a response is produced by the associative system, a person is conscious only of the result of the computation, not the process," writes Sloman (1996: 6), and "Associative thought *feels* like it arises from a different cognitive mechanism than does deliberate, analytical reasoning" (Sloman, 1996: 3). This "reflexive" system is part of the processes producing our stream of consciousness, or "consciousness *as*" something, forming "an ever-present backdrop for hanging the mental pictures that we focus on and it is usually only noticed if there is something very wrong with it"

(Lieberman, et. al., 2002: 218; more on the latter will follow).

The processes, and sometimes the representations, can be described as "implicit" rather than "explicit" In regards to thought, "intuition" refers to these unconscious, nonreflective processes, and the resulting knowledge or belief termed "intuitions." Speaking of "intuition," Lieberman (2000: 109) notes that "phenomenologically, intuition seems to lack the logical structure of information processing." The inferences drawn by this system feel "given," like something we just "see" (Lieberman, et. al., 2002: 204). There is an affective element to intuitions; when we experience positive affect or feeling associated with a representation or process, we implicitly and nonreflectively trust them because they feel right (cf. Damasio, 1994). This intuitive system of inference or reasoning, and the intuitions and intuitive beliefs it engenders, is however not quite the same as what common parlance presents as a "hunch" or suspicion ("I've an intuition that..."; "What's your intuition on this?"). There is indeed often a feeling of naturalness to the intuitive, but a (low-level) feeling of which we may or need not be aware.

Operationally, the A-system involves associative, subsymbolic, pattern-matching heuristic processes, within a connectionist, parallel-processing structure (Sloman, 1996; Lieberman, et. al., 2002; Pyysiäinen, 2004). Being parallel, rather than serial, means that multiple inferences and associations can be made of or with many represention at once. It is subsymbolic in that it does not make use of symbols (where representational units stand for any one single thing or concept), but rather where representations are "reflected in the pattern of activations across many units in the network" (Lieberman, et. al., 2002: 206). Such is a "connectionist network," a model of how representations and computations can be instantiated across a network of associations, which incidentally fits well with how neural networks seem to be structured and work. Being heuristic, it proceeds quickly and automatically, delivering “rough and ready” knowledge about our experiences, associatively pattern-matching by using “temporal and similarity relations to draw inferences and make predictions that approximate those of a sophisticated statistician” (Sloman, 1996: 4). When making decisions, there is an implicit, unconscious appeal to affect: we “ask a question” and wait for a feeling to emerge (Lieberman, 2000: 110).

When considered over time, the operation of the A-system amounts to and is responsible for nonreflective, implicit learning processes of developing skills and acquiring implicit knowledge through maturation and experience. Again, it is implicit because we do not know (or may not be aware how) it is occurring, need devote no explicit attention to mastering such skills or acquiring such knowledge, and may not be aware that we have (acquired) such skills and knowledge—the skills and knowledge we use in our daily lives. “The A-system,” writes Pyysiäinen (2004: 131), “is largely responsible for what is known as 'common sense' or 'everyday thinking'.” It

> proceeds from the immediate experience of individuals; it aims at short-term, practical efficacy, not at creating general theories; it seeks evidence and not counter-evidence; it makes use of individual cases as evidence and personalizes values and ideals; it makes use of abductive inference; and its argumentation often takes a narrative [rather than logical] form.

So, through our experiences, we will apply and develop concepts and associatively and inferentially come to hold expectations and make predictions about the world. These are effectively implicit “theories” and intuitive “beliefs,” that often unbeknownst to our conscious selves structure and inform our understanding of (and consequent acting and living in) our experienced worlds, forming (locally)[7] coherent representations of the situations at hand.

This is not to suggest the A-system is a "poorer" kind of reasoning;[8] any evaluation depends on the goals we have. True, it does not provide the rigorous, logical thought that is epitomized and appraised in philosophical argument and scientific theorizing (this belongs to the B-system). The A-system does provide fast and helpful, if not usually fairly (and contextually) accurate, reasoning about situations, that "serve the purposes of organizing the data of experience and guiding behavior" (Pyysiäinen, 2004: 131). Indeed, we probably could not function on (the slower) deliberative, conscious reasoning alone; the A-system provides the initial representations that B-system reflection needs for its explicit logical ratiocination. Furthermore, intuitive processing and experiential theories can provide insight that might otherwise elude us; it is the spontaneity and associations of A-system processes that is truly creative (as when something just "comes to mind" or we experience "flashes of insight").

Following the work of others, notably those with interests in culture and religion (Sperber, 1997; Barrett, 2004; Pyysiäinen, 2004; Barrett and Lanman, 2008), we can translate what was above discussed (in terms of representations and cognitive processing into the more familiar terms of "belief." Representations of the A-system to which we credally commit might be termed "implicit" or "intuitive beliefs." For an intuitive belief

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7 Note that implicit reasoning systems do not aim for global coherence of all information and experience, something which the B-system does however often seek out.

8 This is precisely how some researchers conceived A-system processes. For instance, heuristics were first described as "quick and dirty ways of arriving at decisions," and accordingly "serious sources of error because of their overuse or inappropriate application," and there was focus by psychologists "on their maladaptive consequences...mainly regarded as undesirable quirks in thinking" (Epstein, et. al., 1992: 337). A fuller perspective recognizes that such intuitive processing is also incredibly adaptive and useful, that "the two systems serve complementary [not competing] functions" (Sloman, 1996: 18), as the above paragraph seeks to show.

(for a belief to be intuitive), we may not be aware that we have it—that we have a representation of its content, with a credal disposition towards it. Barrett and Lanman (2008) suggests these intuitive beliefs map onto what might be called "tacit knowledge."

> These non-reflective beliefs are the cognitive representations that we have whether we know we have them. They are non-reflective in that they do not require conscious, deliberate, reflective [B-system] resources to form them. We may not be aware of our non-reflective beliefs even though they guide our information processing, speech, and other actions. (Barrett and Lanman, 2008: 111)

Intuitive beliefs are thus formed by A-system non-reflective processes. They are formed spontaneously and effortlessly through our development and experience, and we may not know we acquire them, or that they help guide and structure behavior, or that we appeal to them in our intuitive reasoning and acting. As such, we may have no (explicit, known) justification for holding them or finding them reasonable. They are often not (and need not be) represented as propositions, though may (or will) become so when made the objects of reflective awareness, thereby becoming reflective beliefs as well. Intuitive beliefs are part of what McCauley termed "natural cognition."

That implicit knowledge is *learned*, that we *develop* intuitions and implicit knowledge *over time* and *through experience*, clearly suggests that these are note solely or crudely "innate" or "hard-wired," although some degree of nativism is possible. Certainly these reflexive, intuitive systems may be "innate" in that they first begin to develop due to genetic programs. Some implicit knowledge seems to be present without experience, as seen in newborn infants' skill and bias towards picking out and attending to human faces and facial-like images from an otherwise undifferentiated perceptual field of shades and colors. The very ability to learn depends also upon a host of cognitive structures and processes that must already be present and minimally developed to be used, which shape and bias our perception and experience of the world, abstracting and providing information that can then be cognitively processed.

But it is also the case that reflexive intuitive systems can be initially underdeveloped, requiring certain environments and experience to form, the same way a muscle develops through use and might otherwise deteriorate when neglected. The way our bodily feeling and experiences within physical space structure much of our conceptualization is one example (cf. Lakoff and Johnson, 1997). Human experiences during development in our shared physical and social worlds surely play a role in the development of our cognitive systems. The exact extent of shaping as well as fluidity may vary from system to system and process to process, and an issue of debate and research among scholars and scientists.

McCauley (2011) has offered the term "cognitive naturalness" or "cognitively natural" to capture these features of the A-system. "As a first pass...beliefs and actions that are intuitive, familiar, and held or done without reflection qualify as cognitively natural" (2011: 14). He notes that "*intuition* is the principal manifestation of natural cognition in our mental lives" (2011: 14), and often such cognitively natural knowledge is transparent (we know what we know and that we know, but may not know why we know it). Natural cognition produces the "background knowledge, which both frames and enables our transactions within our physical and social environments" (2011: 15).

Going further, however, McCauley divides natural cognition into two types, that which is "maturationally natural" and that which is "practiced natural." More modest than nativist claims of innateness,[9] arguing that some cognitive systems and intuitions are

9 "Whether some cognitive accomplishment is maturationally natural does not depend on whether it depends exclusively or even directly on some genetically determined capacity. Any genetically determined capacities, if any there be, will qualify as maturationally natural. But maturationally natural

maturationally natural is merely to claim that they reliably and regularly develop across all human populations. If there is a cultural element to the development of maturationally natural cognition, it is only of the general sort. McCauley notes that maturationally natural cognition and practices humans develop and take up spontaneously, and "[The] acquisition does not depend upon explicit instruction or specially structured learning environments, and it does not turn either on inputs that are particular to a culture or (even) on inputs that are culturally distinctive" (2011: 29). McCauley contrasts this type of cognition with that which is "practiced natural" (like "second nature"), those ideas, skills, and ways of thinking and acting that have become natural through much experience and use, which have come to use or be part of the A-system through particular practice and learning. It is not then that culture is "unnatural"—culture may be and often becomes natural through "practice"—but the specifics of culture are not maturationally natural. This will prove to be an important distinction.

The B-System. B-system processes and representations closely match what we tend to think of as "thought" and "ideas." It is marked phenomenologically by our awareness of these ideas and beliefs, of our deliberation, reflection, and ratiocination. The B-system is "reflective awareness," explicit "consciousness *of*" something, such as objects of perception or mental representations like concepts, ideas, or beliefs. "Any phenomenon or event in the stream of consciousness," write Lieberman, et. al. (2002: 218), "can be extracted from that stream, attended to..., reflected upon..., integrated with other symbols..., and so on." There is a sense that reflective thought is more willful,

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cognitive systems need not be innate, let alone genetically determined" (McCauley, 2011: 45).

potentially more "our own": "Thinking usually feels volitional, controllable, and somewhat effortful, whereas in contrast seeing feels thoroughly involuntary, uncontrollable, and easy. We decide to think about something...and then we go about doing so" (Lieberman, et. al., 2002: 220). It may be more associated with our selves, our identities, something we take pride in, and because of this at times more trusted.[10]

Explicit reflective thought is operationally symbolic and rule-based.[11] It proceeds serially and sequentially, using symbolic logic to construct propositions which can in turn be limitlessly processed with other rules and propositions to form even more propositions. Rather than finding patterns in the world, the B-system "tries to describe the world by capturing different kinds of structure, structure that is logical, hierarchical, and causal-mechanical" (Sloman, 1996: 6). The B-system is "able to encode any information that has a well-specified formal structure," which "also allows the generation of new propositions on the basis of systematic inferences, as well as genuine [causal] explanations, in contrast to mere predictions" (Pyysiäinen 2004: 131). The "rules" it uses can be instructions, or may be like "laws of nature or society or rules of logic"; some are

> handed down through culture, others are made up, and some are discovered in nature or logic. Humans can understand and apply all of these rules without external support as long as they have become internalized, as long as their analytical machinery has access to and mastery of them. (Sloman, 1996: 5)

The B-system literally requires more time to work. While implicit processes are quick and work when an immediate response is needed ("on-line" reasoning), explicit

10 This however surely varies. There are times when a correct answer seems to elude our reflective thought, and we instead "trust our gut instinct," our intution, and what feels right or natural. Sometimes we blame our reflective thought for going wrong or leading us astray. Relatedly, on a cultural level "intuition" can also be deemed a source of truer insight, higher truths, or mystical seeing into what is more real.

11 "I call this form of reasoning *rule based* because rules are the form of representation that exhibits the properties of productivity and systematicity most transparently. Rules are abstractions that apply to any and all statements that have a certain well-specified, symbolic structure. Most important, they have a logical structure and a set of variables" (Sloman, 1996: 5).

reflection is slower and more deliberating. Consequently, it is more suited for analysis and forethought ("off-line" cognition):

> Symbolic logic allows us to escape the limits of empiricism and move beyond the mere representation and association of events in the world and into the realms of the possible. ...we can consider the future before it happens and learn from mistakes we have never made. (Lieberman, et. al., 2002: 221)

It is also more dispassionate, its rule-based logical structure less directed by affect and apparent associations. Conversely, "the more emotionally charged the situation, the more a person's thinking is dominated by the experiential [A-] system" (Epstein, et. al., 1992: 330).

The B-system is partly activated by and biasing of the A-system. Lieberman et. al. (2002) describes the reflective system as possessing an "alarm-system," being activated when we encounter problems or incoherence in our implicit, intuitive processing; "an act of search or investigation" following "a state of perplexity, hesitation, and doubt" (Lieberman, et. al., 2002: 222, quoting John Dewey). Exactly what qualifies as a vexing problem is partly established by our reflective system itself, which can instantiate a bias as to what to be aware of in our experience that we ought to reflect upon, as though setting an alarm clock as to when explicit reflection should be called.

While there has been in Western intellectual thought a higher view of rational, reflective thought over intuition, explicit reasoning has its shortfalls as well. B-system thought may also arrive at faulty conclusions, for instance by failing to consider alternative information (Lieberman, et. al., 2002: 226). While its logical virtues have been extolled, phenomenologically "People implicitly know that reflective awareness can be painfully oppressive in a way that the stream of consciousness cannot" (Lieberman, et. al., 2002: 219). The authors go on to suggests that having this system "may explain why dogs as a whole seem so much happier than human beings”!

The B-system is more thoroughly “cultural” than the “maturationally natural” A-system. While intuitions develop readily, in an “untutored” fashion, given human bodily and social experience, the reflective processing and explicit knowledge of the B-system depend much more heavily on culture—on actual language, public representations, explicit propositional thought, and observed and tutored practices. Culture provides to us many of the rules, propositions, concepts, explanations, skills, and practices that the rule-based logical system of thought will take in and manipulate. Explicit education and skill practicing exemplify this process, though there are degrees.

B-system representations and processes can, as with the A-system, be couched in terms of “belief.” Reflective beliefs are “those beliefs that we consciously hold; truths we explicitly endorse” (Barrett and Lanman, 2008: 111). A reflective belief is explicit and we are aware of its content and our attitudes and feelings about that representation. It is something we can easily report to ourselves or others, and we are aware of (or seek out) the justification for our belief, and may have explicit memories about when we came to acquire such information and why we trust it as valid. We are conscious of our rational reflection upon and using our explicit beliefs.

A cognitive capability that has important bearing for explicit beliefs is our meta-representational ability. Described by Sperber (1997), this is the ability to embed representations within other representations, for instance the representation “the earth is flat” embedded in the representation “John believes that the earth is flat.” This can function as a kind of bracketing of a representation without being committed to it. It also, importantly, allows for meta-representing propositions that one may not fully understand,

and by virtue of this even believing something one does not understand. This could be that "there are millions of suns in the universe," which young Lisa does not understand (she knows only of one sun) but will believe on the authority of her trusted teacher. Or it could be that "the Father, Son, and Holy Ghost are one" which young Bob cannot conceive (three persons who are one?) but whom trusts his Sunday School teacher and believes. (Both examples from Sperber, 1997: 75-76). Both Lisa and Bob have developed a reflective credal dispositional attitude towards their respective explicit representations, yet do not fully understand what they mean. The same may go for beliefs about evolution.

When prompted about a belief held only implicitly, it is likely that we may be able to reflect upon it, thereby making it explicit and communicable—and thereby representing it within our reflective B-system (or rather, it becoming explicit by virtue of becoming so represented). The implicit is made explicit, and takes on a propositional character. It seems likely that at those moments of reflection, the belief is thus dually instantiated and dually processed. Thus there may seem to be some overlap between these types.

To summarize, "implicit" belief perhaps best captures beliefs—representational commitments, "tacit knowledge"—that we are not aware we hold or possess. Because representations in the A-system may consist in distributed networks, such "beliefs" may be more like dispositional states. When we ascribe "virtual" beliefs (Sperber, 1997: 69) to someone, this may be what we are indexing—a dispositional belief-like character of implicit cognition. "Reflective" belief, on the other hand, best captures the inverse, the beliefs—the representational commitments and credal attitudes—that we know we hold, and that we know why we hold them. That is, we can reflect, or have reflected on them, for reasons and justifications of a logical (rather than narrative) sort. Reflection of the "first-order" may merely make us aware, make explicit, *that* we have a belief; it is reflection of the "second order" when we realize why, or deliberately think-through and develop our explicit beliefs. "Intuitive" and "explicit" may seem to partly overlap, as we may be aware of having an intuition or an intuitive belief—thus it may be "explicit" in that sense—but not know why we believe. Yet intuitive (and implicit) beliefs should still be recognized as produced by A-system processes, and "explicit" (and reflective) beliefs by the B-system. "Implicit" and "explicit" may largely address the phenomenology of cognition and belief, while "intuitive" and "reflective" are more directed at the level of processing.

This, then, has been an introductory sketch of cognition, with particular attention to the "dual-processing" model or two-systems approach widely held within cognitive science. I next turn attention more fully to the manner in which these cognitive systems and types of belief interact, in particular to the kind of "primacy" intuition appears to enjoy, which is especially salient when considered in light of maturationally natural intuitive beliefs.

<u>"Intuitive Primacy"</u>

An interesting effect of our possessing two distinct cognitive systems of reasoning is that both can operate in tandem and are mutually inclusive. Moreover, one kind can develop into the other. For instance, objects can be abstracted from our "stream of consciousness," from intuitive processing and our implicit knowledge, and become objects of reflective awareness and explicit reasoning. As noted above, if only momentarily, we may make the implicit explicit, by reflecting on our thought and becoming aware of that which we were unaware. We may store previously implicit representations as explicit memories, and later use them in symbolic, logical thought.

Furthermore, what initially took explicit attention, deliberation, and reflection, over time can become intuitive, implicit, and nonreflective as well. This is what happens when something becomes "practiced natural," or "second nature." Interestingly, it has been shown that when this happens different regions of our brain manage the processing (that is, are activated, for the same content or activity; this in turn supports this distinction between these two systems). Playing the piano or solving mathematical problems (which are cultural practices), for instance, may both begin with our conscious, reflective systems of learning and reasoning; over time, we develop the nonreflective intuitive-level processing where these activities can be done spontaneously and without explicit attention. There is information that we initially knew how we reasoned or came to acquire it, but which later is reflectively unavailable but still used in intuitive reasoning. Hence, importantly, even cultural information, of any sort, through the "practice" of everyday cultural living seemingly can become just as "natural" as that intuitive knowledge developed through maturationally natural cognition.

Without otherwise preexisting explicit beliefs, intuitions seem to function as the "default" of reflective beliefs of reflective thought. When confronted with novel questions or problems for which we have not explicitly reflected, we will "default" to our implicit knowledge and will form an explicit belief consistent with intuitions (Barrett and

Lanman, 2008: 112). Intuitive beliefs thus ground and suggest explicit ones; inversely, explicit beliefs gain plausibility when convergent with implicit beliefs. Unless our explicit beliefs are challenged (for instance, by an interviewer), when in line with intuitive beliefs, they will feel right.

However, because there are two cognitive systems that can operate independently and simultaneously, these systems can also conflict—they can arrive at contrasting and even incompatible responses and solutions. More often than not, the intuitive A-system takes priority. Consider some of the observations and verdicts the above cited authors have made of this dual-processing interaction:

> [E]ven when a person is attempting to be rule governed, associative responses encroach on judgment. The force of the evidence is to support that people have and use two computationally distinct systems of reasoning but also that the associative system intrudes on the rule based one. (Sloman, 1996: 15)
>
> It seems that we humans are at once capable of developing complex theoretical approaches to things, and also incapable of holding on to these approaches in fast on-line reasoning. This is because our explicit reasoning tends to get invaded by intuitive presuppositions that are not voluntarily or even consciously brought to the chain of reasoning and the validity of which thus is not assessed. (Pyysiäinen, 2004: 124)
>
> [T]he influence of the experiential conceptual system...is so fundamental that even when people attempt to be completely rational, they are often unable to escape its influence. (Epstein, et. al., 1992: 334)[12]

This distinction plays out in observation and experience. “The fact that both systems can be operating at the same time gives rise to some familiar dissociations between what we think and what we see” (Lieberman, et. al., 2002: 225). Sloman (1996: 3) explores this through “several experiments [which] can be interpreted as demonstrations that people can simultaneously believe two contradictory answers to the

12 “Intrudes,” “invades,” “unable to escape” do have negative connotation, so it is important to note the characterizations are relative to an individual's own goals and avowals of the appropriate reasoning. However, a holdover of the philosophical primacy of logical thought may also be at play.

same reasoning problem—answers that have their source in two different reasoning systems." Such is the case with optical illusions like that of the Ames room or the "Müller-Lyer Illusion" (cf. Sloman, 1996: 11; McCauley, 2011: 37-44).[13] Through uncontrolled, nonreflective processes, the person in the Ames room appears to change size, while one of the Müller-Lyer lines simply "looks" shorter. But we can also enter the room or reason about its construction, or measure the two sets of lines, and come to a different, reasoned explicit belief. Yet we will still succumb to the illusion, and "feel" that what we perceive is real and right.

Another experimental example is that of the fictional "Linda" (cf. Sloman, 1996: 11), whom subjects learn is an intelligent, single 31 year old woman, who as a student majored in philosophy and was concerned deeply with issues of social justice and discrimination. Subjects in the experiment were asked to rank eight statements about Linda according to probability, two of which were that (T) Linda is a bank teller, another that (T & F) Linda is a bank teller and is active in the feminist movement. Across 3 groups of participants, over 80% ranked T & F as more probable than T alone. Logically, T alone (that Linda is just a bank teller) has to be more probable than the conjunction of T & F (that she is both). Participants will even explicitly, logically recognize this, when it is pointed out. Yet there remains for most more psychological force to assenting to T & F, because from the description of Linda, we (due to intuitive, associative thought) more readily imagine her as a feminist than a bank teller, which makes T & F simply seem

13 The Ames rooms is a room that, when peering through a keyhole, appears to be of normal proportions, yet is actually cleverly designed, accounting for the viewer's perspective, such that a person moving to one side of the room or the other will appear small or giant to the observer. The Müller-Lyer illusion consists of two lines of equal length, one placed a short distance above the other, the former with abutting end-lines pointing inward as though making arrows on each end, the other with lines pointing outward, which appears to be the longer.

more likely. Two cognitive processes delivering two verdicts—and one having more force than the other.

In terms of belief, because of these two systems, we can therefore have the two different types of belief *about the very same thing*. We could hold a belief that there are pink unicorns intuitively, implicitly, and nonreflectively, and we can also hold that belief explicitly and reflectively, this "holding" done by two different systems, simultaneously. But more importantly, this dual-processing allows that we can *believe and disbelieve the very same thing*, or in other words hold beliefs that are incompatible or mutually incoherent—believing something intuitively, and believing-not reflectively. In cases like the above, subjects come to know that they are drawn towards different "beliefs," different judgments regarding a particular problem. In these clever experiments, the stakes are often not high. In "real life," however, there is often more importance in the reasoning and choices we have to make. Moreover, we may not always be aware (very often we are not) that we think in these two different ways, make inconsistent judgments, and hold incompatible beliefs.

Supporting evidence for this also comes, fittingly, from studies of religion. Barrett (1999) explicitly surveyed subjects on their beliefs about God (for Westerners) and Shiva, Krshna, Brahman, or Vishnu (for Indians). Given time to reflect, subjects explicitly reported their beliefs (their propositional commitments, or knowledge or understanding) of their avowed deity, describing, in other words, how there deities are represented. Following that, subjects read a narrative involving their deity, and then answered questions about it. Despite subjects' prior explicit descriptions of omnipotent, unlimited, super-human deities, in the narrative task subjects appear to systematically interpret or misremember the stories, and describe a much more limited, human-like deity.[14] Barrett explains the differences as due to the fact that the initial questions called for reflective "on-line" cognition, and subjects could report on their systematized, structured beliefs about deity. In answering the narrative questions, however, subjects instead appealed to intuitive "off-line" reasoning, drawing on and expressing implicit, intuitive beliefs which were in line with standard intuitions about agency, psychological states, and actions. It is notable that without the dual-processing and -believing model, interpreters are left asking what the subjects "really believe," or questioning whether they are inconsistent, "bad" reasoners. The two-belief view instead allows us to recognize as normal the multiplicity that may exist, with different contextual application and role.

This "theological incorrectness"[15] (Slone, 2004) quite often goes unnoticed, as certainly do most other of our (non-theological) inconsistent beliefs—those we might avow and those we implicitly hold. Context and situation is largely responsible, as we appeal to our separate cognitive systems and beliefs in different kinds of situations for different needs. (Fast, "on-line" A-system processing is used when quick decisions are needed, whereas B-system processes are activated when we have time to deliberate and explicitly reflect.) But this dissonance can come to our attention; sometimes we can brush off this dissonance, sometimes we live uncomfortably with it, and sometimes we simply may not know what to make of it. Hence our feelings of being "torn," of being "pulled" in different directions—of our "heart" telling us one thing and our "head" telling us another.

14 For instance, while subjects may have reflectively endorsed an omnipotent God who is unconstrained by time or space, in recalling the narratives they describe a God who first answers one person's prayer, and then moved on to answer another's, as an embodied person would have to do; the omnipotent God would be able to "answer" both prayers simultaneously and immediately.

15 Incorrect, that is, according to subjects or people's' initial theological avowals.

As the above example affirms, when it comes down to "real-world," "everyday" tasks, intuition usually gets priority. This has been put into stark perspective in research in moral psychology by Jonathan Haidt (cf. 2001, 2007). In one experiment, subjects were read various narratives of events. One story, for instance, described a family whose dog had been hit by a car, and reasoning that it ought not be wasted, they decide to barbeque it. Another story describes a brother and sister, who while vacationing in the south of France decide it might be fun to have sexual intercourse, and do so each with contraceptive protection; no one knows, they choose to keep it a secret, and out of disinterest (not guilt) decide not do it again. Many subjects (unsurprisingly!) claim that the acts were morally wrong. Yet the arguments they give get dismantled by the interviewer, until subjects are avowedly left with no rational, logical reasons, yet hold to the intuitive belief in the moral wrongness nonetheless. Haidt's studies collectively support the dual-process model, and suggests what Haidt (2007) calls (in the realm of moral reasoning) "intuitive primacy (but not dictatorship)."[16]

This fits with the observations about the general "force" of A-system processes and beliefs noted earlier. In Haidt's work, explicit, reflective thought comes to be characterized as post-hoc rationalization of intuitive beliefs. We possess intuitions (determined to a great extent by affect, for instance in moral reasoning by disgust), and then develop reasons or justifications for why we have them. The moral verdicts above "feel" right given the disgust felt towards the actions, but if our reflective system wants more than feeling as a reason, it will construct an explicit, logical explanation as well. (Even these have to eventually feel right, else we would continue to develop reasons ad

16 I will provide an extensive discussion of Haidt's moral psychology in chapter 4.

infinitum.)

Haidt does note however that this “intuitive primacy” is “not dictatorship.” “Affective reactions push, but they do not absolutely force”; and “There are at least three ways we can override our immediate intuitive responses” (2007: 999). Haidt lists these as conscious verbal reasoning, reframing a situation, and talking with people who raise new arguments. These amount to consciously, explicitly acquiring new data for intuitive consideration, a recursive interaction between intuition and reflection, and between an individual and other persons.

Because of the “primacy” intuition formally enjoys and obtains over reflective thought, what, substantively, intuitions humans tend to have becomes quite relevant as well. Recalling McCauley's argument for “maturationally natural cognition,” some intuitions or intuitive beliefs are likely to be formed during and as part of natural human maturation—independent of particular experiences, instruction, or culture. Evolutionary explanations, however, *are* a specific part of particular culture from which people learn. Hence the relevance of intuitions that may conflict with evolution, reasons that evolution could be “counterintuitive” or cognitively “unnatural.”

Maturationally Natural Intuitions

Many intuitive beliefs seem virtually universal. Some of these have come to be called by many cognitive psychologists and anthropologists “folk” domains of knowledge, or intuitive ontologies or ontological intuitions. Our folk-mechanics (expectations about and understandings of the regularities and causal properties of the physical world), folk-biology (classificatory, causal understandings about living things, and the subject of Part II of this chapter), and folk-psychology (beliefs about people's, ourselves' and others', mental states, intentions, and agency) seem to reliably develop and be present in all healthy, socialized humans. This panhuman universality raises questions. How do these beliefs develop? How do we acquire them? Are they innate? Genetically determined?

As noted earlier, certainly our genetic programs provide the initial foundation for developing the cognitive systems that are responsible for forming our intuitions and implicit beliefs. But it is unlikely that many "beliefs" are genetically determined, in that sense "innate," hence the preference here for McCauley's description as "maturationally natural." The idea here is that such beliefs readily develop in physically healthy humans living in physical, socio-cultural environments, given the embodied and embedded cognitive systems we have.

Indeed, it takes both time and experience to form maturationally natural intuitive beliefs, an interaction of genes, biology, and body; physical and social environments; and cognitive processing. Regarding maturationally natural intuitions or intuitive beliefs, Pyysiäinen (2004: 126) writes

> They are "innate" in the sense that the gene-environment interaction in ontogeny [development] gradually and by necessity builds a cognitive machinery that produces these intuitions regardless of any conscious effort and regardless of the specific type of cultural environment in which one matures.

This may suggest intuitive beliefs are "acultural." But the author continues:

> These modules [responsible for intuitions] are taken into use in ontogenetic development in interaction with a natural [i.e. physical; nature] and cultural environment. It hardly makes sense to ask what comes from culture and what is innate, because everybody matures in a culture. All we can ask is whether some cognitive capacities would develop different in a *different kind* of cultural environment. (Pyysiäinen, 2004: 138)

Because of the ontogenetic interaction between experienced nature and culture, it is difficult to say what might be "innate," and difficult to describe the causal history behind what is maturationally natural. As regards maturationally natural cognition then, a crucial distinction arises between the general, formal features of (a) culture (like language or economic exchange), and its particular, substantive features (a particular spoken and written language, or monetary exchange or barter). While one may be apt to focus on what is different about another culture, just as we universally share in much the same bodily and natural experience, so too much of our culture is shared as well. These include, for instance, use of language, kinships and family structures, and social relations of exchange. These formal, general features of culture conceivably could have played a role in the "gene-culture coevolution" responsible for the development of our cognitive capacities (cf. works by Boyd, Richerson, and Henrich). Relatedly, cross-culturally shared generals may be what evolutionary psychologists Tooby and Cosmides have called "evoked culture," "recurrent patterns across cultures whose forms substantially depend upon evolved dispositions of the human mind" (McCauley, 2011: 55). But where the generalities of culture leave off and the specifics begin may be a difficult thing to determine.

Developmental psychology plays an important role in discovering what is maturationally natural, as its subject essentially is the development, or "maturation," of human cognition. Developmental psychologists are able to discern many patterns of development or emergence of cognitive capacities, many of which are consistent across peoples and cultures. As McCauley notes,

> There seems to be fairly broad agreement about what many aspects of the minds of school-age children are like. The parties to these disputes [e.g. about

> "innateness"] may not see eye to eye about the origins of these patterns or about the operating principles of the systems that realize them, but they do concur that by school age children the world over possess a surprisingly large amount of similar knowledge that pertains to a variety of the same domains across individuals and across cultures. (2011: 60)

To reiterate again, McCauley stresses a degree of agnosticism as to where such maturationally natural cognition comes from. It could, for instance, be founded upon reliably developing inductions from universally shared experiences, or instead "initiated by specifications in the human genome and emerges—under most circumstances—during a particular period in human development," akin to the "eruption of teeth" (2011: 70).

McCauley points out however that cultural particulars can, through various means of "practice"—such as particular instruction and tutoring, or also more generally through "socialization" and "enculturation"—become "natural" or "intuitive" as well. Eventually, some such skills and patterns of thinking may become "familiar, automatic, and unconscious" (2011:24)—in other words, intuitive. "With extensive practice these thoroughly *cultural* activities eventually begin to feel natural. They become *second nature*. … However natural they come to feel, though, their cultural origins should...be evident. Theirs is a *practiced* naturalness" (2011:24-25). While culture can, in this fashion, become natural and intuitive, there is however a crucial function of maturationally natural cognition.

A question which might be asked is: "whether the environment in principle plays a selective or a constructive role. In other words, do differences in the environment only select different prespecified mechanisms to be triggered, or do they actively participate in the construction of cognitive mechanisms?" (Pyysiäinen, 2004: 138). That is, is culture merely "evoked," as Tooby and Cosmides might have it, or can culture also "construct";

is culture merely passive, or it is an active participant in human cognition? There is indeed evidence for the latter; however, culture also works within a degree of cognitive "constraint."

Maturationally natural cognitive structures and processes can—akin to the primacy to the A-system enjoys—as some writers put it, "constrain and canalize" (Gervais, et. al., 2011: 390) the ways of thought and what we can acquire or believe. Cognitive constraint precipitates from the (contextually) observed force of the intuitive over the explicit, Haidt's "intuitive primacy." "Maturationally natural cognitive systems and the non-reflective beliefs they produce serve to inform and constrain the formation of practiced natural non-reflective beliefs"; they "limit what is easy to learn and achieve mastery of" (Barrett and Lanman, 2008: 113). Intuition may make it relatively "easy" to acquire some beliefs, and fairly "hard," because maturationally natural cognition may "bias" which representations we are likely or able to acquire and assimilate. Learning and acquiring knowledge and beliefs which go against these biases and intuitions will "require more rehearsal in order to reach [practiced] naturalness and to produce non-reflective beliefs" (2008: 113); it requires more "cultural scaffolding" to think and acquire beliefs that are contrary to maturationally natural cognition.

This, I argue, is precisely what plays out in evolutionary thought and dis/belief, and in many respects the rest of this work traces the virtues and limitations of the cognitive constraint of maturationally natural intuitions and biases, and the corresponding place and role of culture. Are there nonevolutionary, or religious, elements of maturationally natural cognition that bias people against evolutionary explanations? How do religious and scientific cultures, or elements of culture, interact with natural cognition? These questions pursue the fruits, but also limitations, of the perspective of a "strong intuitionism." Before explicitly considering the issue of species and essentialism in Part II, I first discuss a case for theoretical vigilance in appealing to cognition, and secondly reaffirm the case for "belief."

Theoretical Vigilance

It was suggested that implicit knowledge and intuitive beliefs can be formed in the natural course of human development and maturation; this common interaction of universal human cognitive systems across shared environments and experiences leads to intuitions that are virtually universal. How do we know this is the case? What counts as universal and what not?

Anthropologically, cross-cultural comparisons have yielded evidence in this regard. The behavioral sciences in experimental fashion similarly aim to uncover intuitions that might otherwise elude observation. A provocative review study by Henrich, Heine, and Norenzayan (2010) has however made some enlightening, if not also unsettling, observations and raised crucial questions about many of these studies and about what they may, or may not, tell us about "human nature."

Their article, titled "The Weirdest People in the World?", review the data that has been studied by a host of researchers and articles in the behavioral sciences (such as psychology and economics), specifically in "those domains which have largely been assumed, at least until recently, to be de facto psychological universals" (2010: 62). What they find is a heavy experimental reliance on (meant somewhat playfully)[17]

17 "We also use the term "WEIRD" throughout this paper to refer to the exceptional nature of this sample, and do not intend any negative connotations or moral judgments by the acronym" (Henrich, Heine, and Norenzayan, 2008: 83).

"WEIRD" subjects—subjects from Western, Educated, Industrial, Rich, Democratic societies.[18] For instance, an analysis of the top journals in six sub-disciplines of psychology between 2003 and 2007 showed 68% of subjects coming from the U.S., and 96% from Western industrialized countries; samples tend to come from the authors' own countries. This entails, they note, that 96% of samples come from countries with only 12% of the world's population (2010: 63). "Telescoping" further, 67% of U.S. samples and 80% of those from other countries "were composed solely of undergraduates in psychology courses" (2002: 63).

This narrow database in and of itself is not necessarily problematic. What *is* problematic is that research authors often, explicitly or implicitly, draw "inferences about the *human* mind and *human* behavior," and these are rarely challenged. "This lack of epistemic vigilance underscores the prevalent, though implicit, assumption that the findings one derives from a particular sample will generalize broadly; one adult human sample is pretty much the same as the next" (2002: 63).

But this is not always the case. Henrich, Heine, and Norenzayan then proceed to review studies from which comparative data in the same domain is available from both (so to speak) WEIRD and non-WEIRD societies. They make a fourfold series of telescoping comparisons: first between industrialized and small-scale societies; second between Western and non-Western societies; third between Americans and "the rest of the West"; and fourth between typical American subjects (college undergraduates) and other Americans. In each case, they found that in certain domains[19] there are salient differences

18 They are self-aware that these are not perfect, indisputable terms for classification. Roughly they apply to large-scale societies of Northern and Western Europe, and anglophone countries like the U.S., Canada, and Australia, as well as Israel (which are, historically, societal and cultural offshoots of Europe).

19 In such areas as visual perception, economic decision making, and spatial cognition; punishment and

between populations, with the former samples generally occupying an extreme position in comparison to the latter samples—thus making adult American undergraduates the "WEIRDest" of all. They even found that American children are outliers (suggesting that societal, cultural differences can influence early on).

It is not that WEIRD people tend to be categorically different; rather, there tends to be a spectrum of continuity among the sample populations studied. But the WEIRD subjects do fall on one end of the spectrum (e.g. Westerners have the most independent self-concepts, rather than the relational, interdependent self-concepts more common, for instance, in Eastern populations; American undergraduates tend to be the most individualistic). The authors do note, though, that in many other domains, there does seem to be broad continuity across populations both WEIRD and not, for instance (notably) in regards to folk-biological psychological essentialism (the topic of Part II, this chapter).[20] These at times "striking similarities across populations...could indicate reliably developing adaptations..., by-products of innate adaptations..., or independent inventions or diffusions of learned responses that have universal utility" (2002: 78). Such things might reliably be taken as human universals, human nature. But, in the discontinuous areas, WEIRD subjects are arguably the least representative "slice of humanity." Generalizing from these subjects to all humans is misleading and unjustified.

This may raise more questions than clear answers of how to proceed with research.[21] Clearly, claims of human nature or of universality need to be made only when there is sufficient comparative data to support them. This could be formulated as a kind

cooperation, self-concepts, and analytic vs holistic reasoning; and individualism.

20 Other areas include some perceptual illusions, perceiving color, emotional expression and recognition of (5) "basic" emotions, false belief tasks, and analog numeracy.

21 As raised and discussed, for instance, by many and varied authors in the article's accompanying peer commentary, and in the authors' response.

of "WEIRDness test" that researchers could ask and make of their database from which they draw conclusions. But is there any certain or definitive way of knowing when enough is enough? How many societies ought researchers sample from? Which ones? Should scientists take the average across samples, with this standing for "human nature"? Or ought researchers look for populations that could be considered "representative"? But, which are these, and how is this selection justified? Seeking a "representative" population might problematically suggest that there is a "true" human nature, a "right" way for humans to be. There is some justification for at least assuming that WEIRD societies are not representative, in that evolutionarily considered WEIRD people "grow up in, and adapt to, a rather atypical environment vis-à-vis that of most of human history. It should not be surprising that their psychological world is unusual as well" (2002: 80).

Asking these kinds of questions also raises the question about the plasticity of human nature. Are WEIRD people the harbinger of the future? As societies continue (as is the trend) to for instance industrialize and democratize, does the human mind follow these footsteps toward WEIRDness? Regardless, being aware of cross-cultural differences of human behavior and psychology underscores the role of environment and culture in the shaping of human minds. This supports further research in such areas as gene-environment interaction and cultural evolution; information gathered from both WEIRD and non-WEIRD (namely, across multiple kinds of societies), "instead of being dismissed as unusual exceptions, ought to be considered as crucial data points that help us understand the ontogenetic processes that build our psychologies in locally adaptive and context-specific ways" (2002: 80).

I thus join the authors and commentators in *not* concluding that such research from the behavioral sciences is unjustified, irrelevant, and ought not be pursued. Rather, one must be vigilant as to the data and research appealed to, and of the claims one might make. This really, of course, applies to any area of inquiry.[22] Henrich, Heine, and Norenzayan's review both gives reasons to trust in the knowledge that cognitive science can provide, while maintaining cautious evaluation of the conclusions derived.[23]

Belief in Belief

As noted earlier, the theoretic category "belief" has come under some scrutiny. Eliminativists or eliminative materialists are wont to make "the radical claim that our ordinary, common-sense understanding of the mind is deeply wrong and that some or all of the mental states posited by common-sense do not actually exist" (Ramsey, 2007). I do agree that, in a reductionist fashion, belief-talk can be eliminated (redescribed, that is, in terms of credal attitudes and representational commitments)—what I disagree with is that it needs to be. This is because at many levels of analysis "belief" is still a cogent and useful category.

Religion scholars skeptical of belief have perhaps not been eliminativists in the strong sense, but they have disfavored its use for a variety of reasons.[24] Central is the

22 Philosopher Stephen Stich in his commentary notes, for instance, how academic philosophers are "WEIRD, highly educated, and male." Incidentally, they tend to have "weird" intuitions as well—quite important, since "intuition" is a generally approved method of inquiry in philosophy. This has repercussions for their claims, and their pedagogy, suggesting something "that most philosophers have been loathe to consider: Many women students may have intuitions that differ from those their male professors insist are correct" (Stich, in Henrich, Heine, and Norenzayan, 2002: 110).

23 Perhaps of note, the evolutionary skepticism under analysis here has historically been prominent (explicitly so) in the WEIRD societies of the U.S. and U.K. So to some extent, research which does not pass the "WEIRDness test" is still of value and relevance, though by no means an excuse to lay down "epistemic vigilence."

24 Godlove notes that there are two "lines of attack": the strong thesis that "belief" is "methodologically suspect," and the modest thesis that belief-talk contributes little to understanding and explaining religion (2002: 17).

narrow focus that belief brings to conceiving and studying religion. J. Z. Smith (1998) has traced the history of the terms "religion, religions, religious," and locates the shift to or emphasis on "belief," as defininitive of religion, in the work of Protestants like Zwingli and Calvin, with a consequent focus among much of Western Christianity on orthodoxy (right belief), on the doctrinal, confessional aspects of faith. Western Christianity was in turn part of the cultural context for the comparative study of religion, and arguably the prototype for (a) "religion." But, as scholars like Catherine Bell point out, the belief-based framework is apt to constrain and distort religious traditions by over-intellectualizing them, overemphasizing the doctrinal elements of a religion and ignoring or misconstruing, or deemphasizing, elements of ritual, performance, power, social relations, and others (2002: 101). It imposes a systemic coherence and cultural universality that does not stand up to empirical observation (such as "the chinese believe in spirits," or "Christians believe..."; 2002: 108, 111).

However, I find that the account of beliefs sketched above provides resources for meeting the concerns of belief critics, and for establishing a positive program for cognitive study of religion. It involves explicitly rejecting the connotations that can make "belief" problematic; for instance Bell sees "belief" as "denoting the culturally particular foci of religion—specifically those things that we hold not to exist. … Belief is our characterization of the specific illusions of others" (2002: 106). Perhaps this has held for some, but there is no reason it needs to hold. Beliefs, intuitive and reflective, permeate our cognition, no matter the culture. True, because culture is an important experienced source for acquiring explicit beliefs, they are apt to vary. But whether beliefs are "true" is a question of a different order that need not be entertained; the scholar adopts a position of *methodological* naturalism, agnosticism, or atheism, bracketing questions of *metaphysical* commitment. We may be apt to see our own beliefs as true and others (which differ) as not,[25] but this is not unique to religion, nor an argument against "belief." Rather, as with inferences from WEIRD subjects, an opportunity to exercise epistemic vigilance.

Furthermore, Bell states that "we also talk about belief as a type of deeply held mental orientation or conviction. That is, belief is described as one type of thing, an all-or-nothing, on-or-off state" (2002: 106). A mentioned earlier, this is not so; belief can come in degrees; one can be more or less disposed towards a credal treatment and acting towards the represented. Bell also finds that belief language seeks out a systematic coherence to beliefs that is not present, either individually or culturally. Regarding individuals, we have already seen that beliefs can be anything but broadly coherent; they may exist rather piecemeal and disconnected, and they may even be inconsistent and conflicting. Bell notes this too, but beliefs are there nonetheless.

The claim that beliefs aren't systematic across all people of a culture is the most crucial. Yes, we might claim that "The Chinese believe in spirits." This does iron over many differences, nuances, and degrees of "belief in spirits," and ignores those who do not in fact believe. This seems however a problem for any discussion of groups, societies, and cultures, where generalizations are made, whether talking about belief or the performance of ritual. There are always going to be outliers. We may need to attend to what is being picked out as important at which level of analysis. Even as

25 As in my research here: I do accept (believe) a Darwinian, evolutionary explanation as correct, and this to some degree prompts my interest in the way evolution is interpreted, doubted, and rejected. But my goal is to also bracket this in a sense, and study people's believing independently of the veracity of the representations—a methodological stance.

generalizations ignore differences, they also allow us to see things we might otherwise not. Though not all U.S. Americans are obese, and not all French slim, to note that Americans are obese, and more so than the french, may help us look for reasons behind such averaged phenomena. The same may go for Fundamentalists believing evolution is false, or Chinese believing in spirits.

The above discussed cognitive science provides insights for structuring how we think and talk about belief. We may grant first-person privileges to an individual as to whether they reflectively, explicitly believe something. However, we may be unsure about the degree to which we assent to something (which may entail determining how likely it is we are to act and respond as if we believed, as if something were true). When it comes to explicating something that was previously or otherwise implicit, we may also find difficulty explicitly formulating it in terms of the concepts, propositions, and language available, to ourselves and others. So the first-person privilege may be checked by knowledge of the realities that accompany our reflective thought.

Things are yet more difficult in ascribing intuitive beliefs to ourselves and others. Because implicit thought may be unconscious and subconceptual, what representations we hold and our attitude towards them may not be immediately accessible or clear. We are left with making inferences about implicit belief on the basis of behavior and other beliefs. One may not have a representation of people living on the moon being false, but knowing for instance that one avows that the moon has no air and that people need air to live, are we justified in attributing “there are no people living on the moon” as a belief? At best this may be a “tacit” or “virtual” belief (Sperber, 1997: 69), a belief by virtue of other beliefs and by pragmatic disposition. Particular context and an overall holistic perspective may determine whether or not to call this a "belief."

Purposeful, goal-directed behavior among intentional creatures with the capacity to represent is a good indicator of implicit beliefs. The (probably evolved) utility of representing the world is after all to maneuver within and manipulate that world; what we believe about the world effects what and how we experience and what we do with and in it. However, a single action could conceivably be due to different beliefs. We might think Paul runs from tigers to avoid being eaten. But, following Alvin Plantinga (1993: 225-226), perhaps Paul actually *wants* to be eaten, but runs away to await a better prospect? Or believes that the tiger is a large friendly cat wanting to be petted, but that the best way to pet it is to run away?

Considerations like these may prompt a hermeneutics of suspicion. But it need not dismantle belief-talk altogether; what may be required is a degree of "faith,"[26] (non-theological) faith that given what we know about one's disposition and about the situation—or rather about many individuals, the nature of cognition, and relevant contexts—this is our best inference about what representations one holds a credal attitude towards. This may range by degrees from well supported ascriptions that even the subject may avow, to a kind of Davidsonian "radical interpretation" where corroboration is limited but cogency granted.

While gray areas do remain, the cognitive perspective nonetheless has provided a few important considerations regarding "belief." It helps establish and articulate "belief" as a viable psychological category—or rather, given the dual-process view, categories—

26 Something psychologists have noted as well. Regarding incompatible beliefs, Sloman notes that our ascriptions indeed involve a "leap of faith": "Psychologists have to trust participants' and their own intuitions that some part of their minds are compelling them to believe something that some other part of their minds knows to be false" (1996: 11).

against claims of eliminativists. It clarifies what belief-talk is about: a dispositional attitude towards representations of varied sorts. Most important, the cognitive account shows that belief-talk isn't about one particular kind of thing. Many of the problems Bell has with belief are mitigated by subdividing belief into different types. Explicit beliefs have a place, but rightly do not do the broad work that might be classically ascribed to them. The recognition of implicit beliefs enriches our understanding and explanations. Implicit beliefs do permeate and structure a wide range of individual and collective activities, including the performances and rituals which a figure like Bell studies, while explicit beliefs indeed, though avowed, may be somewhat aloof and unconnected with everyday religious practice.

Indeed, because implicit beliefs might not be (made) explicit, and because the explicit may not match or reflect the implicit (which also motivates and structures), we see the crucial need for going beyond avowals and assertions, beyond written assertions and doctrines (which Bell (2002: 111) rightly notes may be more like arguments than accurate portrayals, prescriptions rather than descriptions), and look also to bodies and social actions, holistically at all behaviors of an individual and her cultural partners. This can entail both, for instance, qualitative analyses of ritual performances, or quantitative analysis of experimentally collected data. However, I maintain that if we are to have a cogent conception or definition of religion (and thus an object of study for the scholar of religion), representations must be involved (namely of a kind of agency or agents), and thus we cannot completely eliminate belief and still have a viable category of religion.

A welcome complexity and nuance is brought to “belief” and “believing.” It calls for caution and epistemic vigilance in our theorizing, but opens up potential for a certain robustness in coming to understand the responses people can have and form to representations, like images, ideas, and concepts, as well as a theory about the origins of species and the development of life.

We can now recognize, and taxonomically describe, a certain richness to the evolutionary phenomena I examine here, and realize in another fashion just why one phrase like "antievolutionist" or "evolutionary disbelief" runs into limitations. People might be explicitly antievolutionist, explicitly communicating disbelief of evolutionary explanations. But they may only be implicit antievolutionists, interpreting evolution as false but with little awareness as such. Similarly, one can be both explicitly and implicitly anti-Darwinian; explicitly and implicitly Creationist; and explicitly and implicitly evolutionist, Darwinian, and anti-Creationist. There are degrees of each and shades in between. One may have well-articulated, reflectively constructed justifications for their positions; or a particular belief may be intuitive and just "feel right." One can feel strong emotional commitment, or be affectively aloof. With meta-representation, one can explicitly believe or disbelieve something one need not understand. These formal distinctions are in addition to the varied substantive content that doubt of Darwin's idea might entail.

Part II: Application and Analysis

I turn now to an examination of the role that "essentialism" plays in evolutionary mis/understanding and dis/belief. Evolutionary skeptics have avowed the fixity of species as a reason that Darwinian evolution has not and can not occur. This, it turns out, is quite congruous with maturationally natural intuitions; the concepts of species within

Darwinian evolution, however, are not.

<u>"According to its Kind"</u>

Many within the Abrahamic traditions have taken the scriptures to exhibit or endorse a kind of species essentialism as stated and supported in Genesis. Consider two passages,[27] part of the first creation narrative:

> And God said, Let the earth bring forth grass, the herb yielding seed, [and] the fruit tree yielding fruit after his kind, whose seed [is] in itself, upon the earth: and it was so. And the earth brought forth grass, [and] herb yielding seed after his kind, and the tree yielding fruit, whose seed [was] in itself, after his kind: and God saw that [it was] good. (Gen 1:11-12)
>
> And God created great whales, and every living creature that moveth, which the waters brought forth abundantly, after their kind, and every winged fowl after his kind: and God saw that [it was] good. (Gen 1: 21)

"After its kind," "according to its kind," has been understood as an affirmation that species reproduce true to kind, accordingly fixed or immutable.

Founder of the "Answers in Genesis" ministry, Ken Ham, writes at length on the fixity of these kinds:

> In Genesis 1, the phrase "after his kind" or "after their kind" occurs a total of ten times. This phrase is used in reference to the animals and plants as they are to reproduce on the earth. The Bible clearly teaches that God created fixed kinds of animals and plants... One kind could not change into another kind. Today we know there can be great variation within a kind, but fixed boundaries do exist. …
>
> There is no indisputable, in-between, transitional forms anywhere in the world, living or fossil. What we observe are distinct groups of animals and plants, as we would expect on the basis of what the Bible teaches. Those who believe in evolution have to make up additional arguments as to why these in-between organisms are missing... (Ham, 1998: 150)

27 Taken from the King James Version. I selected the KJV as especially relevant, as the version contemporaries of Darwin would be most likely familiar with, as well as the version favored among the American Fundamentalist movement; furthermore many Protestant denominations and individuals understand it as a divinely inspired translation. However, other English translations use this similar language of kinds to varying degrees—it is not peculiar to any one version.

Ham argues a few things here. First, that the Bible speaks of the creation of fixed kinds which cannot change or evolve. He allows that variations do and can exist (as evolutionary theory would require, and which we can readily observe), but that these occur within "fixed boundaries."[28] In addition, there is the argument that this position is more explanatorily parsimonious; it is the evolutionist who has to posit additional mechanisms and explanations for why evidence is missing.

A similar position is found in the original creation-science book, Whitcomb and Morris's (1961) *The Genesis Flood*:

> Thus, the fossil record, no less than the present taxonomic classification system and the nature of genetic mutation mechanisms, shows exactly what the Bible teaches—namely, clear-cut "kinds" of organisms, each perhaps including numerous "sub-kinds" with unabridged gaps between (1961: 450).

Similarly, a contemporary Christian apologetic website writes:

> The Bible describes biogenesis (the development of living organisms from other living organisms) and the stability of each kind of living organism. … The phrase "according to its kind" occurs repeatedly, stressing the reproductive integrity of each kind of animal and plant. Today we know this occurs because all of these reproductive systems are programmed by their genetic codes.[29]

These positions fit well with an essentialist view of folk-biological generic species and the anti-variationist position, both discussed below. In these terms, Poling and Evans note that "Biblical literalists hyper-essentialize species, expressing an explicit belief in the immutable God-given essence of natural kinds" (2004: 490). Children too will avow and acquire such explicit beliefs, as for instance a child in a Christian Fundamentalist school that researcher Evans (2001) spoke with: "God made it that way, so it can't

28 For instance, the varieties of dogs or tomatoes, within the "fixed boundaries" of "dog" and "tomato." Creationists sometimes argue these variations or mutations arise only after the Fall, as organisms begin to degenerate from their original, perfectly created state.

29 Clarifying Christianity. (n.d.). "Science and the Bible." Retrieved March 23, 2011, from http://www.clarifyingchristianity.com/science.shtml

change."[30]

The language and concepts of "kinds" thus illustrate and structure not only how evolutionary disbelievers and creationists view species, but also how they understand and analyze Darwinian evolution. God having created "kinds" which reproduce accordingly precludes that kinds can change—at least not greatly. This anti-evolutionary perspective in turn serves as a theoretical framework for interpreting the natural world, as regards fossils for instance—fossils species are always but a new kind or new variety, but never a "transitional" species linking evolved types. Some antievolutionists have taken up the concepts of "microevolution" and "macroevolution" in their analysis and evaluation. Although the scientific utility of these terms is debated, microevolution refers to change and variation *within* a species or kind, while macroevolution refers to change from one species to another. While "to the evolutionary biologist macro- and micro-evolution are seamless processes...it is not necessarily the case for the layperson" (Poling and Evans, 2004: 492). Explicitly, creationists have argued that macroevolution is not possible, but that microevolution is or may be, as it is change or variation "within" one's own kind. As this blogger notes:

> Starting with microevolution. This is about horizontal change, variation and adaptation. We all know that plants and animals do in a sense "evolve" (change, adapt, become extinct, etc.), but do so only within their own kind. For example, in the early Roman Empire there were very few varieties of dogs. Today there are many varieties, shapes, sizes and colors of dogs. However, they are all still the same kind. Dogs can interbreed, change and adapt within their kind. But, they cannot go outside of their kind and become a different kind. A dog cannot mate with or become a cat. A fish cannot become a bird. A plant cannot become an animal. An ape cannot become a man.[31]

30 A Muslim antievolutionist and scientist, Muzaffar Iqbal, writes also of the fixity of species: "Not only does each species preserve its characteristics, but it also receives Divine command...and acts accordingly, the Koran tells us. The ant and the honeybee have always been the ant and the honeybee and will always remain so." In Hameed, 2008: 1637.

31 "revgenlink". (n.d.). Created According To Its Kind - Believe God's Word Not Man's Imaginations,

Further on, commenting on the above quoted Genesis passages, the writer notes that "Our God says nothing about evolving from one kind into another kind. Each and every plant and living creature was mature when created and ready to reproduce its own kind to fill the earth."

Gary Parker, in a creationist book co-authored with Henry Morris, writes similarly.

> That is, the processes of mutation, selection, and sexual recombination all produce variation within type (microevolution—or creationist adaptation), but can these processes be logically extended (extrapolated) to explain the presumed evolutionary change generally from simply to more complex types (macroevolution)? … No, one cannot... (Morris and Parker, 1982: 109).

Morris and Parker characterize variation as "variation within created types" (1982: 112), and variation within type is simply "good design" (1982: 106). As mutations, a source of variation, "are only changes in already existing genes," then mutations in fact "point back to" or "presuppose creation" (1982: 108). "Real evolution (macroevolution)," however, "requires the *expansion* of the gene-pool, the *addition* of new genes and new traits as life is supposed to move from simple beginnings to ever more varied and complex forms" (1982: 118).[32] Biochemist Michael Behe, a main thinker in the "Intelligent Design Movement," similarly constrains the scope of natural mechanisms: "That is not to say that random mutation is a myth or that Darwinism fails to explain anything (it explains microevolution very nicely)" (Behe, 1996: 24).[33]

Christian Blog, Christian Blogs, ChristianBlog.Com. Retrieved March 24, 2011, from http://www.christianblog.com/blog/revgenlink/created-according-to-its-kind-believe-gods-word-not-mans-imaginations/

32 This also displays a popular understanding of evolution as progressive, necessarily. While complexity does appear to have developed over time, degeneration and a development towards more simplicity has occurred as well. Natural selection posits only that those traits that are most adaptive and fitness-enhancing will proliferate, not that complexity must arise.

33 A study of foreign Muslim students at a Holland university found similar acceptance of microevolution, but "almost all rejected macroevolution and connected the idea to atheistic aspirations and to the

This language and thought of "kinds," as applied to biological species, I next argue is quite consistent with maturationally natural cognition.

Folk-Biology and the Essence of Species

"Folk-biology" represents one of the broadest and most basic domains of implicit knowledge and intuitive beliefs that people have, in this case about the living world. It encompasses two intuitive ontologies, with plants and animals inferentially treated as two basic kinds of things in the world. Within that, people exhibit implicit understandings that "species" are well-specified kinds, predicated upon possessing and sharing a common "essence." In Henrich, Heine, and Norenzayan's (2002) review above, folk-biology and psychological essentialism were favorably supported as being cross-culturally universal. The claims involved, in other words, aptly "pass" the "WEIRDness test."

Scott Atran, one of the principal theorists of folk-biology, succinctly describes the basics. First is that "people in all cultures classify plants and animals into species-like groups" (1998: 547), which Atran calls "generic species." The result is a formal categorical structure for living things, independent of any substantive content. Moreover, in addition to this basic division-making,

> there is a commonsense assumption that each generic species has an underlying causal nature, or essence, that is uniquely responsible for the typical appearance, behavior, and ecological preferences of the kind. People in diverse cultures consider this essence responsible for the organisms identity as a complex, self-preserving entity governed by dynamic internal processes that are lawful even when hidden. This hidden essence maintains the organisms integrity even as it causes the organism to grow, change form, and reproduce. (1998: 548).

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impossibility of chance and mutations leading to complex species" (Hameed, 2008: 1638).

Atran finds that "generic species" exist within a larger intuitive taxonomy of "rank." At the top is the *kingdom* rank, which seems to encompass just those two intuitive ontologies referenced above, plants and animals, which "represent the most fundamental divisions of the biological world" (1998: 549).[34] The next rank down is that of *life-form*, which are broad categories, like "tree" or "bird," of related, perceptually similar kinds of things (generic species). Not all species may fall into a life-form taxon. Following this (although there may be other intermediate life-form type ranks as well) is the rank of *generic species*, the "core of any folk taxonomy...which contains by far the most numerous taxa in any folk-biological system" (1998: 549). Generic species are usually named by "primary lexemes" like "oak" or "robin." Underneath generic species are the ranked taxa of *folk-specifics*, usually named "binomially" with "secondary lexemes," like "white oak" or "mountain robin"; within the folk-specific, there may be further *folk-varietals*, often named trinomially, like "swamp white oak."

The claim is not that people always classify living things under this five-fold structure. But minimally, we do understand living things to belong to one of the ontological kingdoms, and to be a particular kind of generic species. Whether the other categories obtain may depend on everyday importance and cultural conditions. For instance, encountering only one kind of bear in one's environment makes it less likely that one will treat bears at the folk-specific or -varietal level, rather than just as a generic species. But in all cases, there is the spontaneous partitioning of plants and animals into generic species, and the tacit expectation that all organisms belong to such a generic

34 Those familiar with contemporary biological classification would note that the Fungi and various unicellular Kingdoms are absent. Fungi, as well as those unicellular colonies of organisms that are observable to the naked eye, we probably take as "vegetative," as plants. Those which escape observation are not accounted for as life at all.

species (Atran, 1998: 550).

This is largely due to our psychological essentialism:

> People ordinarily assume that the various members of each generic species share a unique underlying nature, or essence. This assumption carries the inference of a strong causal connection between superficially dissimilar or non-contiguous states or events. … People expect the disparate properties of a species to be integrally linked without having to know precise causal relationships. (Atran, 1998: 550).

Psychological essentialism is thus a kind of heuristic, an intuitive way of understanding. It can be observed in children as young as four, who

> believe that species members share both observable and non-observable traits...; that species members possess an innate potential to develop the same traits...; and that species identity remains constant across both temporary, artificial transformations...and permanent, natural transformations. (Shtulman, 2006: 171)

Subdivisions of the generic species, into folk-specifics and -varietals, does not represent a division of essence. A long-haired and a short-haired tabby are still in essence "cats," they share that same kind of essential nature. A life-form classification ("felines" or "carnivores" for instance) does not however entail its members all possess the same essence (only some type of similarity). Besides perhaps the ontological kingdom rank, none of these actual, substantive classifications are expected to form independent of experience and learning. Cultural elements like language serve to index and create kinds (Atran, 1998: 554), but it may be that one culture gives more importance to certain folk-specifics or -varietals (like certain forest-dwelling Maya with strong interests in silviculture), while another culture to generic species or even lifeforms (like American urbanites, who may tend to speak only of the life-form "trees," while, however, still recognizing that trees exist as particular generic species). What counts as a species and what not, or how wide or how narrow a species is conceived, can be a matter of culture. In such ways, maturationally natural cognition provides a kind of intuitive structure or structuring of the biological world, with experience and culture providing or shaping the specific content.

Researchers like Atran point out that a psychological essentialism fits well under an evolutionary history. Being able to inferentially generalize at the species level would be useful, for instance in knowing what kinds of things to eat or to avoid, what kinds of creatures were harmful and which benign. Inferences too broad, among unrelated species, could prove less useful (e.g. treating all furred creatures as predator or prey), as well as too specific a focus on only individuals, where knowledge could not be generalized to new situations. (However, it would be advantageous to distinguish one human from another, when living in groups of non-kin and requiring cooperation and reciprocity, which suggests reasons for the evolution of our folk-psychology and facial-recognition system which attribute personal identity and intentions.

In sum, essentialist folk-biology is part of a maturationally natural "folkscience." It delivers intuitions about the world that generally hold up well, that are adaptively useful in our everyday lives. However, people have always realized that the world may not be quite as it first appears, and the cultural practice of science has developed as one way to go beyond our immediate perceptions and understandings of the natural world, developing explicit knowledge structures of more complexity and of other kinds of causation than everyday experience and common sense suggest. (The cultural practices of myth, magic, and religion are, importantly, other conceptual ways of organizing and explaining the world.)

However, while originating in or founded upon the maturationally natural cognitive capacities to organize information, make connections, and seek explanations, through a gradual reflective “ratcheting” of various public representations (like concepts and theories), science has managed to produce some rather “unnatural,” “counterintuitive” explanations for natural phenomena. In this regard, Darwin's account of evolution may be the most counterintuitive scientific representation of all.

Darwin's Different Species

When Darwin formulated a new explanation for the origins of the varieties of life, it required reconceiving the nature of species. Darwinian evolved and evolving species were a fundamentally different kind of thing than those conceived by Darwin's predecessors, who understood species along essentialist lines.

Atran notes that Aristotle set the “theoretical program of natural history” by “inquiring into how the apparently diverse natures of species may be causally related to the nature of life” (1998: 564). Aristotle organized generic species familiar to him into kinds of life form categories on the basis of analogies or analogous organs. Atran characterizes this (Aristotle and Greek naturalist traditions) as the beginnings of a “boot-strapping enterprise in Western science,” making explicit and formalized the knowledge and structure of folk-biology (1998: 563).

Historians of science (e.g. Gould, Hull, and Mayr, discussed in Shtulman and Schulz, 2008: 32) have argued that essentialism stood in the way of developing an acceptable theory of evolution. There were multiple pre-Darwinian evolutionary thinkers. But they all formulated what Mayr called “transformational” theories of evolution, “theories in which evolution is construed as the cross-generational transformation of a species' underlying essence, resulting in changes common to all members of the species" (Shtulman and Schulz, 2008: 32). Lamarck's "inheritance of acquired characteristics," Chamber's "unfolding of a preprogrammed design," Haeckel's "recapitulation of ontogeny," and Bergson's "*èlan vital*" were all proposed mechanisms of essence-transformation (Shtulman, 2006: 172). Transformationists conceived biological change as occurring at the level of the species (and the species' essence); Darwin, however, would recognize instead the evolutionary role of individuals and their variations. Variations were instead devalued or ignored by transformationists, who instead tended "to abstract a single ideal or average as the essence of a system" (Shtulman, 2006: 171). Variations were deviations from the norm; individual traits could be more or less essential.

Darwin by contrast developed a "variational" theory of evolution, where "evolution is construed as the selective propagation of within-species variation" (Shtulman and Schulz, 2008: 32). Darwin recognized that species-level change could arise through the conjunction of individual (inheritable) variations and selective reproduction. Darwin required no change to a species essence for change to happen to individuals; to some extent, the process is reversed. But more appropriately, "essences" fall out of the explanatory narrative all together. In the Darwinian view, "species" precipitate or emerge from groups of interbreeding organisms. Because those populations are continually changing, so too the "species." Species are neither static nor fixed, nor are they the kind of things that even change; they are abstractions from those populations of organisms that change.

Technically then, generic species within Darwinian, evolutionary biology are rather different things than the generic species that form the "core" of our essentialist folk-biology. However, a variational, non-essentialist Darwinian understanding of species is one that must be acquired reflectively, formed as explicit knowledge. But likely, we retain our intuitive beliefs about species. Consequently, intuitions may affect how we interpret and reason with explicit Darwinian claims. We may find Darwinian evolution hard to understand or believe, because it goes against certain biological intuitions. This may amount then to doubting (implicitly or explicitly) evolution altogether. Or we may "believe in" (Darwinian) evolution (in a meta-representational fashion) but understand evolution along more essentialist, transformational lines (cf. Poling and Evans, 2004).

Researchers have found that the latter holds among, for instance, students who have studied and learned evolution. In Shtulman's (2006) study, students were asked to give answers consistent with Darwinian accounts of evolution to various questions on variation, inheritance, adaptation, domestication, speciation, and extinction. Over half of the participants gave more answers that were qualitatively "transformationist" than "variationist. Of those who gave more variationist answers, many did so only in the areas of inheritance and adaptation, due to understanding that organisms inherit traits regardless of adaptive value, and that differential survival is relevant to adaptation (Shtulman, 2006: 181). Transformist answers were also marked by teleological language, using phrases like "need to," "have to," "in order to," or "must" three times as often as variationists (Shtulman, 2006: 185). For instance, regarding the classic case of the peppered moth, a transformist answer might state, "In order to blend in with their surroundings, the moths had to become darker in color," while a variationist might state, "If the environment became darker, the moths with darker color would be better camouflaged against predators and be more likely to survive" (Shtulman, 2006: 186-7). The former, teleological claim treats species almost like agents, a unified body that can collectively seek and undergo change in response to need. Brumby (1984) and Evans (2001) have similarly noted this "Lamarckian" character of many student's evolutionary understanding.

Shtulman and Schulz (2008) more explicitly found subjects (4-9 year old children, and university students) denying even the possibility of variation for or of species. Subjects were first asked whether a behavioral, external, or internal trait was common to all members of a kind of animal (e.g. the coat pattern of giraffes); if so, whether offspring could be born with a different version; and if not, why. Across all subjects, behavioral traits tended to be accepted as more variable, accordingly less essential to a species than external and internal physical traits. Children were less likely to judge a trait as being either actually (20% of children) or potentially variable (55%); they were more essentialist. Some of the adults (consequently termed "transformational") ranked closer to the children[35], avowing double the support of actual variability ("is the trait common to all?"), but only slightly more support of potential variability (could offspring be born without this trait?). Variational adults, on the other hand, supported actual variability (70%) that exceeded the level of judgments for potential variability by the

35 There are concerns with studies such as this, involving both children and adults, (potentially) describing some people as more "childlike" than others. Similar concerns arise with the language of "naive" and "folk-" that is often used, and when placed in a cross-cultural context, may raise shades (perhaps as in "ghosts" or "spectres") of the "primitive" versus the "civilized" mind.
I do not mean to imply anything of the sort. I am trying to seek out differences and explain these differences, not on the basis of anyone's nature, but rather due to experience (under other names, learning, enculturation, (non-linear) development, and so on. We should all agree that humans everywhere have different experiences, in some respects a more-and-less. Children, by degrees of age, have less experience. An adult who has not learned or studied quantum physics is going to, in this respect, be like the child who has not learned quantum physics as opposed to the erudite adult who has. This is not quite (connotative of) the same as the unlearned being child-like.

transformational adults, and support of potential variability still higher (almost 90% of subjects).

Adults also completed a brief survey on their understanding of evolution (a selection of the questions from Shtulman, 2006). The researchers saw a strong correlation between understanding evolution by natural selection, and avowing variability; that is, "those who were most likely to accept within-species variation were also those who were most likely to understand natural selection" (Shtulman and Schulz, 2008: 1054). This might suggest that those who are less essentialist about species are more likely to accept that species evolve (especially under Darwinian mechanisms), and/or that those who accept Darwinian evolution are less essentialist about species. Conversely, "psychological essentialism...is harmful for reasoning about changes to an entire species; this bias appears to prevent individuals from appreciating within-species variation and, consequently, the processes that operate over it" (Shtulman and Schulz, 2008: 1058).

One example of how this plays out in thinking about species comes with tasks that target extinction. One task had subjects organize simple hypothetical (pictorial) organisms into an evolutionary structure over time. Variationists organized the items into a kind of (evolutionarily correct) branching tree, while tranformationists organized them into a linear series. That is, variationists accepted that a single species could branch into further species, some of which could die off and becomes extinct. The transformationist diagram, on the other hand, has only one species changing over time. This may suggest a more essentialist understanding, where a single essence is preserved, although changing, over time. Essentialism may thus constrain seeing evolution as a divergent, non-linear development of non-essentialist species. Poling and Evans (2004) similarly found resistance to accepting extinction, past or future. Many subjects endorsed the potential for need-based adaptation by species in response to environmental change. That is, species will evolve when faced with adverse environmental change (rather than become extinct), as though an intentional and purposeful process.

Shtulman and Schulz's research is WEIRD; we do not here know how essentialism might play out in evolutionary reasoning across a broader range of subjects. But folk-biology and species essentialism (as researched by Atran and others) *is* a more fully cross-culturally studied domain, and finds support and application beyond WEIRD samples.

“Unnatural Science”

In respect to its representation of species, then, Darwinian evolution is counterintuitive, and “fixed” species are the more cognitively natural. Creationist and “transformist” early scientific accounts of evolution are, on the other hand, more congruous with intuition. Similar patterns and associations have obtained in other areas of science as well, with early scientific theories in areas such as mechanics, thermodynamics, acoustics, physical chemistry, and cosmology according with maturational natural cognition (namely “folk-mechanics” or “folk-physics”), but over time developed and refined and in the process becoming more counterintuitive and cognitively unnatural (Shtulman, 2006: 173).

What, then, does the cognitive unnaturalness or counterintuitiveness of Darwinian ideas have to do with explaining the misunderstanding, disbelief, and rejection of those ideas? An explanation, after all, involves making a causal claim, an account of how or why something occurs or is the way that it is. Does this mean that maturationally natural cognition "causes" disbelief in evolution or the evolution of species? Such a claim, quite direct and linear, oversimplifies. This could only be the case if intuition was, indeed, a "dictatorship," or if culture was utterly and only "evoked." It would probably take universal disbelief in Darwinian principles to say that certain intuitions are the "cause." What can be instead claimed is that maturationally natural cognition "biases" and "constrains" the understanding of and commitment to Darwinian representations. In this manner intuition is relevant for explanation, but in a more probabilistic fashion.

The unnaturalness of Darwinian species is part of the broader unnaturalness of science. McCauley suggests there are two broad respects in which the cultural practice of science is cognitively unnatural, and these are its unnatural products and its unnatural processes. Science's cognitively unnatural products are those principles, concepts, and theories that run modestly to radically counterintuitive to our cognitively natural representations, understandings, and expectations about the world. Science's cognitively unnatural processes include "discerning, collecting, recording, generating, analyzing, and assessing evidence," as well as processes that must work against "fallible heuristics, persisting deliverances, confirmation bias, and motivated perception (2011: 118). All these together make science a difficult, unnatural enterprise, and its findings difficult to think and understand.

If, however, science is so cognitively unnatural, how is it that it can exist at all? How did science first get off the ground? McCauley points out that despite many unnatural elements, there are cognitively natural features of science, namely "a penchant for theorizing and a sensitivity to the importance of evidence" (2011: 101):

> Without a doubt, the best illustration of what appears to be a relatively natural cognitive predilection that is integral to science is human beings' readiness to formulate speculative theories. … Most prominently, we do it precisely when we confront circumstances that overthrow our expectations. (2011: 101)

The practice of science involves an elaboration and refinement of these predilections and processes of evidence-seeking and theory-formation, although beyond the extent of data collection and explanatory domains that we are often wont to go. There is, moreover a thoroughly and natural *social* component to science (McCauley, 2011: 137-143). Social motivations (such as competition, desires for prestige, or concern for improving the lives of others) together with social practices (communication and collaboration) and the public and institutionalized nature of science's processes and products (especially writing and the encoding of ideas) are among the crucial catalysts enabling the cultural practice of science to bootstrap, scaffold, and ratchet itself out the realm of the cognitively natural and intuitive. Consequently, if that social domain were to degenerate, so too the products and processes of scientific thought.

There thus exists a tension between cognitively natural thought and belief and those cognitively unnatural ideas of science. Whether on the implicit or explicit level of cognition, individuals are apt to weigh these intuitions and ideas against each other, and maturationally natural intuitions seem to bias and constrain what representations we are apt to produce or acquire and accept. If intuition is not, so to speak, on Darwin's side, there may require more reflective thought and explicit justifications for committing to Darwin's ideas, such as the variability and evolution of species. Representations and understanding of Darwinian evolution is a B-system affair, requiring explicit and reflective thought and belief.

In contrast, religious cultural representations that are congruous with maturationally natural cognition, that are themselves intuitive, may gain the upper hand, so to speak. Implicit cognitive processes, and probably affective responses as well, considered by themselves, bias or suggest to the reflective mind that these are good idea to accept. Depending upon the place or role of religion has in or during one's development, religious representations may become rather natural and intuitive by "practice" as well, doubly biasing people against evolutionary ideas, which may in fact tend to be encountered later in maturation.

Passages in Genesis can be understood as expressing (making explicit) a(n intuitive) representation of species as fixed natural kinds with specific, fixed essences. In turn, the biblical language of "kinds" provides explicit reification of these intuitions. Buttressed with a reflective belief of biblical literalism and a supporting community, fixed-species essentialism would be expected to be even inferentially stronger, and more intuitively "right" seeming and feeling. When encountering Darwinian evolutionary thought, both intuitive (maturatioanlly natural) essentialism and explicit (religious or biblical) essentialism may play a synergistic role in suggesting either implicit or explicit doubt of the Darwin's account, thereby constraining belief and instead probabilistically favoring disbelief. In reflectively disbelieving Darwin, implicit thought made explicit may provide the reasons and justifications for doubt (as seen for instance in micro-/macroevolution distinctions or arguments, for example).

In a similar fashion, we can look at actual cultural practices of public argumentation engaged in by proevolutionists and anti-evolutionists or creationists, and note how, for the latter, "the ball is in their court." In at least one respect, anti-evolutionists can explicitly appeal to implicit intuitions, and exercise these biases in their favor. While public defenders of naturalistic evolution can likewise appeal to cognitively natural dispositions for evidence and explanation, these are however penchants shared by antievolutionists and creationists alike. Both "sides," or different parties, can appeal to some shared predilections, but potentially only one position can appeal to maturationally natural, universal intuitions.

This does not mean that any and all religious traditions or religious beliefs are anti-evolutionists, nor cognitively natural. McCauley notes how doctrinal, theologically robust religion, in fact, is as cognitively unnatural as science.[36] In this respect, evolutionary belief and theological religious traditions are rather similar, arguably both instances of Harvey Whitehouse's "doctrinal mode" of religion, characterized by its use of explicit systems of memory. This and related observations should caution one against speaking of religion "in general" in any discussion of evolutionary dis/belief. The salient features of "religion" may only be the particulars.

Such does not provide any full explanation for the rejection of Darwinian explanations. Evolutionary disbelief and anti-evolutionism are, as discussed in chapter 1, varied and compound phenomena. Because there are (empirically) many aspects to and reasons for disbelief and rejection of Darwinian, evolutionary ideas and explanations, the explanations for these phenomena are going to be many and complex. Psychological essentialism can not play the sole cause, but it certainly may have causal import, and

36 "The most familiar manifestation of the intellectual side of this enterprise is theology. In the course of refining religious formulations to increase their consistency and coherence, theologians avail themselves of many of the same tools that scientists use. Typically, theologians are experts at conceptual analysis and at carrying out the same forms of deductive inference that play such a noteworthy role in science. They often generate convoluted, abstract religious representations that are no easier to understand than esoteric scientific ideas are." (McCauley, 2011: 153)

enrich our understanding of Darwin's doubted idea.

Regarding this complexity, the biblical literalist, after all, looks not just to God creating kinds, but to God creating all together. Whether kinds change might arguably be quite subsidiary to the fact of divine creation itself, which already provides an alternative narrative to that of evolutionary history—creation by God rather than naturalism. And of course, personal experience is one of kinds or generic species of animals sharing traits across all its members, of cultures and languages that represent (and reify) organisms as kinds, and no individual has ever experienced the (macro)evolution of one "species" into another. But we can also see how intuitive essentialism and religious narrative may causally interact in the formation of evolutionary disbelief, the force of which ought not be ignored.

This chapter has thus argued how a few facets of human cognition—formally, maturationally natural intuitive thought and belief, substantively, the species essentialism of folk-biology—likely play a role in evolutionary disbelief. The following chapter considers another, that of a predilection for teleological reasoning, considered in light of antievolutionary arguments and evolutionary mis/understanding based on concerns and issues of purpose and design.

Chapter 3
Divining Design: Intuitive Issues of Teleology

One of the most recent skeptical positions and (purported) challenges to biological evolution (by natural selection or natural mechanisms) is the self-named Intelligent Design Movement. Its basic argument is that features of the natural and biological world point to, or are best explained by, an intelligent cause, rather than by undirected (chance, blind) physical processes. Evolution by natural causes (such as natural selection) alone, it is reasoned, are incapable of explaining the complexity and design of living organisms and their parts; they instead require an intelligent, designing cause.

The biochemist Michael Behe is one prominent thinker of Intelligent Design. Claiming that "at last we have reached the bottom of biology"—both its lowest level of analysis, the molecular, as well as the limits of (naturalistic) biological explanation—"we have discovered a complex world that radically changes the grounds on which Darwinian debates must be contested" (Behe, 1996: 31). After a biochemical tour of the cell and sub-/cellular molecular processes, Behe concludes:

> The results of the cumulative efforts to investigate the cell—to investigate life at the molecular level—is a loud, clear, piercing cry of 'DESIGN.' The result is so unambiguous and so significant that it must be ranked as one of the greatest achievements in the history of science. (1996: 233)

Although figures like Behe present Intelligent Design as a purely scientific claim, an often hidden or masked intention of the proponents is that this "intelligent cause" is

God. In this manner, Intelligent Design is but a recent permutation of the classic Teleological Argument for the Existence of God, the "Argument from Design," now placed in explicit opposition to naturalistic, Darwinian evolutionary explanations of living things. While the evidence appealed to is contemporary (molecular-level cellular organelles or complex immunological process, for instance), and much terminology newly fashioned ("irreducible complexity," "complex specified information"), the form of this thinking has in fact a very long pedigree—of philosophical argument, theological apologetic, and anti-Darwinian challenge.

What I argue here is that such design arguments are explicit, well-formed versions of less developed, more implicit intuitions that many people have and have had—both about the world and about evolution. Formally similar to the argument of the previous chapter, teleological reasoning and arguments to-and-from design are attractive, seem cogent, and are deemed true in part because they correspond to implicit, nonreflective beliefs and intuitions about the purposes and perhaps the origins of things in the world. Conversely, there may be something cognitively, intuitively contrary—counterintuitive—about evolutionary explanations of life, invoking natural, non-intentional and non-teleological processes. However, as was also seen before, maturationally natural intuition does not tell the whole story, for cultural context must also play a part. Yet, these natural intuitions do help explain the recurrence and resilience of the philosophical and theological arguments to/from design, explicit arguments against evolution on the basis of design, as well as common, fairly widespread patterns of misunderstandings about biological evolution. Teleological natural cognition biases people against Darwinian evolution, and explicit antievolutionist argument reifies and appeals to this natural cognitive predilection.

"Teleology" is a term not without unambiguous definition, whose conceptual meanings will be discussed, together with the related but distinct concept of "design." In Part I, I first will discuss some historically important and influential philosophical and theological uses of teleology and related arguments from design, and how these formed the immediate intellectual context in which Charles Darwin developed and delivered his evolutionary account. This takes us, second, to the reception of Darwin's thought, with particular emphasis on the deemed non- or teleological aspects of natural selection, and the scientific, philosophical, and religious challenges—as well as agreements and amendments—made on this basis. In Part II, I then turn to a collective body of recent works in cognitive psychology on the character and scope of an intuitive predisposition towards teleological reasoning about the natural world, along with related research into the nature of beliefs about origins and of "chance." The last section of the chapter explicitly discusses a model of theoretical synthesis, a "constructive interactionism," between, so-to-speak, "cognition" and "culture."

Part I: Teleology in History

Teleology and Design in Philosophy and Theology

"Teleology" derives from the Greek *telos*, meaning end or purpose. Something which is "teleological"[1] would possess purpose or be goal- or end-directed, and it may have come about through a teleological process. Philosophically, "teleology" can be taken as the study of or theory of purposiveness, or of things with ends, goal-

1 The term "telic" would probably suffice as well, but it is a less common term.

directedness, or purposes. Volitional human actions represent teleology *par excellence*—human agents have intentions, and act in a purposeful, end-directed manner to carry out these goals. Artifacts as well are paradigmatically teleological; they are end-directed towards the performance of some function, or endowed with some capacity—most unambiguously because of the intentional human designers who make them. Indeed, the essential characteristics of an artifact are its ends, its function.

The identification of something as teleological (or not) can become difficult, especially when intentional design is not involved. While a self-regulating system like a thermostat, or (though not without dispute) an organism's regulation of its body temperature, seem appropriately teleological, it seems too weak and problematic to say that a salt which readily dissolves in a solution is teleological—although salt achieves such an end-state by virtue of its constitution, is this an end-directed capacity? The language even of "directed" perhaps implies a "director," as would "designed" and "designer;" this element of intentionality is what makes teleological language difficult and debated within biology, as with talk of "purpose," "function," and "adaptation."[2]

Whereas there is some ambiguity as to teleological ascriptions, and of what is constitutive of teleology, this arguably is less so with "design." Something which is designed clearly seems made by a designer, an intentional intelligent agency operating according to plan and purpose; a design is precisely that purposeful plan. A distinction

2 Allen, Bekoff, and Lauder (1998) have edited a volume highlighting the major and disputed opinions on how teleological language may be used in biology and to what it refers. The two primary views are the backward-looking, causal, or "etiological" perspective, which looks to an "adaptation's" history in order to determine its purpose or function (indeed, whether it is an adaptation at all). The other main view is forward-looking, a "capacity" approach, which seeks to determine something's purpose in the context of what it contributes to an entire system's function. Within these perspectives, some deem teleological language and explanations necessary; others, that an eliminative reductionism (to purely physical, causal accounts) is possible, but not desirable as teleological language and concepts are fruitful. However, others, like Hanke (2004), argue that teleological language "bedevils biology," as intentional through and through, and needs to be eliminated.

between design and teleology, and between two notably different types of teleology, can be seen by comparing two philosophers, Plato and Aristotle, arguably the originators of these concepts within Western thought.

Plato presents both a line of teleological reasoning and subsequently an early version of the philosophical and theological argument from design. In the *Phaedo*, Socrates recounts hearing from a reading from Anaxagoras, “that it is the mind that arranges and causes all things.”

> I was pleased with this theory of cause, and it seemed to me to be somehow right that the mind should be the cause of all things, and I thought, 'If this is so, the mind in arranging things arranges everything and establishes each thing as it is best for it to be. So if anyone wishes to find the cause of the generation or destruction or existence of a particular thing, he must find out what sort of existence, or passive state of any kind, or activity is best for it. (*Phaedo,* 97)

Socrates becomes disappointed, however, when Anaxagorus proceeds to offer only material or physical causes for explaining things, ignoring “intelligence.” This would be the equivalent of explaining Socrates's being in the jail cell in terms of sinews and bones. The “real causes,” however, “are that the Athenians decided that it was best to condemn me, and therefore I have decided that it was best for me to sit here and that it is right for me to stay and undergo whatever penalty they order” (*Phaedo*, 98). The real causes of things involve intelligence, because it is intelligence which can arrange (design or direct) things towards their good (end or purpose), an intelligence which, moreover, values certain ends which give to it its purposes (cf Ruse, 2004: 13-14, 264).

In the *Timaeus*, Plato goes further, building upon intelligence as the real cause, to arguing for the need of a designer (but not ex nihilo creator) to have ordered and designed the world. “We must declare both kinds of Causes, but keep distinct those which, with the aid of thought, are artificers of things fair and good, and all those which are devoid of intelligence and produce always accidental and irregular effects" (*Timaeus*, 46). Here Plato arrives at *nous* as the primary cause, with material causes merely secondary. The eternal mind, the Demiurge (God), using reason to discern the good ends for things, in turn imposes order upon disorder, and this is design. Such is how order, namely purposeful end-directedness towards one's proper good, can come about; unintelligent causes can produce only "accidental and irregular effects."

This is an early form of the the argument from design. Michael Ruse explains that the "argument *from* design" actually has two components: the argument *to* complexity followed by the argument *to* design (Ruse, 2004: 15-17). The first argument is to show that the world exhibits complexity, or rather "apparent organized complexity" (though even this term suggests an organizer); namely, a feature of the world deemed in need of special explanation. In Plato's Greek thought, it might be phrased as the difference between order and chaos. The second argument moves from the acknowledgment of this order or complexity to the recognition of design—that this complexity necessarily has an intelligent, designing cause. The final move is thus to claim a designer, that the evidence of design is evidence for a designer. The argument, together, aims to "divine" design, in a double sense—on the one hand, to find and infer design in nature (in the manner of a "diviner" finding, say, underground water), and on the other hand to attribute this design to God, to a divine designer.

Aristotle agrees with Plato that explanations that appeal only to (in Aristotle's terms) "efficient" causes (as well as material and formal causes) are not sufficient (this is the argument to complexity), and agrees that the full explanation requires a teleological element, one that appeals to a fourth kind of cause: final cause, so called because something's end or purpose, its finality, is the cause of its being or being that way. But Aristotle doesn't see something's final end (its good, for Plato) as needing to be mediated or caused by intelligence, and thus Aristotle doesn't follow Plato in the second move to design and a designer. In his *Physics*, for instance, Aristotle writes “It is absurd to suppose that ends are not present because we do not see an agent deliberating” (*Physics*, 2.8). For him, ends are present, and they explain, but it is *not* because they were put there by a designing mind. Rather, teleology is imminent, it is internal to something's nature. Something's ends, the purposes it has or serves, are simply part of its nature. For Plato, however, teleology comes from without, originating with a designing mind; it is external.

Despite their differences, Plato and Aristotle are firmly united against atomists like Democritus and Epicurus, who deemed explanations by efficient causes sufficient. As an example (both of nonteleology and of a proto-evolutionism), the epicurean poet Lucretius writes that “Nothing in the body is made in order that we may use it. What happens to exist is the cause of its use” (*On the Nature of Things*, IV, 833). This is a reversal of the Platonic explanation. For Lucretius, there is no good or end as a final cause for something being the way it is; the past and present mechanisms of nature, even episodes of chance, are explanatory enough. But Plato and Aristotle deny that this is so. Collectively, these Greek thinkers here represent three teleological positions on nature. Plato's teleology is an external one, assigned from without by an intelligent and designing mind. Aristotle's teleology is internal and natural. And Lucretius offers an ateleology, or perhaps an emergent teleology, where material and efficient causes are sufficient explanations, and where function and apparent design arise out of this. These three positions basically recur throughout subsequent religious, philosophical, and scientific thought.

The Platonic argument from design was taken up in Christian philosophical theology and steadily elaborated over the centuries. While Augustine gives priority to the testimony of Scripture, he also remarks how “we have evidence of the world itself in all its ordered change and movement and in all the beauty it presents to our sight, a world which bears a kind of silent testimony to the fact of its creation, and proclaims that its maker could have been none other than God” (*City of God*, Book XI, ch. 4). Thus Augustine argues *that* the natural world was created, and that it was created *by God*, “the ineffably and invisibly great, the ineffably and invisibly beautiful.”

One of the famous articulations was given in the 13th century by Thomas Aquinas in his *Summa Theologica*, as the last of five “proofs” for the existence of God.

> The fifth way is taken from the governance of the world. We see that things which lack knowledge, such as natural bodies, act for an end, and this is evident from their acting always, or nearly always, in the same way, so as to obtain the best result. Hence it is plain that they achieve their end, not fortuitously, but designedly. Now whatever lacks knowledge cannot move towards an end, unless it be directed by some being endowed with knowledge and intelligence; as the arrow is directed by the archer. Therefore, some intelligent being exists by whom all natural things are directed to their end; and this being we call God. (*Summa* Part I, Q2.3)

While much of Aquinas's thought was Aristotelian, he is here showing Plato, exhibiting all the core components of the argument from design (a cause requiring knowledge and intelligence; the inference to a designing agent), including the denial of the Lucretian position (“not fortuitously, but designedly”).

The Christianized-Platonic argument from design consistently would be utilized by a number of Christian thinkers, especially Anglican, achieving its prime in the 17th

through early 19th centuries. Writers include the chemist-theologian Robert Boyle (multiple works, latter 17th century), the naturalist John Ray (*Wisdom of God as Manifested in the Works of the Creation*, 1709), clergyman William Durham (*Physico-Theology,* thirteenth edition 1768), and the philosopher and apologist William Paley, in his (1802/1814) work *Natural Theology* (*or, Evidences of the Existence and Attributes of the Deity, Collected from the Appearances of Nature*). Even though Boyle and others had previously appealed to the example of clock or watch,[3] it is Paley who is most often cited for the "watchmaker analogy."

Paley begins with a walk upon the heath:

> In crossing a heath, suppose I pitched my foot against a stone, and were asked how the stone came to be there; I might possibly answer, that, for anything I knew to the contrary, it had lain there forever: nor would it perhaps be very easy to show the absurdity of this answer. But suppose I had found a watch upon the ground, and it should be inquired how the watch happened to be in that place; I should hardly think of the answer I had before given, that for anything I knew, the watch might have always been there. (...) There must have existed, at some time, and at some place or other, an artificer or artificers, who formed [the watch] for the purpose which we find it actually to answer; who comprehended its construction, and designed its use.
> (...)
> Every indication of contrivance, every manifestation of design, which existed in the watch, exists in the works of nature; with the difference, on the side of nature, of being greater or more, and that in a degree which exceeds all computation. (*Natural Theology*, 7-8; 16)

Paley really adds nothing new to the formal elements of the argument, but does elaborate upon the argument in terms of illustrations and supporting evidence. As science (natural philosophy and natural history) advanced and knowledge of the workings of nature increased, theologians and natural philosophers acquired more analogies for design,

3 Including Cicero, regarding a sundial, in the first century BCE: "When you see a sundial or a water-clock, you see that it tells the time by design and not by chance. How then can you imagine that the universe as a whole is devoid of purpose and intelligence, when it embraces everything, including these artifacts themselves and their artificers?" (*De Natura Deorum*, ii. 34).

finding more intricate and complex features of the world to compare to the constitution and creation of artifacts, to in turn evince design and lead the mind to the designer, God. Thus Paley could write hundreds of pages all in illustration and support of divine design by way of the complexity and teleology of the natural world. This single volume on "natural theology," buttressed by the emerging natural history and natural sciences, would be expanded some twenty years later into a whole series, the *Bridgewater Treatises*, thanks to the endowment of the Earl of Bridgewater and the penmanship of multiple authors.

That this teleological reasoning and the argument from design has been formed and appealed to for more than two millenia is its recurrence; that it has done so despite philosophical, religious, and scientific challenges is its resiliency. Darwin's account of evolution by natural selection, to which we will shortly turn, forms one such challenge. But a philosophical challenge actually comes earlier, some twenty years before Paley walked his man upon the heath. This was the criticism made by David Hume.

Through the voices of Philo and Demea[4] in his (1779/1993) *Dialogues Concerning Natural Religion*, Hume argues that the "argument" is at best a weak analogy based on a mechanical metaphor. While apologists use it to "prove" a wise, benevolent creator behind the world—the Christian God—the analogy may equally suggest multiple designing creators (polytheism), or a poor, inept, or malevolent designer (given that veritable imperfections exist, as well as natural evil), neither of which the Christian

4 Each speaker, though here a united front, argues towards different ends and later in the Dialogues dramatically part ways. Demea's intention partly is to cast doubt on the efficacy of reasoning *a posteriori*, from experience or empirically; thus his later emerging favoritism for the *a priori* "ontological argument." Philo, oft called "the skeptic," seems to wish to cast doubt on the philosophical theology as a whole, remaining agnostic on matters that fall outside his empiricism.

apologist wants. Hume suggests different metaphors might be just as appropriate: although apologists use the comparison with a complex, humanly designed machine, might the universe be instead like a plant or animal, self-generating and self-organizing, and thus an organic, regenerative metaphor fitting? Perhaps too this universe is simply one specimen among many (suggesting what many today call a “multiverse”). We have no certainty that we can properly apply the analogy of a man-made machine to the universe, and we haven't experience of other universes (say, a mix of designed and undesigned) to judge its efficacy. At best, Hume conceded that the universe bears “some remote analogy” with human design, but this is far from providing a proof for God, or granting any meaningful content to the concept.

Hume, and his observations that the “argument” to design can seemingly go in many directions, expressed in multiple metaphors, suggests there are limits to this reasoning's practical work. Hume is skeptical whether the argument is actually likely to produce belief in design or a designer; rather, it seems to follow from those already believing in a creative agency like God, a philosophical apologetic for that belief. But Hume was also deeply aware that the design analogy was quite attractive, even for the skeptical Philo (and likely Hume himself): the world does *seem* designed, and there is something appealing and settling about the teleological argument—something intuitive, we might say. But Hume-the-empiricist nonetheless kept his beliefs in check: even if we have a proclivity to see the world as something designed, it may not be correct or warranted to—reflectively, rationally—make that conclusion.

Darwin and Design

The place of Aristotelian teleological and Platonic design thought is a pertinent backdrop to understanding Darwin's account and the responses it evoked. Throughout medieval thought, Aristotle's doctrine of final causes had explanatory importance. But with a developing science (eventually termed a “revolution”), the doctrine of “final cause” was challenged. Francis Bacon explicitly rejected them from science, referring to final causes as “barren virgins” (as far as natural explanation goes), relegating them to philosophy and metaphysics, while figures like Copernicus were able to demonstrate the explanatory power of material and efficient causes alone (Ruse, 2004: 24-25). By Darwin's time, while final cause had been effectively removed from sciences like physics and chemistry, in natural history it was still appealed to and believed necessary by some, all the more so alongside the British tradition of natural theology. However, whether appropriate or necessary, asking questions about final cause did prove fruitful: William Harvey discovered that the heart was a pump providing circulation precisely by asking about its final cause, its what-it-is-for? (Ruse, 2004: 37).

The biological world of natural history was fertile ground for natural theology. The complexity, and specifically the adaptiveness, of living things pointed to their design, to their “contrivance.” Questions of final causes formed the teleological backdrop (for some) to morphology and anatomy; the useful parts which a creature possessed, seemingly so well suited for its environment, were clearly not by chance but by design.[5] To study life was to study final cause and design.

Darwin did not set out to challenge this tradition of thought. In fact, not

5 Another morphological school of thought was instead Platonic, not in the sense of design but in its idealism. Focusing on homology, thinkers like Cuvier and Owen saw species as designed not for adaptiveness, but according to various idealistic plans or archetypes, forms which “life,” over time, “explored,” by populating with actual organisms.

following the medical path of his father, Darwin had instead enrolled in theology Cambridge. The sole area of his studies in which he showed interest and expertise was the natural theology of Paley. Whether Darwin would complete Paley or "turn him on his head" is a matter of some debate.

While not the first person to put forward a theory of biological evolution, development, or transformism (Comte de Buffon, Jean Baptiste de Lamarck, Robert Chambers, and Herbert Spencer had done so already), Darwin would put forward an argument with enough cogency, detail, and supporting evidence that biological evolution —by natural, undesigned means—became a tenable explanation for life, eventually achieving widespread acceptance within the scientific community.

Darwin argued that species could develop over time by lawful processes given the physical properties and laws of nature. The basic premises of Darwin's argument are relatively few and simple. One: all living things are engaged in a "struggle for existence" given the "conditions of life." Most important here is the observation garnered from Thomas Malthus that, unabated, populations increase geometrically or exponentially. But the conditions of life constrain this, and thus more offspring are born than do and can survive into adulthood and reproduce. Necessarily then, some individuals die and others live and procreate. Two: there also exist (seemingly random) small variations among members of a population or species, as seen for instance in the domestic breeding of plants and animals. Three, relatedly: these traits (all traits) can be inherited by progeny. This virtue of inheritance is what allows the domestic breeder to form over time his unique and different breed or variety (of pigeon, for example). All together, those individuals with traits that better adapt them to their environment—better endow them in their struggle for existence—will have a better chance of surviving, reproducing, and in turn (by inheritance) passing on these beneficial traits to future generations. In a manner analogous to the artificial selection by human breeders, Darwin saw nature as "selecting," and over time developing new varieties, and new species.

But for Darwin the analogy stops there—although the evolutionary process *seems* to exhibit design, it is not the case that we need assume an actual designer; the naturalistic evolutionary account is sufficient. That is, there was no designer behind the creation of new variations; observation suggests they are essentially random or chance. Nor is there an actual designer selecting which individuals live, reproduce, and pass on their traits; this is virtually a lawful effect of an organism's fittedness to its environment.

It is not that Darwin denied their was a Creator, a designer God, but he did move God out of the details of natural history and into its generalities. Darwin wrote, for instance, of God as having designed the physical laws and properties of nature that were in turn responsible for evolution. This was God as the first cause, with the laws of nature as the second. Arguably, this allowed by a kind of global teleology and design, with a final cause (God having reason to create and ascribe the laws and properties which He did), but locally there was an absence of teleology and design; the evolution of species proceeded by material and efficient causation alone, not designed or directed by a final cause. God *could* be part of a grand explanation, but God was *not necessary*; natural, physical laws and the properties of matter, being what they are, are causally sufficient. If God was among the particular causes, then natural selection would be drained of all its efficacy—it would be God, not nature.

Logically, Darwin's evolution by natural selection amounted to a challenge to traditional Aristotelian and Platonic thought (but only arguably a complete rejection of their premises); conversely, Darwin represents a kind of vindication of the Lucretian claim, that "what happens to exist is the cause of its use." Moreover, the Paleyian position that stressed and elaborated the Platonic premise of the inconceivability of complexity, order, and biological contrivance having arisen by "blind chance" or "brute force," without teleological final cause or intentional design, was now presented with an illustration of and explanation how this could in fact occur.

Briefly reviewing Darwin's reception (as discussed in chapter 1), many pictures are painted of what Darwin's reception looked like. What is sure is that reaction ran the gamut. Some enthusiastic embraces, some hostile rejections, with much thoughtful reflection, misunderstandings, and alterations in between. By no means was it a situation of science-versus-religion; discussions and debates occurred on all sides of science, philosophy, theology, and even social and political thought. While there were multiple criticisms and challenges,[6] it is especially noteworthy that so many of these

6 Darwin's *Origins of Species* was charged with being too speculative, a hypothetico-deductive form of argument; much contemporary science instead praised firm Baconian fact-gathering systematized by induction. While Darwin can be read as inductive as well, as the latter chapters accumulate numerous examples as evidence and application of natural selection, it was also charged there was too little evidence in support of evolution by natural selection. There was also alleged evidence against evolution: skeptics would point to gaps in the fossil record, to jumps between species lacking transitional forms; and to hybrids, like the mule, as they were always infertile, suggesting new evolved "types" could not reproduce. There were also serious theoretical problems—causal gaps—with the theory. For instance, Darwin lacked an account of inheritance, and it was moreover believed that parental traits blended in offspring; a new trait would thus become diluted over time, not passed on and spread throughout a population. Additionally, evolution hadn't enough time to work; William Thompson (later Lord Kelvin) had estimated the age of the earth to be only 40 to 200 million years old, too few for a long and slow evolution by natural selection. In time, these criticisms would be met; enough evidence and theoretical applications took place in the years following the *Origins* publication, that by around 1875 evolution had become scientific fact, although there remained questions about the actual mechanisms and about the scope and efficacy of natural selection.
As for religious critics, they (namely British Protestants) were initially able to ride on the coattails of scientific criticism. When that criticism began to wane and evolution's acceptance wax, Christians had to regard religion on their own grounds and form their own responses. These responses are not necessarily what popular pictures present. While today antievolutionism is often associated with a young-earth Creationism based upon a literal reading of Genesis, this view only came to prominence around the early 1900s, being taken up and further developed by American Fundamentalism and its

considerations centered precisely on the issues of teleology.

Teleological criticisms came from mutually inclusive positions of science, philosophy, and theology. Consider one critic, the American chemist-and-Christian Josiah Cooke, lecturing in 1961 (just two years after the *Origins* were published). "The difficulty to my mind in Mr. Darwin's particular theory is not its developmental feature, but in the fact that he refers the development to what I can understand only as an unintelligent cause" (Cooke, 1856: 263; cf. Weber, 2009: 276). The problem was not then "development" or evolution, per se, rather that "the whole scheme of nature...might have been evolved through the concurrent action of various unintelligent causes alone" (Cooke, 1865: 257). In other words, an evolutionary explanation of life would be acceptable, were it not naturalistic or materialist, but instead included or allowed for design (namely, by God), an intelligent teleology.[7]

Other Christians argued similarly, the most notable being the Princeton Theologian Charles Hodge, one of the few to fully read and understand the *Origins*. Because Darwin had removed design from natural history, Hodge would provide a curt verdict following a long argument:

> The grand and fatal objection to Darwinism is this exclusion of design in the origin of species, or the production of living organisms. By design is meant the intelligent and voluntary selection of an end, and the intelligent and voluntary choice, application, and control of means appropriate to the accomplishment of

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biblical literalism. The earlier responses to Darwinism were more varied. In part due to developments in geology and earth history earlier in the 19th century, most Christians already had adopted either "Day/Age" or "Gap" interpretations of the Genesis account, which had allowed for an earth with a much longer history. This helped open the door for a long Creation, one that may have involved evolution. Evolution as *fact* became fairly acceptable; it was the particular *theory* that was problematic, particularly one, as we will see, that removed God from the details.

7 Cooke may have agreed with Darwin more than he realized. In his lectures, he points to the particular chemical properties of, for instance, oxygen, water, and carbonic acid, as bearing "the stamp of the Great Designer" (1865: 170), as fittingly designed and adapted for life (Weber, 2009: 276). This seems in line with Darwin's statements that God had impressed upon matter the laws and properties they have, which have resulted in life.

> that end. That design, therefore, implies intelligence, is involved in its very nature. No man can perceive this adaptation of means to the accomplishment of a preconceived end, without experiencing an irresistible conviction that it is the work of mind. No man does doubt it, and no man can doubt it. Darwin does not deny it. Haeckel does not deny it. No Darwinian denies it. What they do is to deny that there is any design in nature. It is merely apparent,… But in thus denying design in nature, these writers array against themselves the intuitive perceptions and irresistible convictions of all mankind, - a barrier which no man has ever been able to surmount. … It is impossible for even Mr. Darwin, inconsistent as it is with his whole theory, to deny all design in the constitution of nature.
> (...)
> The conclusion of the whole matter is, that the denial of design in nature is virtually the denial of God.
> (...)
> What is Darwinism? It is Atheism. (1874: 168-170; 173; 177)

While Hodge writes as theologian, much of the argument is not theological, with his inference of atheism basically precipitating from the exclusion of "design" from nature. One might argue there is less an argument here, and more an assertion: that there is in nature the appearance (an appearance we cannot deny) of design, and thus design exists. The "intuitive perceptions and irresistible convictions of all mankind" are, implicitly, taken to be indexes of truth—a theological position, or tradition, that extends from Descartes to Hodge to Plantinga (among others), that establishes epistemological ability on God's benevolent creation of the human mind. Something, then, which is as counterintuitive as the denial of design ("impossible," and, argues Hodge, inconsistent with all other thought,) can only but be erroneous.

What of Hodge's theological argument that "the denial of design in nature is virtually the denial of God"? It is the inverse of the standard design argument: where there is design, there is a designer; where there is no design, there is no designer. This inference is the backbone of Hodge's theological problem with Darwinism, that it amounts to atheism, thus problematic for Christians. Divine action which is limited to the initial creation (or design) of the world, endowing it with fixed laws and principles, is unsatisfactory; this is but a weak Deism, where God is no longer needed within the world, no longer acting. A God who is virtually absent is virtually nonexistent. “Irresistible convictions” aside, Hodge saw the theological need to retain a God who directly acted in—who directly created and designed—the world. Anything less was atheism.

It is worthwhile to pause and ask, Did Darwin deny design? Did he abolish teleology from the natural world? An answer depends upon who is asked. As noted above, Darwin himself claimed there still was divine design, though it happened only in the initial creation. In his autobiography, Darwin (convergent with the observations and claims of both Hume and Hodge) wrote of

> the extreme difficulty or rather impossibility of conceiving this immense and wonderful universe, including man with his capacity for looking far backwards and far into futurity, as the result of blind chance or necessity. When thus reflecting I feel compelled to look to a First Cause having an intelligent mind in some degree analogous to that of man; and I deserve to be called a Theist. (Darwin, 1958: 92-93)

As for specific design, of particular species, of variations, of adaptations, this Darwin denied—partly theoretical, partly theological. Previously, claims (like those of Paley) of design and teleology painted a rather rosy picture of adaptation; what was missing was an acknowledgment of veritable poor design and useless design (and arguably malevolent design, or natural evil, as Darwin would keenly note). Darwin pointed to things like rudimentary organs (like a half-formed tooth that never develops), or a diverse kind of species or adaptations all filling the same niche or function. For the special creationist, invoking divine design, these are mysteries—the only explanation is that “God willed it.” But under a theory of evolution driven by variation and law-like natural selection, they are potentially understandable and a causal account can be pursued.[8]

Furthermore, make everything an instance of design, and there follows not only puzzling aspects of life, but troubling ones as well:

> But I own that I cannot see, as plainly as others do, and as I should wish to do, evidence of design and beneficence on all sides of us. There seems to me too much misery in the world. I cannot persuade myself that a beneficent and omnipotent God would have designedly created the Ichneumonidae [wasp] with the express intention of their feeding within the living bodies of caterpillars, or that a cat should play with mice. Not believing this, I see no necessity in the belief that the eye was expressly designed. On the other hand I cannot anyhow be contended to view this wonderful universe and especially the nature of man, and conclude that everything is the result of brute force. I am inclined to look at everything as resulting from designed laws, with the details, whether good or bad, left to the working out of what we may call chance. (Letter to Asa Gray, 22 May 1860, in Ruse, 2004: 127)[9]

Natural evil becomes an even graver theological problem if, as many would have it, God "expressly," "designedly," intentionally creates those evils, and thus holds direct responsibility.[10] There seems little valid reason to suppose that God designs only certain features of nature and not others (designing or creating adaptive traits, but leaving maladaptive, poor, or cruel design to nature). Thus Darwin opts with a design only of the first level, in the creation of laws which then operate accordingly, without intention and without express design.[11] The big picture is Platonic, but the details are Lucretian. This

8 Platonists had their response: it is nature creating according to plans, testing and actualizing many ideal archetypes. Lamarckian progressionists and vitalists also had an answer: rudimentary organs were those in the process of developing, better adapting and perfecting their organisms.

9 Darwin's problem with natural evil with God as designer, together with the death of daughter Anna (following quickly after the death of his father), are the two prominent factors leading Darwin towards his later mostly agnostic beliefs about God.

10 A reason Hume's Demea takes a "Fideistic" turn—believing in God without understanding why natural evil exists.

11 In another letter to Gray (July 3, 1860), Darwin speaks again of concerns over particular design by an interventionist God:

> One more word on "designed laws" and "undesigned results."—I see a bird which I want for food, take my gun and kill it, I do this *designedly*.—An innocent and good man stands under a tree and is killed by a flash of lightning. Do you believe (& I really should like to hear) that God *designedly* killed this man? Many or most persons do believe this; I can't and I don't.—If you believe so, do you believe that when a swallow snaps up a gnat that God designed that that particular swallow should snap up that particular gnat at that particular instant? I believe that the

distinction essentially separates science from theology, and Darwin saw this as beneficial for both science and for religion. The moment it is argued that God need be designedly involved in evolution, the distinction falls and with it the science.

Yet even within the science, Darwin took himself to still be preserving teleology overall. Writing in *Nature*, Asa Gray wrote: "let us recognise Darwin's great service to Natural Science in bringing back to it Teleology: so that, instead of Morphology *versus* Teleology, we shall have Morphology wedded to Teleology," to which Darwin in correspondence replied "What you say about Teleology pleases me especially, and I do not think any one else has ever noticed the point. I have always said you were the man to hit the nail on the head" (in Ruse, 2004). But this was not the teleology of intentional design. This was the teleology of adaptation, the *apparent* design, the purposiveness, that emerges through the natural, lawful process of evolution by natural selection.

Shades of design remain, however. Wallace, natural selection's co-discoverer, wrote to Darwin that the term "natural selection" seemed too "anthropomorphic," with Darwin "frequently personifying nature as 'selecting,' as 'preferring,' as 'seeking only the good of the species', etc., etc." (in Ruse, 2004: 123). This can be a valid criticism, and it represents the concerns about teleological language in biology today. (Interestingly, Wallace would go on to curtail the scope of natural selection, deeming it incapable of being able to give rise to human intelligence and morality, human spirit.) Contrast Wallace with "Darwin's Bulldog," T. H. Huxley, who praised Darwin's removing teleology from natural history, replacing in its stead natural law. Notably though, Huxley had a secular, social, atheistic outlook (and agenda) as well, to which the nonteleological

> man and the gnat are in the same predicament. If the death of neither man nor gnat are designed, I see no good reason to believe that their *first* birth or production should be necessarily designed.
> (in Bering, 2011: 63)

aspects of Darwin's theory especially suited; for being Darwin's greatest defender, he actually cared little for natural selection as the mechanism driving evolution.

So we thus find figures as disparate as Hodge and Huxley agreeing that Darwin demolishes design and teleology from nature. That Darwin was *too* teleological was more a minority. As for the in-between, there was much diversity. Asa Gray, despite having "pleased" Darwin on his verdict above, rubbed shoulders again and again with Darwin. Gray was convinced God had to be involved in the details, the cause responsible for variation. This is one version of what is commonly called "theistic evolution," wedding the structure of evolutionary development with some theistic causation—which consequently preserves the teleology of evolution and operates by degrees of design.[12]

Some were able to accept Darwin's account, including its naturalism, in *toto*, wholesale, and interestingly these tended to be Hodge's kin, Calvinists (such as James McCosh). James Moore credits this with their predestinarian theology; Christian Darwinian Calvinists where able to reconcile "chance" with secondary causes in the same manner they could reconcile free will with predestination (1979: 334). Put differently, this amounts to the ability to hold together both ateleology and teleology, a tension that for many others was too dissonant. Indeed, Moore explicitly states that they saw Darwinism as advantageous precisely because it preserves and strengthens the "telic argument;" God who acted (only) in his initial creation still does so designedly, and the

12 This perhaps is where the Roman Catholic position best fits, with the Church accepting evolution and evolutionary theories, but requiring some degree of divine intervention, namely in regards to human creation and the "infusion" of the human soul. John Henry Newman, a contemporary of Darwin, though "he thought that there had to be more to it all than unaided natural selection," wrote that evolution did not contradict Catholic Faith (cf. Ruse, 2003: 296-299). While in the early twentieth century the Catholic Church did censor the writings of an enthusiastic proponent of evolutionary views, Father Pierre Teilhard de Chardin, it was not on the basis of his evolutionism alone as he promulgated many other views contrary to Church doctrine. Notably, de Chardin's evolutionism, was thoroughly teleological, with its final-cause "Omega Point" directing the course of evolution—this arguably allowed such an extensive synthesis with his religious views.

resulting world, and the evolution of life, can still be by (God's) design. This seems more or less the position Darwin (at times) avowed as well. Christian supporters of Darwin, moreover, saw the alternative—of the special creation of species or of life, by a directly acting, intervening God—as more problematic. The suggestion that God could sometimes act in the world implies that he could also withdraw and be absent from the world; evolution, by contrast, implied the immanence of God in nature (Moore, 1979: 261-264).

While other Christians professedly accepted (Darwinian) evolution, in fact they misinterpreted Darwin and/or added extra-Darwinian elements—most commonly by introducing Lamarckian principles. (This occurred within the sciences as well, as in the neo-Lamarckism of the Americans Cope and Hyatt.) Under Moore's category of "Christian Darwinisticism" (1979: ch. 10), such people were "Darwinistic" but not fully orthodox "Darwinian" (like the "Christian Darwinists" just discussed). Here, again, was a basic acceptance that natural selection was too naturalistic, too constraining of God's agency in the world. As such, Christian Darwinists fell into or adopted (consciously or not) ways of abetting this naturalism. One solution was to credit God with the variations upon which natural selection worked. As above with Gray, rather than allowing for variations which were indefinite, random, and undirected, God could be attributed as the directly creative force: God designedly introduces the variations, which nature will in turn (lawfully) select. Thus views which might be classified as "theistic evolution" are both creationist, insofar as God has a creative role, and evolutionist—but of note is how the evolutionary account thus is often teleological. Evolution here obtains direction—a *telos*—by virtue of God's creative directing.

This could also be done by appropriating Lamarck, or a vitalism, with God endowing organisms with an impulse towards development (and thus their own inner teleology). Furthermore, many saw it as dubious that humans (with soul, developed mental faculties, or moral sense) could have undesignedly evolved from animals—which at the same time placed humans on the same level as the rest of creation. Lamarckian, as well as Spencerian, elements could however place humans (back) on the pinnacle of creation—as those given the most beneficial, highest quality variations, or those who by their species inner impulse have attained the highest degree of evolved perfection. Social and political progressives, Spencerians, and Eugenicists thus were likewise fond of a teleological view of evolution, or a teleological evolutionary perspective, for suggesting progressive direction to the social order, towards some better end point, and thereby vindicating their preferred social activities.

Among all these responses to Darwin's evolution by natural selection, all were concerned over issues of design and teleology, and most all found—by varied means of inference and reasoning—ways to preserve them (except those like Huxley, who wanted it gone). Some saw the only way out through rejection of Darwinism; others saw compatibility, by virtue of the deemed teleological *strengths* of Darwin; still others misinterpreted or altered the naturalistic evolutionary account in ways that readily allowed for design and teleology. This is not to say that every response to Darwin and evolution was centered on these questions of design and teleology; rather, that for virtually all those that did, these elements were crucial and *must be preserved*. The Epicurean, Lucretian position was not an option.

Creationism and Contemporary Thought

Teleology, design, and natural theology in general are not prominent among "Creationist" history or thought, with "Creationism" referring to the conservative Christian tradition that has rose within popular culture to represent antievolutionism *par excellence*. The "Creationism," or -isms, that would develop in the twentieth century, were more motivated by biblical and social concerns than by teleological ones alone.[13] However, especially in the development of a "scientific" creationism, issues of teleology and design were discussed.

While Creationists do not tend to identify with the traditions of Natural Theology and apologetics based on the Argument from Design,[14] the line of argumentation that would come to be (self-)called "Scientific Creationism" or "Creation Science" is, however implicitly, in essence a continuation or (revival) of natural theology. After all, the whole idea that "science" can speak of "creation" is predicated upon the idea that there is evidence in the natural world of supernatural workings which we can empirically, scientifically discover—recall Paley's title, *Evidences of the Existence and Attributes of the Deity, Collected from the Appearances of Nature*.

While one finds no entries for Paley, Design, or Natural Theology in the index of *The Genesis Flood* (the 1961 work that in essence revitalized Flood Geology), by the time "Scientific Creationism" forms and a text like *What is Creation Science* (Morris and Parker, 1984) written, the language of "design" has been (re)appropriated. While *The*

13 These developments, and the social settings and motivations, will be discussed more thoroughly in chapter 4.

14 There are different historical trajectories involved in this, as conservative Christianity and Fundamentalism (within which contemporary Creationism is arguably best placed) come out of a different set of denominations than those within which Natural Theology was once queen (such as Anglican and Presbyterian, though there is some overlap in regards to the latter). Perhaps the resultant similarities are well understood as an example of "convergent evolution"!

Genesis Flood was explicitly biblical and religious, and avowed that if natural evidence seemed to conflict with the Scriptures than Scripture nonetheless was true and science not, *What is Creation Science?* is more optimistic of the evidence for creation, as well as less explicit (even denying of) any religious foundation to "creationism."

The second chapter of this creation science handbook is titled "Evidence of Creation in Living Systems,"and is Paleyian through and through, with biologist Parker claiming that observations of "organization," by logical inference, point to "design and creation," and proceeds with a design-oriented analysis of living organisms and systems. The engineer Morris similarly embraces design, noting how "Teaching structural design made me intensely conscious of the fact that the marvelous structural design of plants and animals could not be the result of chance" (1984: 190). This, indeed, where not explicit (as with or in Natural Theology) is the often implicit understanding—that if the natural world were not created or designed by God, than the (unthinkable, impossible) alternative is that it came about "by chance."

While Creationism thus did either appropriate or arrive at teleological reasoning, it is the more recent Intelligent Design Movement which introduced this chapter that fully and clearly proceeds from this foundation of design. Inaugurated chiefly by lawyer Philip Johnson, with biochemist Michael Behe and mathematician William Dembski also at its intellectual core, Intelligent Design reaffirms the teleological argument for the existence of God while revitalizing it with modern science, particularly at the subcellular, molecular level. Just as Paley claimed the eye was too complex to have evolved by natural means, so too Behe, for instance, argues in regards to bacterial flagelli, blood clotting, and the human immune system.

Upon initiating the first part of the argument from design, the "argument to complexity," Darwin is explicitly cited as the insufficient alternative explanation:

> As biochemists have begun to examine apparently simple structures like cilia and flagella, they have discovered staggering complexity, with dozens, even hundreds of precisely tailored parts. Darwinian theory has given no explanation for the cilium or flagellum. (Behe, 1996: 73)

Behe comes to call this kind of complexity "irreducible," claiming irreducibly complex structures cannot be broken down into functional simpler structures which could have evolved. A mousetrap, for instance, without all its parts present and arranged, does nothing, he claims; regarding the bio-molecular equivalents, natural selection could not or would not select these not-yet-functional traits.

Then follows the "argument to design":

> Darwin's mechanism of natural selection would actually hinder the formation of irreducibly complex systems such as the clotting cascade. … The bottom line is that clusters of proteins have to be inserted all at once into the cascade. This can only be done by .... the guidance of an intelligent agent. … Faced with such complexity beneath even simple phenomena, Darwinian theory falls silent. (Behe, 1996: 96)

And similarly, as with so-called "scientific creationism," the argument is that this conclusion is science, not religion:

> The straightforward conclusion is that many biochemical systems were designed. The designer knew what the systems would look like when they were completed, then took steps to bring the systems about. … The conclusion of intelligent design flows naturally from the data itself—not from sacred books. It requires no new principles of logic or science. It comes simply from the hard work that biochemistry has done over the last 40 years. (Behe, 1996: 193)

Intelligent Design lacks the elements of biblical-literalism and a young-earth, stressing instead only that nature is designed—advocates tend to accept a long-earth history and that evolution has occurred, but not by Darwin's proposed natural mechanisms (alone). Accordingly, it has obtained a wider audience than Creation

Science. (As such, some more conservative, literalist Christians appropriate and promote Intelligent Design, in hopes of it serving as a kind of "gateway" to more conservative views.) It should be of note that at the heart of this appeal is the argument to design, and the alleged impossibility of "chance," in the evolution of species.[15]

The above brief survey of historical teleological thought and of design-related reactions to Darwinian evolution primarily considered only explicit teleological reasoning. However, it is worth considering also teleological reasoning that is more implicit. Surveys and studies of both popular opinion and testing of student knowledge provide some insight into the reception and understanding of Darwin, natural selection, and evolution, outside of the explicit accounts treated above. The picture that arises is that teleological reasoning is more widespread than the explicit accounts alone would suggest.

A common strand of this misunderstanding involves the attribution of goals or purposes to evolution, or the sense that evolution is progressive and tending towards particular ends. Bernatowicz (1958) discusses the use of incorrect or unwarranted use of purpose language in science education, and Brumby's (1984) study looks at similar misconceptions about natural selection among medical students. Nehm and Reilly (2007) likewise study "Biology Majors' Knowledge and Misconceptions of Natural Selection," and also cite and discuss multiple other research articles examining the same subject and drawing similar conclusions.

15 Philosopher-mathematician William Dembski most extensively has written towards this end for Intelligent Design, arguing along probabilistic lines for design over "contingency" or "chance," appealing to "explanatory filters," "complex specified information," and "no free lunch" theorems. (cf. Ruse, 2003: ch. 15)

Arguably the most common theme is the belief "that evolutionary changes occur as the result of need" (Brumby, 1984). This is an implicit Lamarckism, with progressive, teleological contours. As another researcher summarizes (in line also with findings of the previous chapter),

> people conceive of species as entities which have distinct moments of birth and death (and hence ages), and which have needs, and strategies to further them. Evolutionary change is seen as a response to these needs. Mutation and inheritance are thought of as goal-directed, so mutations arise and/or are passed on because they are beneficial. (Nettle, 2010: 206)

In line with suggestions made at the end of the previous chapter, Brumby suggests that students acquire two views about evolution and natural science—the common sense, teleo-Larmarkian, and the naturalistic, Darwinian—which they hold in tandem but differentially are made explicit in different contexts. Such research, primarily from pedagogical, science-education journals, helps to flesh out the landscape of evolutionary understandings, beyond those explicit accounts that tend to be strongly for or against Darwinian evolution.

I would argue that these implicit (mis)understandings of evolution that people—including students explicitly taught Darwinian evolution by natural selection commonly—share a cognitive foundation with the explicit, formulated responses to Darwinism, along with the longstanding argument from design in philosophical theology and the Aristotelian teleology of final causes. These all share in their teleological understanding and reasoning about the natural world.

One might thus ask, Why the prominence, ease, and attraction of teleological interpretations and explanations? Why, as Charles Hodge observed, do these seem to be "irresistible convictions"? Why the unnaturalness of, and even hostility towards, the naturalism of Darwin's idea? Cognitive psychology approaches an answer.

Part II: Teleology in Cognition

Intuitive Teleology

Cognitive psychologist Deborah Kelemen is arguably the primary researcher behind a growing body of work on the development and scope of teleological reasoning, "reasoning based on the assumption of goal, purpose, or function" (Kelemen 1999a: 242). Psychologist Jesse Bering similarly writes that "'teleo-functional reasoning' is just a fancy philosophical expression that refers to people's thinking that something *exists for a preconceived purpose* rather than simply came to be as a functionless outgrowth of physical or otherwise natural processes" (2011: 55).[16]

Kelemen's work in particular is relevant in a number of respects, not only because it deals with human teleological reasoning, but also because her verdict actually resonates closely with those of design proponents like Plato, Aquinas, Hodge, and even Hume and Darwin, for all agree that teleological interpretations of nature seem to be a propensity of the human mind, delivering, in Hodge's words, "irresistible convictions." In addition, her work is fairly well cited in the cognitive and scientific literature as regards both evolutionary belief, and as regards religious beliefs, stemming from her positive (though tentative) answer to to her query, "Are Children Intuitive Theists?" In these latter respects, her work warrants analysis and critique.

Kelemen introduced her research agenda by noting that while adults' assumptions and attributions of teleology were fairly well understood (among psychologists), less was

16 Bering, however, may include too much in his definition, namely whether the attribution of purpose is indeed deemed to be "preconceived," arguably the analogue to "designed." This is a jump Kelemen makes as well, and is a topic which will be discussed.

known of this regarding children (Kelemen, 1999a; 1999b; among others). Children, of pre-school and elementary ages (along with adult comparisons/controls), are the initial subjects of her research. Adults generally reason teleologically about human (or agent) actions, which are done for a reason or goal, and artifacts and their components as well as biological parts, all things which have a purpose or a function.[17] Young children, however, are less restrictive in their teleological ascriptions, and will apply purposes to things like whole living organisms or natural kinds as well. Piaget saw this as a category error, of children overextending the application of the "artifacts" category and of intentional reasoning (and induction from the experiences of people making artifacts for purposes) to non-artifacts like animals and natural objects. As they develop, they learn to discriminate between artifacts, organisms, and natural kinds, restricting in turn the application of intentionality and purpose and so no longer reasoning teleologically about the non-artifactual.

Kelemen challenges the Piagetian position, noting that subsequent research suggests children (by Kindgergarten) *are* able to discriminate between artifacts and natural objects, and are actually able to apply physical-causal reasoning (i.e. efficient causation; rather than just intentional- or agent-causation) from infancy.[18] Kelemen thus reconceives the issue in terms of the scope or application of teleological reasoning, examining whether children, like adults, exhibit "Selective Teleology" (ST), or if they instead exhibit what she provocatively terms "Promiscuous Teleology" (PT). Under Selective Teleology, (implicit and explicit) reasoning about purpose is applied only to

17 Or readily assumed to have; as noted earlier, as regards biological organisms and their "functions," that teleological language is correct or fitting is not without dispute.

18 For brief discussions of these researches, see Kelemen, 2004; Kelemen and DiYanni, 2005; and Casler and Kelemen, 2008. See also Evans, 2000.

domains such as artifacts and biological properties, and may serve in essentialist understandings of these (meaning the essence of some thing, whether a hammer or a human heart, is determined partly by its purpose or function; DiYanni and Kelemen, 2005). Under Promiscuous Teleology, however, teleological reasoning is, unsurprisingly, "promiscuously" applied beyond these domains, for instance to natural objects and biological wholes. Kelemen's, and Kelemen et al's, work collectively suggests children are, indeed, "promiscuously" teleological reasoners.

To illustrate, Kelemen's (1999a) experiments aimed to probe preschool children and adults on what various kinds of things were "for," or if they were not for anything at all. Different open- (subjects provide an answer) and closed-choice (subjects select from a set of answers) questioning was used.[19] While both the children and adults assigned functions to artifact parts, artifact wholes, and biological parts, children more often also assigned functions to biological wholes, natural object parts, and natural object wholes. That is, in the biological world, whole organisms were assigned purposes, and in the physical world, natural objects were as well. Functional attributions, for instance, were that lions were "for walking," plants "to grow," and clouds "for rain."

Kelemen (1999b) found similar results. Here, 7-, 8-, and 10-year old American elementary students were first given a pre-trial tutorial on how a scientist would (physico-causally) explain how clouds form, and then were directed to "think like a scientist" when answering the given questions. They would then be shown four pairs of cards, one of a an unfamiliar, prehistoric, now-extinct animal, and one of an unfamiliar

19 In this particular study, puppets were used; either (study 1): "King Puppet" would would ask the subjects what something was for (and in practice, subjects had learned they could tell the puppet that he was asking a "silly question," like "where do you switch on the dog?" and that there wasn't an answer. Or (study 2): two puppets would have a discussion, each providing an answer/opinion, and subjects would point to the puppet with which they agreed.

natural object. For example, for set one, the experimenter would show the picture of a long-necked aquatic reptile, saying “Here is a Cryptoclidus,” and then show a picture of a pointy rock, saying that all around where Cryptoclidus lived there were these pointy rocks. After being shown the set, participants were asked three questions: one about a biological feature of the animal, a second about a behavioral property of the animal, and a third about a property of the non-living natural object. For each question, there was a choice between two possible answers: one choice was of a teleo-functional answer, which pointed to *either* a self-serving function (for 2 of the picture sets) *or* an other-serving, social function (for the other 2 sets); the other choice was of a physical-reductionist explanation. For example, the researcher might point to the creatures neck, and ask “Why do you think Cryptoclidus had such long necks?” with the options being (1) that (teleo-functional) it helped them to catch food (self-serving) or that it helped them hold up other Cryptoclidus while swimming (other-serving), or (2) (physical-reductionist) “because the stuff inside got all stretched out and curved.”[20]

Regarding both biological features and behavioral traits, children and adults (knowing they were being asked questions tailored for young children) alike most often choose the teleo-functional answer, with children choosing answers of both self- and other-serving types, but adults being more selective and less often endorsing the social, other-serving functions. Children's answers also grew closer to the adults as they progressed with age/grade. Where children and adults most markedly differed was in regards to the questions about natural objects, like the pointy rocks. As to why the rocks were pointy, adults nearly always endorsed the physical explanation: “They were pointy

20 This is not to say only one of these answers is correct, as any one might be a legitimate biological explanation—however, the “how” and “why” of any one is crucial.

because little bits of stuff piled up on top of one another over a long period of time." Children, however, and more often the younger they were, often endorsed the teleological explanations, that the rocks were pointy so that Cryptoclidus could scratch itself, or that "They were pointy so that animals wouldn't sit on them and smash them."

These experiments do not exhaustively and unambiguously lay bare the manner and scope of our teleological reasoning, but they do probe our intuitions, and most importantly show differences with age, from younger to older children, to adults. Noting a difference, there are conceivably three reasons as to why children display (more) PT and adults (more) ST. One (i) is that children are inadvertently taught to promiscuously reason teleologically, directly through adult instruction (in parent-child explanations for instance), or indirectly through culture. This, Kelemen claims, could come in the form of religion (theism), for example that God created clouds to make rain. Another possibility (ii) is that this is simply a part of child development, and as children grow they naturally, developmentally come to cognitively reason differently, restricting the scope of teleological reasoning and expanding the scope of the physico-causal. In McCauley's terms, this is teleological reasoning as "maturationally natural." A third option (iii), partly the inverse of (i), is that Promiscuous Teleology is in fact the natural, cognitive default, and that children instead learn to restrict their teleological ascriptions, and supplement their explanatory repertoire with physico-causal reasoning as they develop, so that by adulthood they have learned to explain things (like natural kinds and whole organisms) in physical rather than intentional, teleological terms—perhaps a "practiced naturalness.". In subseqent research, Kelemen (et al) in essence tests each of these possibilities in turn, and by the last analysis, the third suggestion (iii) is favored.

Kelemen (2003) aims to test the cultural/religiosity hypothesis by conducting the same experiment on British children, but unfortunately this faces methodological and theoretical shortcomings. Kelemen's avowed reasoning is that while Britain and America are in many respects culturally similar, they are highly dissimilar in religiosity. Kelemen here points to sociological work, citing the phenomena of “American religious 'exceptionalism',” compared with Britain on surveyed levels of religious self-identification, belief in God, frequency of church attendance, and similar. What manifests in America is a “civil religion,” a “non-denominational theism,” which has no counterpart in Britain[21]. If, her hypothesis goes, there are differences in the implicit teleological reasoning between American and British children, then culture and socialization may be taken to be causally involved; if not, then more support is given for the other explanations ((ii) and (iii) above).

In brief (as the format of the study was the same as above), Kelemen found virtually no differences between the American and British children; they shared the same tendency toward Promiscuous Teleology.[22] (And American adults, she notes, were slightly less restrictive in their ST than British adults, showing some difference that could be attributed to culture. Whether a *religiously* caused difference is not shown.) The suggestion is that socialization and cultural environment—namely “religion”—are not

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21 Kelemen lastly points to a study between American and British college-educated adults, the former being more likely to generate teleological explanations to open-ended questions (within an experimental setting), with this difference moreover being predictable based on subjects' self-ratings of religiosity. However, in a later study (Kelemen and Rosset, 2009), this is tested by not supported: they find no correlation between religiosity and teleological reasoning.

22 The only notable difference being that American children were more likely to endorse the teleological other-serving functions than were the British, who more favored the self-serving. Kelemen queries if this difference is due to religiosity—with religious instruction favoring the attribution of benevolence which would favor the other-serving functions. This though would need more substantiation; even if correct, it would seem then that culture is nonetheless only acting on a stronger intuitive default or preference, guiding the particular but not the general reasoning and explanation (that is, not influencing whether or not to invoke a teleological explanation, only influencing what kind or form of teleology).

doing the theoretical work here (at this stage in human development).

However, Kelemen's selection of (urban) Americans and British may be critiqued, and exemplifies the limitations associated with the "WEIRD" studies as discussed in chapter 2. Though Kelemen intends this comparison to bracket "religion" as the only variable, with other cultural elements similar and thus controlled, cultural anthropologists and religion scholars alike can recognize that the "religion" Kelemen seeks to test is arguably much more similar than not. What is needed here to strengthen the argument are further cross cultural studies, especially those of a non-theistic culture.

Fortunately, a further challenge to possibility (i) (the "teaching" or "enculturation" hypothesis) is provided. Kelemen, Callanan, Casler, and Pérez-Granados (2005) note that "Children's explanatory activities do not happen in a social vacuum" (2005: 252), and studied a number of question-answer exchanges between children and their Mexican-descent mothers in California, half having completed high school, half not. The researchers here found that children more often asked about biological and social phenomena than about artifacts and non-living natural phenomena,[23] and the questions were vastly most often ambiguous as to whether the children were seeking a phyisco-causal or a teleological explanation in turn (think of the proverbial, open-ended "Why?" a child might ask).[24] In answering, the parents' responses were also coded as either causal, teleological, or nonexplanatory; the researchers were especially interested in responses to the ambiguous questions. They found that the mothers' answers were more than twice as likely to be naturalistic and causal than to be teleological (and there was no correlation

23 The children most often asked questions about biology (31%) and other's behavior (33%), with the other questions being of non-living natural objects, artifacts, and self behavior (9%, 9%, 14%).

24 The exception was regarding artifacts, where coders ranked only 41% as ambiguous, and 26% as seeking a causal answer. For the other categories, the combination of causal and teleological question types was only 7-9%.

with the mother's level of schooling either). This suggests then that child teleological bias is not directly coming from parental instruction, and (together with the weak challenge against indirect cultural socialization above,) suggests a “promiscuous teleology” is instead something more cognitively natural. This still however leaves the possibility between (ii) and (iii)—between (ii) naturally developing, during maturation, into more Selectively Teleological reasoners, or (iii) needing to be explicitly educated and trained to do so.

Two further studies, one involving elderly and Alzheimer's adult patients (Lombrozo, Keleman, and Zaitchik, 2007), and another involving both schooled and unschooled Romanian Roma adults (“Gypsies”) (Casler and Kelemen, 2008), serve to navigate between the above possibilities, by seeking to test the effects of age and education.

In both studies, Kelemen's forced-choice experiment described above was again used. In the former, the researchers found that while (non-Alzheimer) elderly adults tested displayed Selective Teleology (in common with other adult test subjects), those with Alzheimer's disease displayed Promiscuous Teleology, to the same degrees as found in the children tested earlier. Reasoning that Alzheimer's disease partially involves a breakdown of the “semantic physical-causal knowledge base” (Casler and Kelemen 2008: 357), and if this accompanies a return to PT reasoning, then it seems more likely that ST and physico-causal reasoning is something learned and acquired, but also potentially lost; selective teleology, moreover, only *supplements* PT, but never entirely replaces it. So when such acquired knowledge[25] disintegrates—as seems to be the case with Alzheimer's

25 Which might perhaps be either B-system explicit knowledge, or intuitive-level and “natural” by practice —the salient feature, however, is that it is learned and acquired, not maturationally natural.

—then Promiscuous Teleology, as a kind of intuitive bias or default, can then reassert itself in one's inference and reasoning, as though having been on standby or repressed during the educated adulthood. This is in line with Brumby's observations that students hold Lamarckian explanations alongside naturalistic evolutionary ones, despite their logical incompatibility.

The study of adult Romanian Roma further supports the culture/education hypothesis. Here, the participants all came from the same community, were all of the relatively same culture (language, country, religion, etc.) and were all engaged in similar walks of (blue-collar, working class) life, with the primary differences being the number of years of attending school and having formal, including formal scientific, education. Here, the High School Education (HSE) adults tended toward ST reasoning (akin to American and British adult subjects), while the Low School Education (LSE) adults showed much more PT (akin to the Alzheimer's patients and younger children),[26] with a noticeably strong linear correlation between years of schooling and number of PT teleo-functional explanations being accepted by subjects.

Kelemen's body of work collectively favors explanation (iii), the view that formal, explicit education in scientific, naturalistic, physical-reductionist causal explanations[27] seems to be the key for shifting one's representational or explanatory *preference* from PT to ST, thereby constraining the frequency and scope of invoking teleological, purpose-based explanations, but not fully replacing or eliminating such bias or tendency.

26 Readers have commented on the potential implications or characterizations of this research—suggesting, for example, that (unschooled) Roma and Alzheimer's adults are "childlike," findings which bear some resemblance to the language of the "primitive savage" from anthropologies of yesteryear. Value judgments, however, are not intended—the comparison is meant only to illustrate the cognitive effects of explicit cultural instruction and education, and in this case a variety of teleological reasoning is paradigmatic of young, not-yet-schooled and not-yet-mature children.

27 Again, a correlate to the theologically-laden "doctrinal mode" of religiosity.

"Promiscuous Teleology" seems to be a kind of maturationally natural, intuitive bias: "an autonomous teleo-functional stance is an innate primitive of human cognition" (Casler and Kelemen 2008: 342). In one of her most recent writings, Kelemen (and Rosset, 2009) dubs this "the human function compunction."[28]

That latest study further explores the scope of teleological reasoning in adults, and makes an additional interesting contribution as well. In speeded (requiring an answer in a short amount of time, 3200ms), moderately speeded (5000ms), and unspeeded tests, college-age adults read sentences describing simple explanations for why things happen. The control sentences were either scientifically "good" explanations, of either physical or teleological types (such as "flowers wilt because they get dehydrated" or "people buy vacuums because they suck up dirt"), or "bad" explanations, which were unwarranted or incongruous (like "cars have horns to illuminate dark roads"). The test sentences, on the other hand, were scientifically unwarranted purpose-based (teleological) explanations of both biological and non-biological natural phenomena ("the sun radiates heat because warmth nurtures life"). Kelemen and Rosset found that the adults tested were more likely to endorse the unwarranted teleological items as speed increased, and slightly more often for biological than non-biological items (51 and 44 percent, respectively, for the speeded; 41 and 33 at moderate, and—noteworthy—35 and 26 when unspeeded). Conversely, there was only a few percentage point difference regarding the correct control items and speed (over 91 percent correct in all instances, with correctness actually *increasing* with speed).

Speeded tests like this tend to elicit A-system cognition—implicit beliefs and

28 This is analogous to the maturationally natural predilection for essentialist intuitions about species as discussed in the previous chapter.

intuitive reasoning—or “online cognition,” while in unspeeded questioning subjects instead use (or have the ability to use) B-system cognition—reflective reasoning and explicit, acquired knowledge—or “offline cognition.” These speeded tests with adult subjects again corroborate the conclusion that Promiscuous Teleology is a maturationally natural intuitive bias, a default cognition, in the absence of, or absence of time for, other reflective and learned knowledge, even when such knowledge has been acquired and such ways of thinking practiced and applied elsewhere.

Accordingly, the recognition of an intuitive “Promiscuous Teleology” is pertinent towards understanding and explaining disbelief of and concerns over evolution, as well as the not uncommon, persistent misunderstandings about evolutionary theory. In addition, the history of philosophical and theological teleological thought and the apologetic and appealing “argument from design” obtain cognitive contours as well. If we intuitively expect things to have or exist for a purpose, and *if* we understand evolutionary thinking to deny or preclude this teleological element (as did Hodge, for instance), then there would be something counterintuitive, something cognitively “unnatural,” and thus less believable and attractive, about evolution. Or, having such intuitive predilection, we may be more likely to misinterpret, or add to, naturalistic evolutionary accounts of species, to include a teleology as well.

However, these studies and conclusions only approach one prong of the teleological fork, that of Aristotelian-purposiveness. The other prong, the question of teleological Platonic-designedness, is not yet addressed—that we exhibit a propensity to see the natural world as having purpose does not necessitate that we see it as designed.

Design in Mind?

When we attribute purpose and function to things, are we doing so because we (first) recognize something as having been purposefully created or designed? Is the promiscuous teleologist implicitly representing a designer, a purpose-giving, function-intending agency? In other words, is the intuitive teleology that Kelemen discusses manifest because of a more basic or antecedent design-reasoning? Or is it simply and properly Aristotelian all the way, where we need not "suppose that ends are not present because we do not see an agent deliberating," where we infer purpose without inferring intentional design?

By no accident, Kelemen (2004) has worked to address this question herself, through the provocative query "Are Children Intuitive Theists?" The thesis would be that "Perhaps children's generalized attributions of purpose are, essentially, side-effects of a socially intelligent mind that is naturally inclined to privilege intentional explanation and is, therefore, oriented towards explanations characterizing nature as intentionally designed artifact" (2004: 296). Later on,

> All that is under question is whether children make sense of the world in a manner superficially approximating adult theism, by forming a working hypothesis that natural phenomena derive from a nonhuman 'somebody' who designed them for a purpose—an intuition that may be elaborated by a particular religious culture but derives primarily from cognitive predispositions and artifact knowledge. (2004: 297)

Prima facie, intentional-design as the cognitive primary (from which teleol-functional reasoning derives) is not unlikely. The domains to which we apply purpose and function when exercising Selective Teleology (as in the studies above) are those of the social, artifacts, and biological organs, traits, and behaviors. As noted early in this essay, human intentionality in actions and artifacts suggests paradigmatic teleology.

These have a purpose, goal, or function because somebody intended a purpose, goal, or function for them. We may, then, apply a teleology to those domains because we first or implicity apply intentionality or design: some agent had a purpose, or designed something to fulfill a goal; ergo, this action or thing has a purpose, a goal or function—purposeful because it was designed for a purpose.

But what of rocks which "are pointy so that animals won't sit on them and smash them"? Clouds that are for raining, lions which are "for to go in the zoo"? Are these explanations given on the basis of intentionality and design? Kelemen (2004) discusses others' research that suggests there may be a link, for instance Evans' (2001) study of creationist responses on origins-questions by schoolchildren of various backgrounds, and Guthrie (1993) who highlights humans' propensity to invoke agent-explanations in situations of uncertainty. (A further discussion of Evans will follow below.)

But while the inference is logical, it may not be necessary; "It may be that children's ideas about purpose in nature have no explicit link to intuitions about intentional design because they are instead linked to other kinds of intuitions" (Kelemen and DiYanni, 2005: 7). Adults for instance will appeal to lay (though scientifically erroneous) ideas of evolution or spontaneous generation in explaining how and why natural and living things developed, without appealing to intentional-design explanations (e.g. hands evolving to grasp; birds developing to fill an insect-eating ecological niche). Thus Kelemen and DiYanni (2005) set out to test this.

In their study, children were first asked open-ended questions about "Why did the first ever *x* come to exist?" (or "come to be," or "happen"), *x* being a natural event, natural object, animal, or artifact shown to them on a card. Following that, the subjects were asked to make a closed-choice between two answers that two other people had provided; one response gave a teleo-functional explanation, the other a physical-reductionist explanation. Finally, the children were asked of each of the items on the cards, "Did someone or something make the first ever *x* exist or did it just happen?" For both of the latter two portions of the study, the presented answers were reversed for half of the subjects.

In tune with the other discussed studies, for the first question children exhibited the same teleological promiscuity, attributing teleo-functional explanations over both physical and agent types, across all object domains. Following that, physical explanations were preferred for natural events, and agent explanations for artifacts. Where agent causes were given, the researchers coded them, with persons attributed as the agent for 58% of artifacts, but with a supernatural agent as cause of 50% of natural events, 44% of natural objects, and 76% of animals (many answers were indeterminate as to the answer). These attributions held, with greater percentages, when subjects answered the final question, explicitly about whether the origin came from someone or something, or if they just happened.

The authors rightly note that teleo-functional ascriptions are correlated with identifications of agency. However, children would ascribe function before ascribing agency (and they note a similar finding among British undergraduates (2005: 21)), so potentially reasoning about function in turn prompted ascriptions of agency. Along this line, the stronger and more definite ascriptions of agency only emerge when subjects were *explicitly* questioned whether or not "someone or something" was the cause. It is plausible then that children and adults alike will ascribe teleo-functional purpose independently of ascribing intentional agency; agency enters the explanation only (or more so) when subsequently and/or explicitly questioned about something's existence and purpose. This is also in line with the work by Evans (2001) and Guthrie (1993): Evans was *explicitly* asking about animal origins, and the Guthrie reference pointed to situations of explanatory uncertainty, where the question of “why?” might enter reflection. Thus agent explanations may be the work of B-system reflective processing, not maturationally natural intuitions.

This, after all, is the logical pattern of the argument from design: first the argument to complexity, noting the complex, ordered, functional, purposeful aspects of the world; then the argument to design and finally the argument that a designer exists. While historically Aristotle followed from Plato, cognitively the reverse may be the case.

Designer Culture

Research by E. Margaret Evans (2000a; 2001) draws a fuller picture of the cognitive contours of design, and her work on the emergence of children's beliefs regarding biological origins is suggestive of how cognitive intuitions and cultural environment interact, specifically in the case of creationist and evolutionist beliefs.

In a similar manner to Kelemen, across 2 studies Evans conducted research on children of various ages as well as their parents, from 3 different communities (in the first, in a university town; in the second, from multiple rural communities, with children attending both Fundamentalist and non-Fundamentalist schools). In both studies, children were questioned on origins beliefs in two manners. First was an open-ended format, where subjects give their views on how the “first ever” of something came to be.

Second was a closed-choice format, where the researcher provided possible answers to questions about the origins of organisms, natural objects, and artifacts, and subjects showed their level of agreement or disagreement with the answers offered, which represented (formulated in different ways) "creationist" ("God made it and put it on earth"), "evolutionist" ("it changed from a different kind of animal that used to live on earth"), "artificialist" ("A person made it and put it on earth"), and "spontaneous-generationist" ("it just appeared"; "it came out of the ground"). Parents conducted a questionnaire, reporting on the kinds of answers (to the questions and answers above) that they were likely to give to their children if asked. Data about child's school type, church affiliation/attendance (classified as Fundamentalist or non-Fundamentalist), parental education level, importance of religious activity, and knowledge of and interest in natural history and fossils were also collected.

Evans notes how the two formats function differently and may elicit different cognition. While open-ended questions may elicit whichever answers or explanations come most readily or "naturally" to the subject (as intuitive beliefs), "closed-ended" or "forced-choice" questions, on the other hand, "gave participants the opportunity to explicitly consider all explanations, making it possible for explanations that are not easily invoked in an open-ended recall procedure" (Evans, 2001: 231).

Some general patterns emerge across both studies and both formats. In the open-choice test (of Evans, 2001; the same pattern was observed also in Evans, 2000a.), for the non-Fundamentalist subjects, young children (grades K-2) almost equally gave creationist and spontaneous-generationist (SG) answers, with very few evolutionist responses. For the "middle" aged children (grades 3-4), SG responses decline, and creationist increased (by nearly the drop in frequency of the latter). Older childrens' (grades 5-7) evolutionist responses increased substantially, with a decline in creationist answers—the two were nearly equal, each occurring almost 50%. Adult responses were close to the older childrens', with slightly more agreement with evolutionist and creationist answers, and almost no agreement with SG.

However, for the Fundamentalist subjects, across all ages creationist responses were highest, and were almost the only answer given by older children and adults; the somewhat fewer creationist responses of the young and middle children were offset by more SG responses. While evolutionist answers were also few for young and middle children, they remained virtually absent from older child and adult responses as well.

The same patterns loosely emerge from the closed-choice questions, but more strongly differentiated. Here, the rankings were by level of agreement with the explicitly suggested answers, from strongly disagree (1) through strongly agree (4). Again, across both groups, there was a gradual decline with age in SG agreement. For non-Fundamentalists, there was again a rise in creationist agreement among middle age children (though not as stark as before), followed by decline (but all within the range, on average, of slightly to strongly agreeing), and a corresponding increase in evolutionist agreement starting with older children (from a mean of slight disagreement up to a neutral (2.5) position).

For Fundamentalists, however, there was nearly perfect, widespread creationist agreement (4—"strongly agree") across all ages, with less SG agreement among the young and middle age children that had previously reduced their creationist answers. Evolutionist agreement was slightly higher than SG here—but both evolutionist and SG agreement was only in the range of strongly to slightly disagreeing, and once again virtually remained static with no increase with age.

Evans' researches may speak to the question of design, and show the potential interaction of A- and B-system, implicit and reflective processes and beliefs. Consider the differences in the answer types the children and adults gave (or agreed to). Creationist (for biological origins; artificialist for artifacts) explanations are both teleological and intentional—an agent creating for a purpose. Evolutionist and SG explanations are both nonteleological (as recorded and presented) and nonintentional.[29] Of interest in Evans's results is that there is not simply a decline in creationism followed by an increase in evolutionism; in the open-choice questions, SG had a strong initial presence (almost on par with creationism among non-Fundamentalists). This shows young children are capable of naturalistic reasoning (and potentially non-teleological reasoning, regarding origins[30]), again supporting the view that they are not Piagetian artificialists. But while available to the young children, such explanations seem to become unsatisfying or deemed incorrect by the middle ages (if possessing more reasoning skills and knowledge at that point, more incoherences with other beliefs may arise), and in turn get replaced with creationist responses. Relatedly, SG explanations were less agreeable during the closed-choice study; the explicit presentation by another person, along with opportunity for explicit reflection on the explanation by the subjects, may have allowed the younger children to this time around reject them.

29 Differences between these explanations lie some in their manner of cause, SG perhaps better allowing for a series of proximal causes in the explanation, whereas for evolution the mechanism is elusive; additionally, as discussed in chapter 2, evolution entails a violation of essentialism, in one kind of creature or thing coming from (or changing) into another, that may be muted by SG where a kind of thing just appears.

30 The acceptance of the nonteleological processes of SG isn't necessary at odds with Kelemen's findings above; that SG isn't an intentional, teleological process doesn't preclude that those creatures generated now themselves have goals or purposes, the object of Kelemen's studies.

As for creationism, unlike Kelemen who suggests children may be "intuitive theists," Evans suggests that these origins explanations are formed on the basis of a "source analogy" with human intentions and actions (2001: 220-224, 250-251).[31] Things that are made by humans are made intentionally for a purpose. Consistent with other cognitive research on religion, the representation of God is similar to our representation of humans in most matters of psychology and agency, differing in having special (and cognitively counterintuitive) powers. Accordingly, while humans make artifacts but do not make animals and natural kinds, God can, and gauged by the responses, does—children do not confuse God and human creativity, but instead differentially apply God and humans as creators to different domains. Hence a source analogy, but not identity.[32]

What Evans distills from this is that parental teaching and cultural environment only begin to exert significant influence after children reach the older age mark; younger children are less characterized by any cultural contribution, and are more similar across the two cultures here compared. Yet neither middle nor young children are identical in beliefs across both (non- and Fundamentalist) cultures, so culture may have some influence from early on. However, in 3 of the 4 studies beliefs do change with age. Evans suggests that what is guiding the younger children's responses is more likely to be intuitive beliefs than reflective beliefs acquired from culture—analogous to the

31 This bears some resemblance to Lakoff and Johnson's Conceptual Metaphor theory, whereby concepts are based upon bodily and physico-spatial experiences. In the case at hand, psychological and social experience is a primary source.

32 We can also see the use of a source analogy at work on the evolutionary side. For instance, the development of mechanical philosophy in Europe was influenced by the actual development of machines; mechanical metaphors, in turn, helped greatly to buttress physico-causal thought, the foundation for a naturalism about nature. This is an important cultural context for natural explanations such as Darwinian evolution.

developmental pattern we saw from Kelemen earlier.[33] But the scope of these intuitions depends on context.

Cognition on the basis of a “source analogy” may be a level removed from an outright “intuition” (as was the potential case with Promiscuous Teleology), although the analogical reasoning may still be maturationally natural and intuitive. After all, representating human intentionality and agency is maturationally natural, and experiences of intentional agency are universal. However, as regards design, there is also an additional crucial element: God. God is not a basic, intuitive concept or category, but is instead part of and particular to culture. Creationist children and adults who provide and agree to creationist answers to questions about origins invoke a representation of God which—though many natural intuitions may inform and structure that concept—has a foundation in culture. Thus, a creationist “culture of design,” like Fundamentalism, is also a “designer culture”—a culture that, in some fashion, plays a constructive role in structuring and disposing cognition and reasoning about creation and design which its members display.

Spontaneous-generationist answers, for instance, that show up to some degree in one of the studies, are unlikely to have been explicitly taught by parents or teachers, and so may stem from some form of maturationally natural cognition. However, the almost complete agreement with explicit creationist answers across all ages of Fundamentalist subjects (as compared to the non-Fundamentalists) suggest that culture can strongly influence origins beliefs. Conversely, Evans did find that those children most likely to

33 Even if we supposed that origin-explanations were all, so to speak, “from culture,” and that younger children simply do not well acquire or understand this cultural knowledge, then room is still left for intuitive constraints and biases as responsible for the “canalization” of this cultural knowledge in, say, SG or creationist directions.

display evolutionist reasoning, were also more likely to be interested in natural history and fossils, and to have their parents endorse such scientific findings and inquiry—both are methods of inquiry and empirical evidence needed for evolutionary understanding. In regards to questions about the origins of artifacts and natural objects, Fundamentalists also displayed more consistency across age groups than the other culture. The uniformity of these beliefs among the subjects, furthermore, may point either to a uniformity across their culture, or to a culture more effective at "enculturating" its young members; the non-Fundamentalist group, in contrast, may be more eclectic or less constructive.

Towards this end, Evans develops a model she calls "constructive interactionism" (Evans, 2001: 252, citing work by Wozniak and Fischer), and suggests that "Children generate intuitive beliefs about origins...while communities privilege certain beliefs and inhibit others, thus engendering diverse belief systems" (2001: 217). A child's culture—parents and family, school and church, to name a few elements—through its explicit, public representations, provides its developing members with a conceptual and explanatory repertoire. These are not, however, simply absorbed by children as though sponges; they must be incorporated into both their intuitive belief framework, and their developing set of explicit coherent beliefs—hence a "constructive interactionism." Discussed earlier was the idea of maturationally natural cognition as "biasing," "constraining," and "canalizing" what is represented, thought, and believed, perhaps by cultural acquisition; here, the language of "interactionism" is not quite so one-sided, so cognitively or intuitively weighted, and helps draw attention to the positive role and constructive capacity of culture as well.

In this model, culture still builds upon a cognitive foundation. In the context of and discussing Dan Sperber's "epidemiological perspective," Evans states that "children born into a world of preexisting public representations would not be able to avail themselves of such representations unless they already possessed some system of analogous intuitive beliefs" (Evans, 2001: 261). It is socialization, but cognitively instantiated and dependent upon intuitions. And yet, at the same time, culture is doing crucial formative work:

> By selecting a particular range of learning opportunities [schooling, child's interests], the custom complex can restrain or expand the expression of these intuitive explanatory modes. The sanctioning of interests in religion or of natural history, for instance, augments these intuitive propensities, which then undergird the emergence of more sophisticated capacities to engage in religious or scientific dialogs concerning the origins of species. (Evans, 2001: 258)

The picture is one of give and take, of cultural shaping combined with cognitive constraint, and in this manner a "culture of design" can be a "designer culture." It is easier for a creationist, Fundamentalist culture to "suppress or, at least, fail to facilitate, natural explanations such as spontaneous generation or evolution" (Evan, 2001: 252). Creationist ideas are "far more contagious."

In her summary of the persistence of creationist beliefs, Evans argues

> that this persistence is not simply the result of fundamentalist politics and socialization. Rather, these social forces themselves depend on certain propensities of the human mind. On this account, the persistence of creationist beliefs in a population attests to their cognitive affinity as well as their public availabilty. (2000b: 305)

As with representations of species and natural kinds as essentialistic and fixed, having both an intuitive basis and a cultural, religious elaboration and reification, so too with creationist beliefs of origins-by-design. Explicit representations of a creative God designing species may constructively interactive with natural analogical reasoning of intentional actions and artifact creation. It is not "all culture," generally or particularly

—"not simply the result of fundamentalist politics and socialization"—nor "all cognition" or natural intuition.

Conclusions

I answer Kelemen's question, "Are Children Intuitive Theists?" in the negative. Cognitive research indeed suggests we are intuitive Aristotelians—we represent many natural and biological things and features of the world as possessing intrinsic functions, purposes, and ends—but it does not fully demonstrate that we are also intuitive Platonists—that we represent these teleological things as designed by an agency. Without the culturally located and acquired concept of "God," it is not clear we would readily, intuitively reason to design or creation. Conversely, it is not clear that our teleological predilection is a cognitive cause for god representations (in a way analogous, for instance, to the proposed "hyperactive action detection device" of Barrett, 2004, and others). "Design" may be a cognitively natural inference, but one which requires particular cultural input, and it proves difficult separating cognitive defaults from culture in this regards. It does not seem to be universal across or even within cultures, which something that is maturationally natural would exhibit. For the young non-Fundamentalist, after all, an implicit spontaneous-generationalism is nearly as common as creationist understanding. However, it does seem that, based on natural analogical reasoning, even a small "dose" of culture prompting the extension of human intentionality and creative agency to another domain (biological species) and source "God" will readily "serve to inhibit the expression of natural explanations for the origins of species" (Evans, 2001: 253).

By and large, these are all "WEIRD" studies; the research unfortunately is not robustly cross-cultural. Evans' comparison of non- and Fundamentalist cultures, notably, still occurs within one geographical location within the United States. It is not unreasonable to expect that many of her non-Fundamentalist subjects were still Christians of some variety, and explicitly tutored in creationist explanations.[34] Going abroad to conduct research in other cultures would certainly enrich the data and the conclusions, as would, presumably, seeking out subjects raised in non-religious or explicitly atheistic families, who might be apt to, implicitly or explicitly, provide naturalistic explanations for biological origins or reason against creationist accounts. If levels of creationism persist among younger children in these latter cases, the argument that creationist reasoning is a natural propensity would be strengthened.

Yet, countless religious traditions contain narratives of creation. On the one hand, we might then predict that cross-culturally—coupled perhaps with our teleological predilections—humans are likely to naturally take up the design stance. Yet on the other hand, we might wonder why creation narratives are so prevalent. As mentioned in chapter 2, cross-culturally recurrent features of both cognition and culture are good candidates for being human universals, with some foundation in our panhuman cognitive systems. A chicken-and-egg question might then be raised—which came first, design-reasoning in intuitive cognition, or design-reasoning in cultural narratives? This is not, however, meant to imply one factor necessarily predates the other—as will be discussed in chapter 5, "gene-culture co-evolution" allows that cognition and culture may have gradually developed mutually and interactively.

34 One can also see the effects of culture by considering the responses to evolution in other countries. Evolutionary doubt was for instance much less common in France and Germany, where the argument from design had not attained such an influential position among clerical and popular theology.

Aside from specific intuitions and predilections, general cognitive features may also play a role—that is, one can consider the cognitive forest as well as its particular intuitive trees. Creationism considers final cause, which is God's purpose; spontaneous generation involves proximal causes, which are near in time and place; evolution appeals to ultimate causes, which explain the entire process, but which are temporally removed and more mechanically mysterious (to the non-expert). Simply in terms of causal representations, creationism and SG may be more representationally facile than evolution. This is in line with McCauley's general thesis, that in multiple respects science is cognitively unnatural, counterintuitive, and difficult.

Our ability to meta-represent may help with this representational difficulty, as someone, child or adult, can believe or avow a particular kind of explanation without fully understanding it. For instance, Evans suggests SG is a viable "explanation" for younger children, in part because they do not yet fully grasp the existential nature of the question, "why did *x* first come to exist?" They may not fully realize that there was a time of non-existence. When they do, when questions of origins are raised, (only) then questions of teleology or final cause of those origins, or the purposes of those organisms, come to mind. For a child raised in a naturalistic or weakly religious environment, but where evolution is still cognitively difficult, Evans suggest creationism fills that explanatory gap, between where SG is not viable and not fully explanatory, and where evolution can begin to be integrated instead. This is her explanation of the "jump" in creationist answers/agreement of the middle age children of non-Fundamentalist communities—when recognizing SG as insufficient or incoherent, they move to the next most natural or accessible explanation.

In regards to teleology, evolutionism seems to be at odds with intuitions—it is cognitively unnatural. If evolution is disfavored or disbelieved on these teleological grounds, then reasoners may have only a few options: reject evolution completely; reject its ateleology; or reject the teleological beliefs that conflict with Darwinian evolution. This seems to be precisely what happens. For the former two, religious (creationist or theistic evolutionist) and Larmarkian explanations seem to be the common alternatives, whether intuitively reasoned or culturally inspired. As for the latter, in order to "reject" teleology it seems to take precisely that explicit, reflective thought exemplified in the education levels studied by Kelemen and colleagues as well as the preference for natural history and fossils as found by Evans in her subjects. A reflective knowledge structure is needed to represent and believe Darwin's idea, to find it—and its non-teleological, undesigned elements—cognitively acceptable and assimilated with other beliefs. It takes cognitive work to become a Lucretian.

These efforts to "divine design" do demonstrate many cognitive contours and foundations to evolutionary dis/belief, and suggest that population levels of antievolutionism and evolutionary doubt are due to more than the explicit activities of, namely, religious creationists (as some opine, and popular culture often suggests). Yet analysis of this research also, again, indexes the theoretic boundaries to a cognitive—and in particular the "strong intuitionist"—perspective alone. A robust examination of teleological reasoning and representations of design shows both the complex interaction of implicit and reflective processes, as well as the "constructive interactionism" of culture and cognition. Chapter 5 will, in essence, explicitly address questions of cognition-culture interaction, and more fully articulate a model of cultural influence and transmission. Before that, while also extending inquiry into the cultural aspects of cognition, Chapter 4 turns to the issues of moral value that arise in both the history and study of Darwin's doubted idea.

Chapter 4
Of Monkeys and Men: The Moral Foundations of Antievolutionism

The previous two chapters considered criticisms aimed at the scientific or explanatory correctness of Darwinian, naturalistic evolution, and argued how certain maturationally natural intuitions and cognitive biases (namely in regards to representations of species and of teleology) play a role in misunderstanding and questioning evolutionary theory and motivating actions of criticism. This chapter looks at the moral and value-based concerns with evolution which, interestingly, may be more motivationally powerful and more historically important. What at first glance is a "mere" scientific theory about biological origins and the development of varied species gives rise to concerns and social movements on such extra-scientific matters of values, morality, human nature, religion, and social order, items arguably outside of the natural world empirically studied by natural science. This "leap" from explanatory to moral or ethical, I suggest, happens precisely because biological evolution says something of that particular species called *homo*, itself the meeting point between natural, social, moral, and religious worlds. Hence the title of this chapter (playing on the John Steinbeck novel), alluding to a recurring motif that represents, in a number of perhaps implicit manners, moral concerns with Darwin's idea. That Darwin evolutionarily, biologically links humans with animals—Man with monkeys—proved problematic.

Distinct from beliefs about the correctness of evolutionary theory, a substantial concern of anti-evolutionists and creationists, and indeed of the wider population skeptical of biological evolution, rests with the perceived moral implications of naturalistic evolutionary theory, and especially of its being taught to children in public education. By "moral implications," I mean, broadly speaking, conceptualizations of value, of what is good and right, as pertains for instance to human nature and ethical conduct. In addition to the evolutionary linkage of humans with animals, moral concerns also centered on the materialistic or atheistic nature of evolutionary accounts as contrary to and destructive of the Christian Bible or Christian faith, and on the potential (subsequent) destruction of the foundations for personal salvation, morality, and social order. Such negative opinions are of course but one position on a wider gamut, alongside those deeming evolution religiously or morally neutral or ambivalent, and those finding positive moral implications in evolutionary accounts of life. Yet the potency of the negative position is not to be underestimated, and it may even be more commonly held than not (Brem, Ranney, and Schindel, 2003). So understanding this phenomena, and accounting for why these judgments are formed as often and readily as they are, is a matter worth attention.

Just as I pursued an intuitionist perspective in the previous chapters, by looking for maturationally natural intuitions and biases to partly explain the explicit and implicit concerns and arguments against Darwinian evolution on matters of species and design, so too I here again seek out relevant research and models from cognitive science to more fully understand and explain the moral concerns with evolution, and the resulting social anti-evolutionisms. Why do people take issue with evolutionary explanations, on moral rather than (just) explanatory grounds? How did a naturalistic explanation about the origins of species give rise to institutions and social movements devoted to undermining its scientific validity and keeping it from being taught to youth in school? Why does a high school student, who voices that it would be "kind of good to learn more about evolution," get taunted with the moniker "monkey girl" (Humes, 2007)?

This, again, is not to disregard reflective thought, top-down processes, and cultural influence. Religious narratives, doctrines, and theology, and philosophical and logical argument, have certainly shaped judgments concerning the moral character and effects of Darwinian explanations. But I argue that there are also important intuitive, bottom-up, culturally-independent cognitive foundations as well—maturationally natural, yet culturally structured, moral intuitions and emotions—which help explain the potency and motivational force of anti-evolutionist concerns, and the impetus for and power of social movements with their sights set on evolution.

To probe the cognitive levels of moral anti-evolutionism, I look primarily to the work of psychologist Jonathan Haidt, and the "social intuitionism" and "moral foundations theory" that underlies his descriptive, explanatory moral psychology. Following Haidt, a key step in understanding these moral claims is to recognize, in his words, that, empirically, "morality is about more than right and wrong." At the level of moral cognition and moral psychology, moral-type evaluations (with a foundation in feelings) are also made of things social and sacred (and to different degrees for different cultures). Indeed, in some aspects of moral judgment, moral values and religion come together, which help explain religious opposition to evolution, and may also serve as a theoretical perspective on religion itself, along Durkheimian lines of binding and building community.

In the first part of this chapter, I will elaborate on the history of anti-evolutionism (as sketched first in chapter 1) with particular attention to the moral claims, value judgments, and social actions made against evolutionary explanations and their being taught. Here highlighted is the place of evolutionary representations of humans, and the moral implications that follow—the "monkeys and morals." Prominent in this discussion are the early Victorian concerns over evolution by natural selection after Darwin proposed the theory; the rise of American Fundamentalism, William Jennings Bryan's anti-evolution crusade, and the Scope's "Monkey Trial"; and the development of "Creation Science" and continued opposition and legal battles against teaching evolution in the schools. In the second part, I introduce and discuss Jonathan Haidt's "Social Intuitionist Model" and "Moral Foundations Theory," and in part three I argue for its (general and particular) relevance for understanding the moral aspects of anti-evolutionism.

Part I: "Darwin's Dangerous Idea"

While multi-faceted and complex, reactions to evolutionary explanations on moral grounds or with moral character can, I suggest, be distilled into separate yet overlapping concerns and lines of argument. It is in focusing on the moral concerns over evolutionary theory that "Darwin's doubted idea," becomes, as Daniel Dennet first phrased it, "Darwin's Dangerous Idea"—in this case, dangerous for spirituality, morality, and society. One prong of these moral concerns revolves around the conceptualization of human nature that is perceived to precipitate from an evolutionary account of human origins and animal ancestry; the second revolves around the perceived conflict of this naturalistic explanation for the development of life, species, and humans with other narratives of origins and creation, such as the Book of Genesis in the Christian Bible. Alternately stated, one concern centers on what evolutionary theory substantively or positively says of human nature or morality (e.g. humans are animals; "might makes right"), and another concern centers on what evolutionary theory *doesn't* say, that is, how it conflicts with other understandings (e.g. divine special creation). In one way or another, the foundations for morality are perceived to be challenged, altered, or destroyed. I use the language of "perceptions" because evolution has been and can be understood in multiple ways, with different people perceiving multiple moral implications, and do not want to suggest there are certain "correct" implications.

Arguably implicit in these concerns is the representation that ideas and concepts determine morality, as both defining what is moral and defining how we ought to act or the characters we ought to develop. Both avowed by the actors within the history, and attributed by the third person in analysis, is the idea that representations, namely beliefs, are potent, and that evolutionary explanations and religious historical narratives deliver and ground these morally potent beliefs. Having the "right" (correct) beliefs about natural and human history yields the "right" ideas necessary for "right" (good, moral) behavior, character, and social institutions. However, we should recognize that this is not the whole story, as emotions, feelings, habits, and social dynamics also operate.

Darwin recognized that a natural, evolutionary account of humans raised moral concerns, and avoided the topic of human origins in his first book, waiting some twenty years for Natural Selection to find support in itself before attending to human evolution in *The Descent of Man*. Nonetheless, other readers and commentators readily raised questions for themselves. Indeed, historian Edward Larson (2004: 92) notes that "This [human evolution and its implications] was what most intrigued others about Darwinism from the start."

The Moral Days of Darwin

Adam Sedgwick, geologist teacher of Charles Darwin but later opponent of natural selection, wrote to Darwin that

> I have read your book with more pain than pleasure. … Tis the crown and glory of organic science that it does thro' final cause, link material to moral. … You have ignored this link; and, if I do not mistake your meaning, you have done your best in one of two pregnant cases to break it. Were it possible (which thank God it is not) to break it, humanity in my mind, would suffer a damage that might brutalize it. (Larson 2004: 91)

In this pre-publication response to the *Origins*, Sedgwick did not think Darwin had succeeded in providing a naturalistic, non-teleological theory, but he raised a concern that others would repeat: destroy the divine, designed creation of humans, and you destroy their morality and deplete their moral nature. Sedgwick explicitly brings the issues over teleology (as discussed in the previous chapter) into the moral domain, something which was many times only implicit or secondary. Sedgwick's concerns stand as an early instance of what would prove to be an oft repeated opinion. In contrast, for instance, to "theological and philosophical anxieties" over design that occupied the explicit thought of many intellectuals, says David Livingstone (1987: 49), it was the shared ancestry of humans and apes that proved to arouse more popular controversy.

For Darwin's fellow Victorians, it was apparently enough of an argument to call "Man" an animal, or especially an ape or monkey, to then conclude him immoral. It was at a minimum an insult or a debasement. Such was Samuel Wilberforce's jab at T. H.

Huxley at the famous Oxford debate,[1] when the Bishop asked Huxley if he was related to apes on his grandfather or grandmother's side. Huxley is said to have replied with his preference for a descent from apes than for relation to a man like Wilberforce who uses his great faculties to introduce ridicule into science. Furthermore, diverse comments and editorial cartoons referencing or depicting monkeys, sometimes comically, somehow managed to capture in this one motif a host of moral concerns over the linkage of human origins with the animal kingdom and all which that might imply—or to stress the apparent ridiculousness of such an unsettling suggestion.

Why the popular concern with linking monkey and man? If it had been assumed that human's divine creation and nature was responsible for their mental and moral faculties, and their precipitant goodness, the suggestion of human evolution from animals minimally raised questions about this link, and (more)often created doubt that such a position of humans as intelligent, spiritual, and moral could be maintained—whether the opinion that humans were special and above the rest of creation, or about what behaviors were moral and right. "The matter of human origins was particularly sensitive because it impacted how people viewed themselves, other persons, and God," writes Larson .

> Crucially, evolutionary naturalism undermined belief in an indwelling spiritual soul, which for many people defined the very essence of humanness. The doctrine that God specially created the first people by giving them eternal souls carried with it certain implications about the meaning of human life; the theory that humans evolved naturally from soulless animals carried others; and many individuals found it difficult to switch. (2004: 133)

A few, like Huxley in *Man's Place in Nature*, explicitly countered that this link between creation and value was not necessary, and animal connections not base, by

1 Although the specifics of this public debate are not fully known, historians like Livingstone (1987: 32-42) nonetheless credit the event with most fully bringing evolution to scientific and public consciousness, and sparking the most controversy.

asking

> Is the philanthropist or the saint to give up his endeavors to lead a noble life, because the simplest study of man's nature reveals, at its foundations, all the selfish passions and fierce appetites of the merest quadruped? Is mother-love vile because a hen shows it, or fidelity base because dogs possess it? (Larson 2004: 96)

In other words, Huxley cautioned against committing the “naturalist fallacy”; moral value hinges upon more than the origins of those traits. Some went beyond a position of neutrality to advocating certain positive moral prescriptions implicated by human evolution, seeing evolution as a kind of new religion, with such views ripening into social movements and philosophies like social darwinism and eugenics. However,

> Most people simply refused to believe their highly developed minds, morals, or emotions evolved from those of beasts. The gap appeared too great. They felt themselves superior to other animals. For many, these feelings carried more weight than an abstract scientific theory. (Larson 2004: 134)

Larson's noted distinction between feelings and abstract theory are on the mark, as we will later see.

The Evils of Evolutionary Education

Twentieth century Americans would likewise have moral concerns over evolutionary theory, particularly in regards to its being taught, through public schools, to the nation's youth. Of note is how these concerns developed from, in Larson's words, “an inward-focused campaign to purify church doctrine into an outward-looking crusade to change government policy” (2004: 206). That is, Christians with antievolutionary leanings were originally in dialogue with more liberal, modernist Christians—the general population at large. These latter Christians may have accepted or embraced evolutionary theory (for instance, as God's method of creation) as compatible with Christian theology, doctrine, and the Bible, along with other “modernist” ideas such as German Biblical “higher criticism” and figurative rather than literal readings of the scriptures—such religious compromises were often seen as a theologically slippery slope away from Christianity[2]. As the decades after Darwin progressed, however, they began to find more impetus to challenge evolution outside the churches as well, in no small part due to the perceived moral and social ill effects of evolutionary accounts of life, especially humans.

The perceived threat was two pronged, one negative and one positive. Negatively, naturalistic evolution was a challenge to Christianity and Christian faith, theologically and scripturally (e.g. evolutionary biology removed or altered design or creation of nature; evolutionary history was at odds with certain readings of the Bible, namely Genesis). By shaking the foundational views of human origins, purpose, destiny and our place in nature, the foundations of morality and social order were thereby shaken. Secondly and positively, evolutionary theory led to alternate im/moral doctrines such as “survival of the fittest” and “might makes right,” and to movements like Social Darwinism, eugenics, and Nazism. William Jennings Bryan summarily speaks to these two prongs:

> I object to the Darwinian theory, because I fear we shall lose the consciousness of God's presence in our daily life, if we must accept the theory that through all the ages no spiritual force has touched the life of man and shaped the destiny of nations. … But there is another objection. The Darwinian theory represents man as reaching his present perfection by the operation of the law of hate—the merciless law by which the strong crowd out and kill off the weak. (Larson 1997: 39).

It was in the first quarter of the twentieth century that such moral concerns most fully took center stage as an issue for conservative Christians and eventually gained

2 See Larson 1997: 33ff.

national attention and became a public policy crusade. Larson credits this transformation in large part to the increasing scope of public education and inclusion of evolution within biology textbooks. “Following the lead of scientific opinion,” says Larson (2003: 8-9), “science educators began adding evolutionary concepts to high-school textbooks almost immediately, and had fully incorporated the doctrine into biology teaching materials by the turn of the century.” Science teachers were encouraged by teaching journals and texts to teach evolution and presented with suggested best practices for doing so (Larson 2003: 23, citing articles and books from 1893, 1900, and 1904). Indeed, calling this evolutionism “doctrine” is fitting, as it was presented as such, not questioned, and many times more asserted than argued.

Coupled with an increase of evolution within secondary school textbooks was the increase of secondary education itself, both in actual and relative numbers. In 1890[3] 3.8% of 14-17 year olds were enrolled in high school, almost some 203,000 students. This, Larson (2003: 26) notes, doubled every decade, to nearly 1,852,000 pupils in 1920. With a rising number of schools and students reached with a science education, more and more of America's youth were taught evolution. Often, these were children of parents who themselves had not been taught evolution, a generation who did not know the “evangelical evolutionists,” the evolution-friendly religiously middle ground. Writes James Moore,

> Fifty years it had taken for the teaching of evolution to filter into the high schools, for the high schools to reach the people, and for the people—those, at any rate, who became militant Fundamentalists—to belong to a generation who could not remember the evangelical evolutionists among its ancestors. (Moore 1979:73)[4]

3 The first year the federal Commission of Education collected data.
4 Discussed also in Larson 1997: 23 and Larson 2003: 27. Relatedly, David Livingstone (1987) has written on what he calls “Darwin's Forgotten Defenders.”

Furthermore, thanks to the pseudo-histories of Andrew Dickson White (1896) and James Draper (1897), the so-called "conflict thesis," viewing religion and science as in perpetual conflict, had become quite popularized, a perspective that many could not avoid at least thinking of when considering evolution.

William Jennings Bryan in a 1921 speech himself credited this rise in public education as cause for alarm, as the reason Darwinism previously "had not done more harm" (Larson 2003: 27). The expansion of evolution, by bringing evolution to the attention of students, parents, and communities, precipitated or even necessitated forming opinions over biological evolution—which for many were negative. What a figure like Bryan, along with other prominent Christian speakers, was able to do was harden "the vague anti-evolution feelings of countless thousands into a fighting conviction" (Larson 2003: 27), a fighting conviction that would culminate with attempts at changing public policy and education standards through the law.

Concurrent with the expansion of public education was the development of Fundamentalist Christianity, and this movement would also, eventually, provide a pulpit from which to proclaim the evils of evolution. Evolution itself was not a foundational or motivational concern behind the organization of the Fundamentalists, but it would become, through some searching, a common target. It is worth considering from what and why Fundamentalism developed.

Fundamentalism grew out of mainline evangelical and independent revivalist churches, with shared concerns over modernism and liberalism and an epistemological foundation in Biblical literalism (Larson 2003: 40). In addition to the doctrinal elements that came from dispensationalist millenarianism (that inspired much of the revivalism of the time), George Marsden (2006) also gives importance to the embracing of Scottish "common sense realism," which understood reality as intelligible, not only to the expert, but to anyone possessing "common sense." This applied to the bible as well, which had a "plain sense" accessible to anyone, containing, under a "Baconian" conception of science, a collection of facts and systematized, classified knowledge. The conjunction of these currents of thought created a democratic and anti-elitist philosophy towards religion, appraising instead the individual and his or her "bible alone," as inerrant, verbally inspired, to be literally interpreted. This agreement of common sense and scripture also allowed, notes Marsden, for the clear, intuitive apprehension of moral principles (2006: 15).

Evangelicals were mixed in their emphasis on evangelism alone, or in also bringing in a dimension of social concern and action as well. The influential Dwight Lyman Moody, for example, initially voiced concerns over the ills facing society,[5] but eventually dropped the element of social involvement from his ministry (Marsden, 2006: 37). In part was the association of "social Christianity" with liberalism, which had already fallen short on theological and doctrinal matters in the eyes of conservative evangelicals (Marsden, 2006: 91-92), and Marsden also notes a shift during 1865 to 1900 from a Calvinistic tradition seeing politics as a significant means of good, to a Pietistic tradition seeing politics as merely restraining evil (2006: 86).

In 1910 the Presbyterian General Assembly formulated five points deemed essential doctrine,[6] the "fundamentals" of the Christian faith. These fundamentals,

5 Moody noted four "great temptations" of the day: the theater, disregarding the Sabbath, Sunday newspapers, and atheistic teachings (including evolution). (Marsden, 2006: 35)

6 Drawn from earlier formulations at the Niagara Bible Conference.

concerning such issues as the inerrancy of scripture and the bodily resurrection of Christ, were avowed in response to more liberal churches which were departing from these views (taking for instance analogical views of the bible, and seeing miracle accounts as figurative—liberal views and those coming out of German historical "Higher Criticism" of the Bible). These conservative principles and doctrines were subsequently further developed over ninety essays in the twelve volume *The Fundamentals*, penned by conservative Christian thinkers and ministers. Though the early response was less than expected, in the long term these "fundamentals" became the "point of reference" for "fundamentalists" and for identifying the fundamentalist movement (Marsden, 2006: 119). In 1918, under William Bell Riley, the World Christian Fundamentals Association (WCFA) was formed. Interestingly, at this point, there was no monolithic opposition to evolution,[7] and many thinkers still allowed for limited evolution and "Day-Age" or "Gap-theory"[8] interpretations of Genesis, the latter of which could be derived from a literal reading, and both of which allowed God to remain present and active in earth's origins and history (Marsden, 2006: 122; Numbers, 1992: 45).

Marsden (2006: 141) notes a shift by the 1920s of Fundamentalists sentiments and actions, away from cooperation with other Christians, less moderation and more strictness, and increased militancy. This he claims was fueled by still growing theological liberalism (e.g. German High Criticsm), as well as the perception of cultural crisis, sparked by issues such as the "Great War" and the societal ills accompanying urbanization and industrialization. It was these observations that Marsden claims

7 While one in five essays in *The Fundamentals* touched on evolution, they did not do so under one consensus (Numbers, 1992: 34).

8 The Gap Theory—which posited an indefinite gap between the first or initial creation, and the (later) 6-six day construction—was endorsed, for instance, in the Fundamentalist favorite *Scofield Bible* (Numbers, 1992: 45).

"revolutionized" fundamentalism; it was the cultural issues that gave the movement a new, extra-theological dimension and urgency (Marsden, 2006: 149).

So not only was orthodox Christianity being challenged by liberalism; now fundamentalists saw the whole of (American) civilization in trouble, because its moral foundations (in the bible and Christian faith) were being compromised. Fundamentalists thus needed to do battle over the fundamentals, and restore to society a solid moral foundation based upon the bible (Marsden, 2006: 159). It was in examining the crumbling moral foundations that fundamentalists found Darwin and evolution, thanks in large part to Germany.

A number of thinkers are partly responsible for linking evolution to the Great War and German militarism. Stanford zoologist Vernon Kellogg,

> having gone to Europe as a peace worker, recounted his conversations with German military leaders. 'Natural selection based on violent and fatal competitive struggle is the gospel of the German intellectuals,' he reported, and served as their justification 'why, for the good of the world, there should be this war.' (Larson 1997: 40)

Philosopher Benjamin Kidd traced the influence of Darwinian thinking on Friedrich Nietzsche, his denial of God, denouncement of Christianity, and embrace of "power," and in turn Nietzsche's place in German militarism. William Jennings Bryan was familiar with and cited both these positions (Larson 1997: 40). A third academic source provided fodder for Bryan's conviction, the study of college students and graduates by psychologist James Leuba, who found a decline in Christian belief of students as they progressed through higher education, and a proportionally lower percentage of believers among biologists than other scientists. Leuba did not link these trends to evolution, but Bryan did (Larson 1997: 41): "What shall if profit a man if he shall gain all the learning of the schools and lose his faith in God?" Bryan queried.

"More than anything else," says Larson of the anti-evolution crusaders of the 1920s, they "opposed evolutionary teaching because it harmed the spiritual and moral development of students," during the teenage years seen as "a special period of impressionability and spiritual vulnerability" (2003: 36). Many fundamentalists saw public schools as the "arena" for the cultural battle, with American youth the future of civilization (Marsden, 2006: 160). To drive home the point of just how evil evolution could be, crusader T. T. Martin warned that "'Ramming poison down the throats of our children is nothing compared with damning their souls with the teaching of evolution, that robs them of a revelation from God and a real Redeemer'" (Larson 2003: 36).

By 1921 Bryan had begun to speak out against evolution, first arguing that Darwinism by Baconian standards was unscientific and unconvincing, and thus schools were instead improperly compelling students to learn and believe it (Larson 2003: 46). Bryan then argued, moreover, that evolution was harmful—it was a materialistic theory that lead people away from God, and was in part responsible for the "bloodiest war in history" (2003: 47). Bryan saw Darwinian evolution as unavoidably contrary to the Bible and opposed to Christianity, and argued for silence and neutrality in regards to human origins[9] in tax-supported public schools so as not to directly or indirectly attack the Bible (2003: 48). "Bryan's slick, well-publicized arguments," says Larson, "quickly steeled vague fundamentalist concerns over evolution into a crusading militancy against teaching as fact a Darwinian view of human origins" (2006: 48). William Bell Riley, a prominent fundamentalist leader, likewise took up the mantle of anti-evolution, with the recently

9 Bryan and many others focused primarily on human origins, as that which should be curtailed in the schools, rather than evolutionary biology at large, as later antievolutionists and creationists often would.

formed World Christian Fundamentals Association (WCFA) behind him, and with other religious leaders like T. T. Martin, John Roach Stratton, J. Frank Norris, and Billy Sunday proclaimed, to at times enormous audiences, the anti-Christian and immoral nature of evolution as well. While messages against evolution thus became well heard in conservative, fundamentalist discussion, Numbers points out that the anti-evolution leadership came from individuals like Bryan and those mentioned above, and from inter-denomination groups like the WCFA, not authoritatively from churches and denominations (1992: 49).

This synthesis of popularist democracy and religious faith proved potent. Indeed, Marsden claims that anti-evolutionism became something of a "national fad," and attracted to the movement people with little interest in the Fundamentalist's doctrinal issues (2006: 170). This shows that concerns over evolution were not grounded exclusively in Fundamentalist doctrine. However, with an audience for these messages against evolution, Fundamentalists could and did gain numbers and attention by making evolution a central issue.

What came out of the expansion of evolution in school instruction, and the attention the growing Fundamentalist movement with a focus on cultural crisis gave to evolution, together with a sense of public power under a popularist democracy, were numerous efforts to enact legislation curtailing the teaching of evolution in multiple states, namely in the form of opposing the teaching that humans originated or developed from "lower" forms of animal life, rather than created by God according to the Genesis account(s). To teach otherwise was not just bad science, but, as one Republican

Tennessee senator said, allowed “Darwin or Spencer or any so-called evolutionists giving our children their spiritual life.” Better, “Let's leave their hellish teachings out” (Larson 2003: 51). Shared opinion and popular power should control education; as a new Oklahoma lawmaker declared, “If you want to be a monkey, go out and be a monkey, but I am for this amendment and will strike this infernal thing while I can” (Larson 2003: 50-51).

While sometimes broad reaching, concerns and criticisms of evolutionary biology by and large centered on the the issue of human origins, as developing from ape-like ancestors as opposed to divine creation as described in Genesis. “Hands off one thing and one thing alone,” wrote the *Chicago Tribune* of the happenings in Dayton, Tennessee, “the divine creation of man, the human being with a soul” (Larson 1997: 8).

Comments and motifs of men and monkeys were ever-present in the famous Scopes “Monkey” Trial, that precipitated from the ACLU's challenge of the Tennessee law that made it illegal to teach human evolution as opposed to biblical creation. “I like him,” reported a a student of Scopes' post-trial, “but I don't believe I came from a monkey” (Larson 1997: 200). But once the trial began, concerns about human origins and about what is morally and spiritually good to believe were placed aside, if not underneath, a defense of the right of the public to control education and criticisms of the scientific validity of evolutionary theory, pitted against pleas for academic freedom, the epistemological authority of experts and the resulting progress it brings society, and the compatibility of evolution, science, and Christian belief (excepting a literally-read Bible).

Both sides claimed victories, and up until the 1980s historians had commonly seen the Scopes Trial as fatal to the anti-evolution movement (Larson 2003: 73-74).

However, the results were in fact more mixed. Any strengthening of evolutionary acceptance in the South was negligible, and Fundamentalism was even strengthened (within conservative circles) by Bryan's "martyrdom" (Larson 2003: 74; Bryan died eight days after the trial). Among other segments of society, Fundamentalists were ridiculed, thanks largely to the media portrayals of Fundamentalists as uneducated, backward, largely rural Southerners. Formerly many fundamentalists, including their leaders, were well educated persons out of urban, northern cities, and from 1922 to 1925 Fundamentalists were almost in control of the(ir) Presbyterian and Baptists denominations (Marsden, 2006: 191). By 1926, however, they were "weakened minorities," and shortly receded from (or were ignored by?) the public stage. What Fundamentalists did, however, was turn inward, and develop their own independent and institutional bases (and it was these who, by the 1960s, continued to choose the wear the badge of "Fundamentalist"; Marsden, 2006: 195),

However, due to the effects on evolutionary education that precipitated from the Scopes' Trial, in a rather real sense anti-evolutionists won. Historian Ferenc M. Szasz sees the trial more as the beginning than the apex of the controversy, of "concerted antievolution agitation." "The trial proved that an antievolution law could be passed and upheld" (in Larson 2003: 74), and that is precisely what happened. Laws against teaching evolution were subsequently passed in other states, and as a consequence publishers of high school textbooks, for economic reasons, dropped evolution from the subject matter—why publish books that would not be bought? So although evolution was only explicitly limited in certain states (and often only human evolution), the end result was a nationwide lull in its teaching. Accordingly, there needed not be the same level of continued public (and Fundamentalist) attention to the matter, if parents' children were no longer being taught the "hellish" doctrine, and so public, legal activity died down as well. Larson dubs this a "thirty-year truce" (2003: 81), one which however would be "shattered" in the 1960s thanks to a new biology textbook and "Creationism's" response.

Creationism and the Courts

One hundred years after Darwin published the *Origins*, American biologists and science educators had realized the dearth of evolutionary theory in education was leaving the science curriculum incomplete. Coupled with a public awareness of the United States' technological lagging behind Soviet advances (namely the 1957 launch of *Sputnik*), there arose a government funded interest in improving science education so as to bolster U.S. scientific and technological achievement. One branch of this Curriculum Reform Movement was the Biological Science Curriculum Study (BSCS) in 1959 (also the centennial year of Darwin's *Origins*), and with leading biologists on board, the BSCS rewrote and published new school texts in the early 1960s (Larson 2003: 91). The three Biology texts quickly secured half the textbook market (2003: 95), and prompted challenge. "Although there were always Christians who opposed Darwinism," writes Larson (2003: 252),

> except during the anti-evolution crusade [of the 1920s], fundamentalists tended to keep their concerns within the church—until the 1960s. The appearance in 1963 of the evolutionary BSCS high school textbooks changed the dynamics. … Protests by fundamentalists erupted in many places.

Thus high schools textbooks once again brought the issue of evolution, and the dangers of teaching it, to public consciousness.

This time around however, biology texts were not the only books to blame. In

Dorothy Nelkin's sociological history of the “creation controversy,” she finds that the social studies curriculum also played a part. At the same time that the natural sciences curriculum was being reworked, the National Science Foundation was also developing *Man: A Course of Study* (Nelkin, 1984: 48). Drawing on ethnographic and animal studies, this social studies curriculum linked itself to biology, rather than a traditionally more historical studies self-conception. Nelkin describes how the course raised questions of the continuity between humans and animals through the use of provocative metaphors with animal behavior, and these and other ethnographic elements suggested a degree of relativism towards values and morality (1986: 48-50). When the *Man* course was introduced at one school, upon students bringing pamphlets on the course home, mothers “stormed the school” (1986: 122-123). “We're all animals, kids are taught here”; “Children are thinking too much about values.” Many wrote to congressmen complaining about the “biased presentation of evolution,” the “atheistic philosophy” of “cultural relativism,” and “secular humanism” (Nelkin, 1986: 127). Nelkin notes that the *Man* social studies course provoked such an attack on the NSF as to end the period of science-curriculum reform (1986: 51).

Developing roughly in tandem with curriculum reform in American science education was the resurgence of a biblically literalist young-earth creationism. While originating as a concern with liberalism within the Christian Church by conservative John C. Whitcomb, a book co-authored with engineer Henry Morris would prove to be the beginning of a newly forming kind of “Creationism,” later self-called “Scientific Creationism” or “Creation Science,” striving to fill the role as evolution's other, in no small part due to legal necessities.

Prior to the BSCS study and texts, evangelicalism and Fundamentalism remained alive and well, even though evolution had receded as a priority concern. What did persist for these religious was a general concern over science and society's deference to it. After Scopes but before the 1960s, as Larson noted above, anti-evolutionism within Christian circles had largely turned its view inward, with anti-evolutionists addressing other Christians accepting of evolution and other scientific theories that they saw as compromising Biblical faith. John C. Whitcomb and Henry Morris's *The Genesis Flood* of 1961 was one such work, but one that became by and large the foundation to a new and popular creationism, a “scientific” creationism.

In one respect, Whitcomb and Morris sought to address fellow Christians on the dangers of modifying a Biblically literal faith with biblical criticism and modern science. The other part of their work is a positive attempt at reconciling science with the bible. Rather than simply reject any science at odds with Biblical accounts and Christian doctrine, Morris and Whitcomb and subsequent creationists aimed to find scientific support for beliefs that otherwise seemed at odds with mainstream science, for instance by looking to the geologic column and hydrologic processes to prove the reality of a global flood and describe the mechanisms for how it came about. The book quickly followed with Morris's co-founding of the Creation Research Society (CRS) in California, providing a new and what would prove lasting institutional base for creationism and anti-evolutionism.

Whitcomb and Morris introduce their book by claiming that

> we have come to a day when the world of science and scholarship no longer regards the witness and warnings of the Flood with any seriousness. Men have

> instead adopted a philosophy of uniformity and evolution with which to interpret both cosmic and human history and with which even to predict and plan the future. Even evangelical Christians, though still professing belief in the divine validity of Scripture, have often capitulated to uniformitarian scholarship, denying the universality of the Flood and, with the denial, thereby sacrificing its mighty evangelistic witness to a world in rebellion against its Creator. (1961: xx)

In this first work, they avow the "verbal inerrancy of Scripture," and seek to

> examine the anthropological, geological, and hydrological and other scientific implications of the Biblical record of the Flood, seeking *if possible* to orient the data of these sciences within this Biblical framework. If this means substantial modification to the principles of uniformity and evolution which currently control the interpretation of these data, *then so be it.* (emphasis added; 1961: xx)

The Bible is primary, and science may or may not corroborate. In the event of unresolvable discord between accounts, it is science which must give way to a faith in the Biblical record. The book is aimed at bolstering biblically literalist faith through science. At this time, there is not yet any rhetoric about a "creation science" with scientific validity independent of religious faith. *The Genesis Flood* is avowedly a religious work motivated by concerns about liberalism in Christianity, seeing a danger in rejecting such literal Biblical accounts as the Noachic Deluge and ascribing instead to scientific theories such as geologic uniformitarianism (as opposed to catastrophism) and evolution.

A series of Supreme Court cases (brought forth by the ACLU) had gradually been limiting the role of religion in public schools through new understandings of the establishment clause (Larson 2003: 95). In 1948 local churches were barred from providing free religious instruction in public schools. 1962 outlawed state-sponsored prayer in the schools, and 1963 outlawed mandated Bible reading. What developed from these cases was a definite position of neutrality in regards to religion within the schools—state schools could neither promote or oppose religion, intentionally or by effect. But it also sparked vigilance by conservatives, keeping watch against the influx of secular (or "secular humanist") values through such areas as science instruction (Nelkin, 1984: 58). While the loss of religion and religious support in schools was cause for alarm, the mandate for neutrality also proved to be a source of optimism for and legal efforts by conservatives

With the influx of evolution thanks to the BSCS texts, one of the first public responses came with a California mother who sought to gain the law of neutrality on her side to oppose the teaching of evolution to her son. Nell Segraves believed teaching evolution denied her son the freedom to believe—that it was a kind of secular, anti-religious indoctrination, far from neutral. Supported by Morris's young Creation Research Society (CRS), Segraves argued that neutrality could be achieved by "'the objective presentation of both points of view regarding origins'" (Larson 2003: 96), and for a decade they pushed the California Board of Education to mandate teaching creationism, as an alternative theory to evolutionary accounts. Thus begins the push by anti-evolutionists and creationists for "equal time" or "balanced treatment," between evolutionary biology and Biblically-based origins accounts, in the name of religious (and academic) freedom and neutrality. Additionally, just as a sociological history pointed to issues of cultural crisis in the 1920s as helping fuel the attraction and spread of conservatism and fundamentalism, so too its beginning in the 1960s. Once again there would be a concerned audience attentive to the conservatives' messages.

When the goal of equal time hit Arkansas, which had an anti-evolution law on the books, the Arkansas Education Association saw a test case, and brought forth teacher Epperson as plaintiff in 1965. This time, forty years after Scopes, evolution had even greater scientific support (the addition of Medelian genetics in recent decades had brought about a “modern synthesis” and strengthened Darwinian theory), *but also public support*, and the trial Judge was aware of this (even scheduling the trial on April Fool's Day). Judge Reed decreed that a BSCS chapter on human evolutionary origins “'does not constitute such a hazard to the safety, health and morals of a community that the constitutional freedoms may be justifiably suppressed by the state'” (Larson 2003:103). The case eventually reached the U.S. Supreme Court in 1968 (*Epperson v. Arkansas*) and the original law was repealed, though there was much disagreement among the justices with no clear, unanimous opinion as to why, exactly, the law was unconstitutional (Larson 2003: 108ff). But the verdict stood: banning the teaching of biological evolution was unconstitutional. This cemented the “equal time” tactic of anti-evolutionists.

Repeal of Tennessee's original Scopes-era statute followed when a lawyer father challenged. It violated his son's constitutional right, he argued, establishing “'Protestant Fundamentalism as a State Religion'” (Larson 2003: 104). Rather than the broad support for the law that was seen with its first passing, now there were only two representatives in support, but voicing the same former concerns. “'We will bring chaos to the hearts and minds of the young if they believe they are just another type of animal,'” claimed a 65 year old rural lawmaker. Larson finds too that now there was increased polarization between urban and rural and Democratic and Republican opposition and support, whereas in the 1920s anti-evolutionism was more diffused with few noticeable trends in the type of people supporting it. Notes Larson, this matches George Marsden's observation of a trend in Fundamentalism through those decades, shifting more heavily to suburban Republicans, potentially a “self-fulfilling public perception” precipitating from the events at Dayton (Larson 2003: 105; Marsden 2006: 185-191).

By 1969, the year after the U.S. Supreme Court finished with *Epperson*, Segraves and colleagues's efforts in California had paid off, with the state's Board of Education seeing creationism as a historically important theory, and allowing it to be taught—in its *scientific* form. This put a qualifier on with what evolution could be "balanced" in "balanced treatment." The question thus hinged on whether creationism was, or could be, science. Morris's new Creation-Science Research Center (C-SRC;[10] later the Institute for Creation Research, ICR) and his older CRS both put out texts and teaching materials claiming such. These texts, of legal necessity, had to present only "scientific" evidence for creationism, and could not include philosophically religious or scriptural arguments.

There is thus note a shift in the presentation of creationism. Whereas Whitcomb and Morris's first work was an avowedly religious text, with the legal landscape regarding religion and evolution in the schools being as it was, Morris (especially) and other literal Bible, young-earth creationists began presenting their claims a bit differently. Creationism became "Scientific Creationism" or "Creation Science," and while its history or similarities with Christian, Genesis-accounts creationism were noted, supporters claimed it had a philosophical and scientific basis all its own, and could be pursued as such. One book, for instance, argues that "the concept of creation is every bit as scientific as the concept of an ongoing naturalistic evolutionary process" (Morris and Parker, 1982: ix). After watering down "science" to simply "knowledge," derived from the "observation of facts" and "finding patterns of order in the observed data," they concluded that "'Creation Science,' therefore, is a perfectly valid area of scientific study"

10 The C-SRC was organized at Christian Heritage College, created by Tim LaHaye, a Fundamentalist with vocal concerns over "the effects of evolutionary beliefs on moral values" (Larson 2003: 123).

(1982: xi).

Along with the argument that Creationism is science (or potentially so) is the claim that evolution is religious. "The Creation Model is at least as scientific as the the Evolution Model, and evolutionism is at least as religious as creationism" (Morris and Parker, 1982: x). The above authors claim this is so due to evolutionary theory's naturalism, it's *atheism,* since it excludes God from the explanation. Being atheistic, it is religious; there was no allowance for neutrality, as methodological naturalism really amounted to metaphysical, religious naturalism or atheism. Hence much polarizing argument and language, that there are two, and only two, scientific options: evolution or creationism, "evolution-science" or "creation-science," the "Evolution Model" or the "Creation-Model." "[T]here are only these two possibilities. … Theism and atheism are mutually exclusive philosophies and are therefore in the same category" (Morris and Parker, 1982: x). When distilled to the level of naturalism versus supernaturalism or theism, this is true to an extent; but when then considered as the current explanations for biological evolution versus a literal reading of Genesis, the exclusions and partisanship become more apparent. This is something the courts regularly noticed.

Beyond the mild success of the Segraves in California, other legal efforts to establish equal time had not turned out favorable. In a 1972 case in Texas brought forth by a concerned mother, the Judge, who had dismissed the case rather than tried it, noted that it is not so easy a matter to provide "equal time" as creationists lobbied for. "'This court is hardly qualified to select from among the available theories those which merit attention in a public school biology class'" (Larson 2003: 132). To say that there is only one theory of evolutionary biology and only one alternative theory of creation is to oversimplify, and could unduly favor "scientific creationism."

However, when a bill was introduced in Tennessee in 1973 to require presenting alternative theories, the idea of fair, balanced treatment was well endorsed by the lawmakers, and was quickly signed into law (Larson 2003: 135-137). Popular support went only so far though, and judicial challenges to the law were quickly made. The appellate court in 1975 declared the law "patently unconstitutional" and deemed there to be two clear violations of the Establishment Clause, by an exemption to the Genesis account from carrying a disclaimer, and by explicitly excluding "satanic and occult" theories of origins from being taught (Larson 2003: 138).

Other efforts aimed (instead or as well) at casting doubt on evolution—the "only a theory" or "theory not fact" approach. One instance was a 1974 Texas board that required textbooks to identify evolution "as only one of several explanations of the origins of humankind and avoid limiting young people in their search for meanings of their human existence'" (Larson 2003: 139). Note the focus not on evolution in general, but on human origins and the "meaning" of existence. One of the founders of this measure saw this as a "middle way" between dogmatism (in evolutionary education) and mandatory equal time. The California Board of Education followed similar suit, requiring that "'dogmatism be changed to conditional statements where speculation is offered as explanation for origins … science should emphasize 'how' and not 'ultimate cause' for origins'" (Larson 2003: 140).

However, the press for creationism as "scientific" and therefore as valid, supported science to be included in the curriculum proved to be the next major move and legal struggle. This approach was fully articulated as a legal strategy for creationists in

1978 by a Yale law student Wendell Bird, and creationist organizations took heed. Note that "Not all American evangelicals, fundamentalists, and Pentacostals followed the ICR line [biblically literal, young earth, creation science], of course, but enough did to stir up American education and politics" (Larson 1997: 257). Public acceptance of evolution, government funding of the BSCS texts, and legal precedents meant that anti-evolutionists could no longer transform their opposition into outright banning or making illegal the teaching of evolutionary theories. Anti-evolutionist activists thus needed a "scientific" alternative—and critics of these would counter-argue with the religious nature and scientific shortcomings of "creation science."

Though evolution was better publically-supported now than in the Scopes' era, in repsects creationism was as well. Creationist organizations, conservative educational groups, and other individuals lobbying for equal time and balanced treatment could look to public opinion for support, as presented in such surveys as the 1979 Gallup Poll where half of surveyed believed God created Adam and Eve to start the human race, and a 1981 Associated Press and NBC poll where 86% favored teaching creationism alongside evolution in science education (Larson 2003: 130-131). A 1987 Williamsburg Charter Survey found similar results, with 7 out of 10 surveyed thinking public schools should teach both evolution and "the Bible's account of the creation of life on earth" (not even put in terms of "scientific creationism"; Larson 2003: 156-157). Even having no deep convictions about creationism, often people favor its being taught on the basis of fairness (whereas the scientifically trained would instead argue that creationism is not science, and can not be so taught). In the face of supportive public opinion, proponents of teaching creationism such as Henry Morris and the ICR could present public education as run by a "liberal humanist establishment," seeking a secular, anti-religious indoctrination in "evolutionary humanism" (Larson 2003: 131). Teaching evolution alone is an "obviously unfair situation," say Morris and Parker (1982: xii), instituted by a biased, doctrinaire scientific establishment. Rather,

> The evidences and arguments on each side, pro and con, should all be presented in schools, letting the students make their own choice as to which model they believe best fits the available data. … *Creationists are perfectly willing to let the issue be decided on the basis of the scientific evidence alone, so why aren't the evolutionists?*

In this manner, anti-evolutionists place the blame on scientists, educators, and politicians.

In 1981, with the combination of public support for teaching creationism, a growing Religious Right and political support (Ronald Reagan voiced support, for instance), and the legal advice of Wendell Bird, continued efforts of the creationist organizations paid off with a "balanced treatment" bill passed in Arkansas, and a year later in Louisiana (Larson 2003: 149-154). The Arkansas bill clearly identified the two alternatives, "creation-science" and "evolution-science," and kept any overtly religious language from being part of the law, which had proved the downfall for earlier legislative attempts, and presented creation-science as pure science which could be taught as such.

However, when the ACLU challenged these laws, their motivational history and that of scientific creationism's would prove detrimental. At the 1981 Arkansas trial (*McLean v. Arkansas*), following two weeks of expert testimony on science and religion,[11]

11 The ACLU provided ten expert witnesses divided into "two teams", a "religious team" which traced the historical and philosophical continuity of creationism and creation science as a religious movement of biblically literalist fundamentalists, and a "scientific team" which documented the absence of scientific evidence for creationism and the evidence in favor of evolution. They closed their case with testimony from teachers and educators expressing their "inability to implement the statute without teaching religious doctrine" (Larson 2003: 161).

Judge Overton concluded that creation science as laid out by the law "is inspired by the Book of Genesis [and] has no scientific merit or educational value as science. … the specific purpose...and the *only* real effect of [the] Act is the advancement of religion" (in Larson 2004: 260). Indeed, the defense had faced difficulty in finding its own scientists as witnesses precisely because most "creation scientists" like Morris and colleagues at the ICR "readily admitted a religious purpose and effect for their scientific activities, and that was just what the statute could not have" (Larson 2003: 162). "The State failed to produce any evidence which would warrant an inference or conclusion that at any point in the process anyone considered the legitimate educational value of the Act," wrote Judge Overton (Larson 2003: 163).

Wendell Bird pushed for separate legal action regarding the Louisiana law, arguing that this state adopted a different statute with a different definition of creation-science and a different legislative purpose (Larson, 2003: 167). After much back-and-forth between courts, appeal and repeal by Bird, state, and ACLU, the Louisiana Balanced Treatment Act finally hit the U.S. Supreme Court in 1987 (*Aguillard v. Edwards*). However, it proved profitless, as the Supreme Court, presented with all the same evidence as before, ruled "creation science" lacking in science, a religious account with religious motivations, and thus violating the establishment clause. Seeing the connection between "creation science" and the Institute for Creation Research, Justice Powell noted that "the Institute was established to address the 'urgent need for our nation to return to belief in a personal, omnipotent Creator' … it is clear that religious belief is the Balanced Treatment Act's 'reason for existence'" (Larson 2004: 261). A dissenting justice Scalia deemed that creation science was potentially science with a secular purpose, but that the evidence before him was not clear to this end (Larson 2003: 181). Some (once again) saw this verdict as the definitive closing chapter on anti-evolutionism. Others were more prescient in believing that the "ruling only forces the religious right to dig deeper into creationism disguises" (Arthur J. Kropp, Executive Director of People for the American Way, in Larson, 2003: 182).

In the late 1980s, law professor Philip Johnson saw the central issue regarding evolution not as Darwin versus the literal Bible, but a philosophy of materialism and naturalism versus theism.[12] Beginning to write on these issues, and commenting on the landscape of creationist and anti-evolutionary books in the 1990s, Johnson saw the need to distance anti-evolutionary arguments and activities from creation science and its biblically-literalist foundations, and became the mind and mover behind Intelligent Design and the Intelligent Design Movement, with figures like biochemist Michael Behe and mathematician William Dembski coming on board. As was discussed in chapter 3, the Intelligent Design argument was a revival in many ways of Paley's "watchmaker analogy" coupled with criticisms that some things of nature are simply too complex to have evolved in a naturalistic, unguided (unintelligent and undesigned) fashion.

In ways Intelligent Design was favorable to people who were skeptical of biological evolution, but who did not adhere to young-earth creationism or biblical literalism. Indeed, a 1999 poll found 47% of Americans believing "God created humans in their present form," a percentage of the population much higher than that of Fundamentalists and avowed biblically-literalist creationists alone (Larson 2003: 189).

12 This is something young-earth creationists have noted too, but it is generally not their foundational or central argument or motivation.

The Intelligent Design Movement promised (yet again) a scientific challenge and alternative to biological evolution by natural means, and apparently had a large welcome audience.

Anti-evolutionists of many stripes (fundamentalists and literalists or not) recognized that Intelligent Design could be the legal answer to their educational woes, which Philip Johnson termed a "wedge strategy": Intelligent Design was the "sharp edge" of the wedge that could cut into naturalism and secular humanism, to reintroduce the supernatural into science and Christian values into society. While some creationists eschewed Intelligent Design because they saw the Bible as central, others (such as members of the "Discovery Institute") embraced it as a starting point to challenge evolution. However, just as "creation science" had fallen to the law at trial, so too Intelligent Design in 2005 at a Federal Court trial in Dover, Pennsylvania (*Kitzmiller v. Dover Area School Board*). The same kind of issues surfaced: Intelligent Design was not science, and it and the school board's policies were carried out with religious motivation and for (and would have) religious effect.[13]

Surveying Evolution's Immorality

The above condensed history aimed at demonstrating the manner in which naturalistic biological evolution has been deemed dubious and harmful, based on moral concerns and judgments regarding the perceived implications and consequences of evolutionary theory. Much of what we see in this history are social movements and legal

13 Barbara Forrest and Paul Gross, in their (2004) book *Creationism's Trojan Horse*, lay out the full history of the Intelligent Design Movement. Judge John E. Jones' (2005) opinion on the Dover trial also discusses in detail the religious history and intended and unintended effects of the school board's efforts, as does Pulitzer-Prize winning journalist Edward Humes (2007) in *Monkey Girl*.

actions intended to curtail the teaching on evolution, arising from moral and religious motivations and justified on moral, spiritual, philosophical, scientific, and academic grounds.

At least one study has aimed at categorizing and quantifying value-based perceptions of evolution, and its results are a helpful complement to the historical accounts above. The title of Brem, Ranney, and Schindel's (2003) article points to its conclusions: “college students perceive negative personal and social impact in evolutionary theory.” That is, the same ills that a figure like Bryan saw in the 1920s are still widely perceived (here, by college students) today.

Quoting Paul Lawrence Farber, a historian of Darwinian ethics, the authors' note (in line with previous observations here), that

> it was in discussing the broader implications of the theory's implications—such as the rejection of a teleological view of nature, the attack on natural theology, or the depiction of man as merely an advanced ape—that tempers flared and statements were made which could transform what otherwise would have been a quiet scholarly meeting into a social scandal. (2003: 182)

They note, however, that there has not been agreement as to these “broader implications.” On the one side are the negative, pessimistic interpretations, that for instance evolution causes the loss of a sense of purpose and meaning in life, or leaves no foundation for a spiritual existence or for morality—the opinion of the Bishop Wilberforces and the Bryans, the Morrises and the Johnsons. But on the other side are the Huxleys and the Dawkins, who find a positive source of “wonder and fulfillment,” or who construct substantive moral principles and nigh-religious faiths out of evolutionary theory.

Through a survey of creationist and evolutionist literature, together with asking undergraduates “what evolutionary theory means for people and society,” the researches distilled “five areas of possible impact for evolutionary theory.” These were:

1. Sense of purpose in life.
2. Perceptions of race and ethnicity.
3. Sense of spirituality.
4. Perceptions of selfishness.
5. Sense of self-determination.

Opinions could be either positive or negative in each area, e.g. evolution could provide a *higher* sense of self-determination, or it might provide a *lower* sense of freedom and free will.

Their study had three parts. First was a means of evaluating the evolutionary knowledge of the 135 participants,[14] of surveying the background conceptual ecology of the participants, by asking them to give evolutionary explanations of an adaptation. The second part was a “Likert-scale” questionnaire (where they rank agreement to a statement on a numbered-point scale), regarding (a) “their beliefs about the origin of and development of life on earth,” (b) “their prior exposure to pro- and antievolution messages,” (c) the “perceived impact of evolutionary theory on individuals and society,” and (d) “their opinions regarding teaching evolution and creation in schools.” The third and final part consisted of written answers to open-ended questions to areas (a) and (d) above, to contribute a qualitative component as well.

The researchers sought to correlate background knowledge of evolution, creationist or evolutionist leanings, and exposure to anti- or pro-evolutionist messages, with beliefs about the “impact” of evolutionary theory. They note that all participants tended to be consistently evolutionist or creationist; few espoused one view at one point and the other at another. While expecting that creationist-leaning participants would see

14 Selected by soliciting passersby through a “recruitment booth” set up at a central location on public university campus, offering $10 to complete the questionnaire.

negative impact (which they did), the authors voice surprise over their findings regarding evolutionist-leaning participants, as they expected they would find positive impact (along the lines of Richard Dawkins, for instance). However, across all groups, the perception of negative impact was the most common: "In each area, there was a significant direction to the perceived impact: an increase in selfishness and racial discrimination, and a decrease in sense of purpose, feelings of self-determination, and spiritual beliefs" (Brem, Ranney, and Schindel, 2003: 194). This was followed by neutral or no impact, and least common for all was the perception of positive impact. While differing in degree, in general evolutionists and creationists were proportionally in line with each other.

They also note that, consistent with other research findings, belief and knowledge were not correlated. That is, having correct knowledge of evolutionary theory did not correlate with belief in naturalistic evolution over strong creationism. Thus, a strong creationist may better understand evolution than an evolutionist. They also note correlations between knowledge and understanding and perceptions of impact: "partial correlations suggest that knowing more about evolution strengthens this perception of negative consequences. … the more a person knows about evolution, the more negative they become" (Brem, Ranney, and Schindel, 2003: 194). This suggests a top-down influence of reflective thought at work.

Their study also supported the findings of previous polls, that a majority believed that "both perspectives" should be presented in the classroom (not necessarily the science class), that "students should have the opportunity to formulate their own beliefs, and silencing either side is censorship" (2003: 194-195). Participants wrote, for instance, that "You can't just force one idea without showing an alternative solution"; that "it is not for me or anyone else to say either is 100% correct"; or that it "would be a very fascist way to go about things if teachers don't let students in on multiple opinions regarding a subject." However, if suggested that teaching evolution led to positive outcomes, participants saw this as a positive reason for teaching evolution; if suggested it led to negative outcomes, it was instead claimed that this fact was irrelevant. Positive outcomes were a "bonus," while negative consequences required an "antidote" (2003: 197).

The authors conclude by discussing the practical and pedagogical implications of their findings, noting that one aim would be to further understand "why the conceptual ecology of college students (and possibly high school teachers) is generating an almost unilaterally negative perception of evolution" (2003: 199). What is it that makes us, apparently, judge Darwinian evolution in the negative? The authors conclude that "Understanding the influence of science on individuals and society seems our best chance for using science in their service." I suggest consideration of the cognitive contours and and moral foundations to evolutionary science may provide much of the understanding they seek.

Closing Remarks to Part I

University of Virginia sociologist James Davidson Hunter, in analyzing a 1987 Williamsburg Charter Survey, concluded that

> The average American gives rhetorical assent to the strict separation of church and state, yet frequently approves of policies which involve considerable cooperation between church and state. … Nowhere is this more clearly seen than in the conflict over public education. In this context the particular and inviolable rights of parents to see that their children are taught within the value system of their own choosing (usually religious in nature) are pitted against the needs of the state for a universal system of education. (Larson 2003: 156).

Thus the space for conflict: evolutionary explanations within biology curriculums are not by the general public taken as value-neutral, and thus can conflict with other values held by parents and other citizens. Whether inherently so in some fashion or not, evolution becomes a moral issue. Summarily, conflicts of value(s) arise on multiple topics:

- between morally, value-laden histories (e.g. naturalistic evolution and biblical creationism) and inferences over human nature or the human person (including dimensions of spirituality, sanctity, and freedom)
- between broad philosophies (naturalism or materialism versus supernaturalism), their explanatory adequacy and correctness and their socio-moral implications
- between opinions over the loci of knowledge (common sense and public opinion, or experts, scientists, and institutions): who decides what is true?
- between ideas about government policy and law (such as a desire for a separation between church and state conflicting with a desire for positive support for particular religious and moral institutions, practices, and doctrines)
- between what is good for children to learn and to be taught, along with views of what a child should become (are we children of our parents? Of the community? Of the state? Of God?)

To summarize the historical analysis, people seem to come to judgments of value from a few lines of inference. One follows from the evolutionary placement of humans in the animal world. Another follows from the perceived conflict of this natural, biological history with religious, scriptural history. A third rests on the assumed or observed effects upon religious faith and morality by (holding, teaching, or learning about) evolutionary explanations, namely for human origins. All of these have been used as reasons in the anti-evolutionary history of social and legal activity.

The historical or sociological perspective might argue how these judgments are formed through the impact of cultural ideas and social forces upon people;.the cognitive approach would also ask whether there are elements of predisposition or readily arising, maturationally natural intuitions that give rise to or shape or support these moral judgments. To approach these possibilities, I turn to the work of Jonathan Haidt.

Part II: The Psychological Foundations of Morals

Here, I introduce the "Social Intuitionism" and "Moral Foundations Theory" as developed by psychologist Jonathan Haidt. Referring to his moral psychology as a "new synthesis" (Haidt 2007), Haidt distills his perspective into four principles: (1) Intuitive Primacy (but Not Dictatorship); (2) (Moral) Thinking is for (Social) Doing; (3) Morality Binds and Builds; and (4) Morality Is About More Than Harm and Fairness. As Haidt will explain, his method is empirical, his moral psychology descriptive—Haidt looks to what people evaluate as moral, to the domains which we affectively, intuitively, and reflectively process and judge to be moral. As it turns out, these domains are not the same for everyone. To be clear, Haidt is not attempting to prescriptively argue for what is right or wrong, good or bad—he is prescriptive only in regards to what we, namely psychologists, ought to regard as, treat, and study as morality and moral psychology.

Haidt's model of morality is one into which we can place the moral concerns of anti-evolutionists. By recognizing the intuitive roots from which they spring, we might understand and explain the readiness in forming and the consistency in nature of moral judgements against evolution, the manners in which people become motivated to take actions for and against evolutionary theory and education. I first discuss the key features of Haidt's "Social-Intuitionist Approach," which is the core of principle (1) above, that of "intuitive primacy"; second, his "Moral Foundations Theory," which is in essence principle (4) and an expansion of traditional views of morality within moral psychology; and afterward (in Part III) turn explicit attention back to evolutionary theory and the relevance and contributions of Haidt's work.

The Landscape of Moral Psychology

In previous chapters, we discussed intuitions and their role in belief formation, namely regarding essentialist natural kinds and teleological purposiveness in the natural, biological world. Through his research, Jonathan Haidt also carves out a place of prominence for intuition in making judgements of moral value—about good and bad, right and wrong, the character of persons, and the appropriateness of actions.

Haidts sees this line of research and the conclusions at which it arrives as moving away from and contrary to a tradition of rationalism in philosophy and psychology, which looked to moral reasoning as the core of ethics and moral decision making.[15] With Kant's rationalist rebuttal to Hume's emotivism, argues Haidt, philosophers largely followed Kant, "in attempting to deduce a foundation for ethics from the meaning of rationality itself" (Haidt 2001: 816). When psychology first developed as a discipline, and psychologists "abandoned the armchair and went into the laboratory," they did not initially follow suit; "the major schools of psychology did not see reason as the master of anything, and their views on morality were compatible with Hume's emphasis on

15 In some philosophical forms characterized (perhaps misleadingly) as "cognitivism" versus "emotivism." Here, however, these distinctions eventually collapse, for you do not have "cognition" without "emotion."

emotions" (2001: 816). This changed in the 1960s, with Lawrence Kohlberg and the Cognitive Revolution.

Haidt calls Kohlberg's work "a sustained attack on 'irrational emotive theories'" (2001: 816). Kohlberg conducted his research largely by presenting participants with "dilemmas in which moral and nonmoral claims were present on both sides, and then he looked to see how people resolved these conflicts." Philosopher Edmund Pincofs calls this "quandary ethics" (Haidt and Kesebir, 2010: 798). Kohlberg prioritized conscious, language-based thinking and reasoning as the basis of developed moral judgment and ethical behavior; what interested Kohlberg was how individuals *reasoned through* moral dilemmas. By the 1970s, write Haidt and Kesebir, "moral psychology had largely become a subfield of developmental psychology that examined how children and young adults solved quandaries" (2010: 799).

Thus transpired the "Great Narrowing," a circumscribing of the domain and character of morality from prior "thick conceptions of morality" such as those of Freud and Durkheim, who asked "how it happened that individuals became willing participants in complex and constraining social orders" (Haidt and Kesebir, 2010: 799). Instead, (moral) psychologists focused on the development of individuals and how they resolved moral quandaries. One prong of Kolberg's influence resulted in the focus on rationality; the other prong is that justice became the centerpiece of morality—justice was with what moral development was concerned.

Rising to challenge Kohlberg on both fronts, however, was Carol Gilligan, who pointed to a second, independent "ethic of care," with reasoning of harm and care "an independent part of moral psychology, with its own developmental trajectory" (Haidt and

Kesebir, 2010: 799; Haidt and Graham, 2007: 100). Feelings of "care" were also a mechanism of moral decision making, and issues of care and harm were also its objects—morality, argued Gilligin, was not merely *reasoning* about *justice and fairness*.

After some debate, ultimately psychologists came to agree that both "sets of concerns" constituted the "proper domain" of moral psychology. But morality was still rather narrowly defined; Haidt and Kesebir cite "the most influential definition in moral psychology" as that of Elliot Turiel, "who defined the moral domain as 'prescriptive judgments of justice, rights, and welfare pertaining to how people ought to relate to each other'" (2010: 799). They note that "Turiel specifically excludes rules and practices that don't directly prevent harmful or unfair consequences to other people. ...mere social conventions, useful for efficient social regulation, but not part of morality itself." Haidt and Graham (2007) have surveyed articles from two psychological journals, the *Journal of Personality and Social Psychology* and *Social Justice Research*, and noted that articles deal primarily issues of justice, fairness, and harm and care (to the exclusion of other candidate issues of moral concern).[16] This way of thinking, argue Haidt and Kesebir, has become a type of "academic common sense," "shared widely by educated secular people," as seen for instance in Sam Harris's conclusion that the Bible and Koran "are immoral books because they are not primarily about happiness and suffering" (Haidt and Kesebir, 2010: 799).

"Is it possible," ask Haidt and Kesebir, "that Turiel and Harris have defined morality in a parochial way, one that works well for educated, secular Westerners, but that excludes much that other people value?" (2010: 799). Haidt thinks yes, and towards

16 Although, it is probably justified that a journal titled *Social Justice Research* prioritizes issues of justice. However, it is also possible that the journal and its articles tend narrowly to treat or define morality as justice or justice as morality.

that end understands himself to be “redefining morality,” to take conceptions of morality —both narrowly within his own psychological disciplines, but also more widely as well —“beyond harm and fairness,” and beyond the individual[17] and his or her explicit moral reasoning. Thus one part of the project involves expanding (what is considered) the moral domain, what empirically is felt, thought, and judged to be moral. The other part involves reanalyzing the causal capacity of moral reasoning; Haidt does not deny that we engage in moral reasoning, but asks whether it is actually responsible for moral judgment, or if it may instead be the consequence (2001: 817). “An intuitionist interpretation is just as plausible,” where moral judgment “is caused by quick moral intuitions and is followed (when needed) by slow, ex post facto moral reasoning” (Haidt, 2001: 817). I first discuss Haidt's conceptions of moral intuition, judgment, and reasoning, followed by attention to his reconceptualization of the moral domain.

Intuitions and Moral Judgment

Haidt's “Social Intuitionist Model” involves three distinct processes: moral intuition, moral judgment, and moral reasoning (usually occurring in that order). Haidt first needs to define what counts as “moral,” and notes that

> Moral philosophers have long struggled to distinguish moral judgments from other kinds of judgments (e.g. aesthetics, skill, or personal taste). [However,] Rather than seeking a formal definition...[I take] a more empirical approach, starting from a behavioral fact about human beings: that in every society, people talk about and evaluate the actions of other people, and these evaluations have consequences for future interactions. (2001: 817)

“An important subset of these evaluations,” Haidt continues,

> are made with respect to virtues, or goods that are are applied to everyone in

17 Indeed, Haidt and Kesebir point out that, across cultures, “construals of the self vary,” with more or less emphasis on collectivism and interdependence to individualism and independence (2010: 799).

> society...or to everyone in a certain social category.... These virtues are obligatory in that everyone (within the relevant category) is expected to strive to attain them. People who fail to embody these virtues or whose actions betray a lack of respect for them are subject to criticism, ostracism, or some other punishment.

Arguing for a virtue-centric approach to morality, Haidt then defines *moral judgments* as "evaluations (good vs. bad) of the actions or character of a person that are made with respect to a set of virtues held to be obligatory by a culture or subculture" (2001: 817). Such a definition of moral evaluations would include the decisions made in rationalist quandary ethics (wherein, for example, individuals judge actions as good/right or bad/wrong according to the "virtues" of justice),[18] moral behaviors based on an ethics of care, and many other views of morality as well, which will prove important later on.

Haidt adopts a conception of reasoning as involving the search for relevant information or evidence, the weighing of evidence and coordinating of evidence with theories, and the reaching of a decision. While "Some of these steps may be performed unconsciously and any of the steps may be subject to biases and errors," a key feature is that "at least a few of [these steps] are performed consciously" (Haidt 2001: 818), where to say that reasoning "is a conscious process means that the process is intentional, effortful, and controllable and that the reasoner is aware that it is going on." This puts it in line with the "B-system" processing introduced in chapter 2. Brought within the moral domain, *moral reasoning* is thus defined "as conscious mental activity that consists of transforming given information about people in order to reach a moral judgment."

Moral intuition contrasts with moral reasoning along the same lines of distinction outlined in earlier chapters. Haidt notes that

> the contrast of intuition and reasoning is not the contrast of emotion and

18 I am here reminded of Nietzche's Zarathurstra, who proclaimed "man" "the esteemer," who bestows value upon things and thereby their meaning.

> cognition. Intuition, reasoning, and the appraisals contained in emotions...*are all forms of cognition* [emphasis added]. Rather, the words *intuition* and *reasoning* are intended to capture the contrast made by dozens of philosophers and psychologists *between two kinds of cognition* [emphasis added]. (Haidt 2001: 818)

Unlike reasoning as delineated above, "intuition occurs quickly, effortlessly, and automatically, such that the outcome but not the process is accessible to consciousness" (Haidt 2001: 818). *Moral intuition*, then, "can be defined as the sudden appearance in consciousness of a moral judgment, including an affective valence (good-bad, like-dislike), without a conscious awareness of having gone through steps of searching, weighing evidence, or inferring a conclusion" (Haidt 2001: 818). According to the terminology developed earlier, we might then characterize this as intuitive and implicit processes (involving perhaps implicit beliefs) that deliver explicit, conscious judgment-beliefs. Haidt sees such a conception as akin to Hume's and the Scottish philosophers', something like an aesthetic judgment: "One sees or hears about a social event and one instantly feels approval or disapproval."

It is the way in which Haidt arranges these three processes that places him at odds with prior schools of moral psychology (namely, Kohlbergian-rationalism). Haidt places moral intuition *first*. The quick affective reactions and spontaneous insight we all have quickly determine the moral judgments we make. Moral *reasoning* then occurs *after* our moral judgments have first been (intuitively) made, reasoning "in which a person searches for arguments that will support an already-made judgment" (2001: 818). It is a "post-hoc process in which we search for evidence to support our initial intuitive reaction" (Haidt 2007: 998). However, while Haidt grants "primacy" to moral intuition, he concedes that this is "not dictatorship." "Affective reactions push, but thy do not absolutely force" (Haidt 2007: 999). Moral reasoning does have a role and place in moral judgment—the questions are when and to what extent.[19]

Haidt presents five[20] lines of research favoring this model,

> studies indicating that (i) people have nearly instant implicit reactions to scenes or stories or moral violations; (ii) affective reactions are usually good predictors of moral judgments and behaviors; (iii) manipulating emotional reactions, such as through hypnosis, can alter moral judgments; and (iv) people can sometimes be 'morally dumbfounded'—they can know intuitively that something is wrong, even when they cannot explain why. Furthermore, [(v)] studies of everyday reasoning [not limited to moral reasoning] demonstrate that people generally begin reasoning by setting out to confirm their initial hypothesis. They rarely seek disconfirming evidence, and are quite good at finding support for whatever they want to believe. (Haidt 2007: 998)

Regarding (i) and (ii), empirically, both in a research setting and probably in much of our everyday experience as well, we see that people quickly pass judgment and then explain, or find reasons for, that judgment. Haidt and Kesebir note there is a correlation between these processes and neural activity as well, with brain areas associated with affect and emotion showing initial activity, proceeded by those areas associated with reasoning and explicit thought. Relatedly, some individuals with damage to these emotionally related brain areas "lose the ability to integrate emotions into their judgments and decisions" (Haidt and Kesebir, 2010: 803). However, instead of turning into "hyper-ethical Kantians," who could presumably arrive at and act on moral conclusions through reasoning alone, they rather

> lose the ability to know, instantly and intuitively, that ethically suspect actions should not be undertaken. Deprived of intuitive feelings of rightness, they can't decide which way to go, and they end up making poor choices or no choices at all.

19 Haidt and Kesebir frame this in the same terms of debate that Hume raised over two centuries ago (between reason and sentiment), and note that "A central challenge for modern moral psychology is to specify when, where, and how reason and sentiment interact" (2010: 802).

20 Haidt only numbers (i) through (iv); I have added the bracketed [v]. Presumably Haidt did not include this in his numbering scheme based on its being general research, while (i) through (iv) denote research specifically directed the role and scope of moral intuitions.

> Like the famous case of Phineas Gage, they often show a decline of moral character. (Haidt and Kesebir, 2010: 803)

Related research points to a "deficit in moral emotions" in psychopaths, with some researchers giving "chilling portraits of psychopaths gliding through life with relatively full knowledge of social and moral norms, but without the emotional reactions that make them *care* about those norms or about the people they hurt along the way" (Haidt and Kesebir, 2010: 804). That is, some individuals can demonstrate cogent moral reasoning and conclusions, but not act in accord with that reasoning because they lack in affective-laden moral intuitions, that are responsible for moral judgement and action in line with that reasoning.

Research also (iii) demonstrates how particular emotions and feelings direct us towards moral judgments. The negative feelings of disgust, for example (and especially prominent) seem to deliver negative moral judgments. Sometimes a little pushing by researchers helps it along. For example, when asked to provide moral judgments of short vignettes, subjects issued harsher verdicts when seated at a dirty rather than clean desk, when seated next to a trash can doused with a novelty "fart spray," or after watching a disgusting video (Haid and Kesebir, 2010: 804). Haidt also conducted an experiment where hypnotized subjects were instructed to feel a wave of disgust upon hearing a benign cue word ("take" or "often"), and gave harsher moral judgments of characters in stories which contained the words than those which did not, with some even condemning a character who did no wrong—"It just seems like he's up to something," wrote one subject (Wheatley and Haidt, 2005). Inversely, by triggering some positive affect beforehand (in the example, by watching a comedy video before the questionnaire), subjects were more likely to give moral approbation, such as to the utilitarian appropriateness of pushing a man to a useful death (e.g. stopping a trolley from hitting five other people; in Haidt and Kesebir, 2010: 804).

Some of the most interesting research comes with instances of (iv) "moral dumbfoundedness." In presenting subjects with stories of "harmless taboo violations," such as one of private consensual sexual intercourse with birth control between adult brother and sister, or a family deciding to eat its dog which had been hit by a car, Haidt, Koller, and Dias (1993) found people delivering negative judgments. However, when queried by researchers for their reasons for their judgments, subjects eventually were unable to explain why (they believed) the acts were morally wrong.[21] Haidt and Kesebir find this and other research "consistent with the notion that the judgment process and the justification [reasoning] process are somewhat independent" (2010, 805). They point to other researchers who

> have analogized moral knowledge to rules of grammar that are known intuitively by native speakers who were never taught them explicitly and who cannot articulate them. … "a chain of argument and induction" is not the way people learn morals any more than it is the way they learned the grammar of their native language. (2010: 805)

Finally, [v] implicit processes often provide the judgment for which we are, afterward, likely to reason and seek justification. Commonly we seek evidence for the opinions and preferences we already have, and once we have it we do not push further—we usually need to be explicitly, directly faced with counter evidence or opposing views to prompt scrutiny of our evidence and seek out further justification; this is our "confirmation bias" (Haidt and Kesebir, 2010: 805). Furthermore, the more affectively

21 Six "probe questions" were asked of subjects after hearing the stories, asking what they thought of it ("very wrong," "a little wrong," or "perfectly OK"), why they thought this, whether any harm was caused, whether seeing the act would bother the subject, whether the actor(s) should be stopped or punished, and what they would think of these acts were they "customs" done often or never in two different countries. (Haidt, Koller, and Dias, 1993: 617)

laden our original judgments or the more emotional commitments we have, the less likely it is we will reason to an alternative position; in contrast, we more readily accept counter evidence and change judgments when we do not have some emotional connections (Haidt and Kesebir, 2010: 805). Because moral judgments are more affectively laden, we tend to commit to them more strongly and often than other "everyday" judgments, and even more so when "a moral issue is tied to one's political identity" (Haidt and Kesebir, 2010: 805), such as "conservative" or "liberal."

Social Aspects of Moral Psychology

Haidt does not stop with providing an "Intuitionist" model of moral judgment, but adds another dimension to make his a "*Social* Intuitionist Approach." This happens when we place a moral judger into his or her community, with other moral interlocutors. This expands the way that moral intuition, judgment, and reasoning interact, with self and others; it is primarily within a community that *reasoning* achieves efficacy in moral judgment.

Haidt writes that

> There are at least three ways we can override our immediate intuitive responses. We can [a] use conscious verbal reasoning, such as considering the costs and benefits of each course of action. We can [b] reframe a situation and see a new angle or consequence, thereby triggering a second flash of intuition that may compete with the first. And we can [c] talk with people who raise new arguments, which then trigger in us new flashes of intuition followed by various kinds of reasoning. (Haidt 2007: 999)

He claims that the first two are relatively rare, and that most "moral change" happens through [c] social interaction. An example of [a] or [b] comes with a study which found subjects changing their immediate reactions to difficult dilemmas, such as whether one might smother their own baby to keep it from crying, were one hiding in a basement from enemy soldiers with a group of other people—meaning one takes the life of the baby to save that of others, and where the baby along with everyone else would face death if it was heard crying. Here, subjects often give or want to give a quick judgment along the lines of "no, it's not okay to smother your baby," but then reason that it might be okay, if not required. However, Haidt also suggests that even when we come to a reasoned judgment (such as above), the original or an opposing moral intuition may remain alongside or "under the surface" (2001: 819). It may be right or good to smother the baby, we reason—but we might still feel highly uncomfortable, and intuitively judge it wrong or bad. Here is a stark, affectively-laden example of conflicting beliefs arising from separate processing systems.

More commonly, deems Haidt, is [c] "reasoned persuasion" (2001: 818), where one's public, verbal justification for a moral judgment (or character or action) may influence the moral judgment of another. Often, we are influenced by others because they present "the counter-evidence we rarely seek out ourselves" (Haidt 2007: 999). However, Haidt hypothesizes that reasoned persuasion works not so much by "providing logically compelling arguments but by triggering new affectively valanced intuitions in the listener" (Haidt 2001: 819). Note then that reason does not override intuition wholesale; rather, reasoning can bring forth new information to which we cognitively attend, in turn producing new emotions, feelings, and affectively valanced intuitions, from which precipitates new or revised moral judgments. And as suggested with subjects with damaged brain areas and emotional deficits, it may make little sense to think that reason alone can motivate.

Alongside the “reasoned persuasion” of public representation and social discourse (and in many ways, reasoning with oneself or private reflection which generates new intuitions or judgments is not much different from discussions with another person), Haidt allows for “social persuasion,” where our moral judgments can be influenced by other people simply by virtue of their being our “friends, allies, and acquaintances” (2001: 819). That is, it is not always that others provide us with reasons towards a moral judgment, but rather simply because we (implicitly or explicitly) trust and value others' opinions within our community, or even that we value conformity, we may develop new moral judgments (through new moral intuitions).[22]

On the one hand then is a social explanation for how our moral intuitions, judgments, and reasonings proceed. But there is another aspect to the Social Intuitionist model, wherein the social is basically the whole *point* to morality. (This is Haidt's second (2) principle introduced above.) In an analogy to our everyday experiences about the world, Haidt suggests that “moral reasoning is not like that of an idealized scientist or judge seeking the truth, which is often useful; rather, moral reasoning is like that of a lawyer or politician seeking whatever is useful, whether or not it is true” (Haidt 2007: 999). It is not that people may not be genuinely interested in getting things right; however, we devote relatively minor effort to doing so, and are rather more oriented on pragmatic navigation of our social groups. Haidt explicitly brings William James' “pragmatist dictum” that “thinking is for doing” into the moral realm, rephrasing it as “moral thinking is for social doing.” That is, morality is about what is useful in our social spheres, and much of what is useful happens to be information about people's

22 We will see more of these social processes in the discussion of cultural transmission and learning biases as discussed in chapter 5.

reputations and characters, including our own.

Our concerns with other people, and with what other people think of ourselves, get situated in the context of group living and cooperation. The "social doing" aspect of morality bleeds into Haidt's third (3) principle, that "Morality Binds and Builds." Here (upon which I also do not long dwell) Haidt discusses the many researches seeking to sketch out the origins of morality, involving the evolution of both psychological processes and cultural practices. Giving a nod to sociologist Emile Durkheim, Haidt argues that the binding and building of morality "constrains individuals and ties them to each other to create groups that are emergent entities with new properties" (2007: 1000).[23] It is suggested that we have the moral intuitions, and make the moral judgments, that we do because they helped us (in our evolutionary past) succeed as groups. Feeling approbation and disapproval towards certain actions, praising or shunning persons or their virtues, burnishing our reputations and bringing to light others'—such aspects of morality may have been adaptive to our ancestors. This is not a one-dimensional evolution, but rather

> modified genes for moral motives may have evolved in tandem with cultural practices and institutions that rewarded group-beneficial behaviors and punished selfishness. Psychological mechanisms that promote uniformity within groups and maintain differences across groups create conditions in which group selection can occur, both for cultural traits and for genes. (Haidt 2007: 1001)

Moreover, "Humans attain their extreme group solidarity by forming moral communities within which selfishness is punished and virtue rewarded," and historically one of the most powerful ways this is done is with gods and religion.[24]

While philosophers have raised questions about what is good and right in itself,

23 Following the Durkheimian approach even futher, Haidt and Graham recently (2011) pointed to religion as a key, or powerful, socio-moral force for "bind[ing] individuals into moral communities."

24 See also chapter 5, on the "gene-culture coevolution" of "dual-inheritance theory."

and probably many other individuals view morality in such a fashion as well, the morally valanced questions of justice and fairness and harm and care of the psychologists' “narrow” morality can, indeed, be seen to play this social, utilitarian role (“useful,” “social doing”) in community formation. Perhaps it is an evolutionary achievement that morality has moved beyond utilitarian awareness by individuals and cultures. Whatever the case, our human development has left us with a set of powerful and motivating moral intuitions with which we judge the moral character and virtuousness of certain, often times social, aspects of our experience.

Fivefold Foundations

Haidt's fourth and final (4) principle is that “morality is about more than harm and fairness.” Haidt began with considering what had recently risen to prominence within moral philosophy and psychology as the central issues of moral concern—justice and fairness, harm and care—and integrated them into his Social Intuitionism, but he goes beyond this “narrowing” and describes a wider, more expansive view of morality under his “Moral Foundations Theory.”

Haidt claims that “Nearly every research program in moral psychology has focused on one of two aspects of interpersonal treatment: (i) harm, care, and altruism...or (ii) fairness, reciprocity, and justice” (2007: 1001). That “morality is about protecting individuals” Haidt and Graham claim has been the “central axiom” uniting most everyone in moral psychology (2007: 100). However, given our evolutionary past of group-living, and empirical, cross-cultural consideration of the moral domain, Haidt believes morality, for many people, has to do with more than those two areas and with more than the individual. Haidt and Kesebir find that "this broadening of the moral domain is a crucial analytical move that must be made in order to understand the moralities of traditional societies and of political conservatives within Western societies" (2010: 815).[25]

Drawing on a three "ethics" model proposed earlier by Richard Shweder—the "ethic of autonomy," the "ethic of community," and the "ethic of divinity"—Haidt and colleagues find five "foundations" to morality—"five psychological systems, each with its own evolutionary history, that give rise to moral intuitions across cultures" (Haidt and Graham, 2007: 104). The five "foundations" (in Haidt and Kesebir, 2010: 822) are:

1. Harm/care: Concerns for the suffering of others, including virtues of caring and compassion.
2. Fairness/reciprocity: Concerns about unfair treatment, cheating, and more abstract notions of justice and rights.
3. Ingroup/loyalty: Concerns related to obligations of group membership, such as loyalty, self-sacrifice, and vigilance against betrayal.
4. Authority/respect: Concerns related to social order and the obligations of hierarchical relationships, such as obedience, respect, and the fulfillment of role-based duties.
5. Purity/sanctity: Concerns about physical and spiritual contagion, including virtues of chastity, wholesomeness, and control of desires.

Haidt is painting a picture where cultural moral practices and explicit moral rules and virtues are built upon the psychological foundations of feelings and intuitions (each with an evolutionary history)—not a pure "nativism," where morality is simply "innate," nor

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25 Noting that most of the "leading figures" behind contemporary moral psychology and its theories "were embedded in two of the most politically liberal communities in the United States: Cambridge, Massachusetts, and Berkeley, California," Haidt and Graham go on to explain that

> Those who have studied morality from a more anthropological and historical perspective, however, have generally found a much broader morality which cannot be supported by only two foundations. … Issues of loyalty to the group, respect for one's elders, self-restraint, and the regulation of bodily processes...are highly elaborated in most human societies.

The writers then ask (of moral psychologists and researchers in social justice),

> Are these concerns just manifestations of an immature 'conventional' morality (Kohlberg's stages 3 and 4)? Are they mere social conventions (a la Turiel), to be distinguished from the 'real' individual-centered morality of harm/welfare/care and justice/rights/fairness? (2007: 102)

They respond in the negative.

an "empiricism" where morality is learned in development, nor yet a "wishy-washy, split-the-difference approach," but, they claim, a "modified nativist view that...fully respects the depth and importance of cultural variation in morality" (Haidt and Joseph, 2004: 55-56; note that chapters 2 and 3 essentially present, also, a "modified nativist view"). Haidt notes that their theory does not require any type of modularity (though they may speak of it as such); it only needs "the sort of 'preparedness' that is widely accepted throughout psychology" (Haidt and Graham, 2007: 106), well described by McCauley as "maturational naturalness."

Moral Foundations Theory thus includes and gives priority to the role of moral intuitions as with Haidt's "social intuitionism" before, but goes on to more fully integrate them into the cultures and societies in which persons reside:

> Each system [moral foundation] is akin to a kind of taste bud, producing affective reactions of liking or disliking when certain patterns are perceived in the social world. Cultures then vary in the degree to which they construct, value, and teach virtues based on the five intuitive foundations. (Haidt and Graham, 2007: 104).

Haidt and Joseph earlier deemed this a "heretofore ignored link: the link between *intuitions*, especially a subset of intuitions that we argue are innate in important respects, and *virtues*, which by and large are social constructions" (2004: 56), and proposed

> that human beings come equipped with an *intuitive ethics*, an innate preparedness to feel flashes of approval or disapproval toward certain patterns of events involving other human beings. … These intuitions undergird the moral systems that cultures develop, including their understandings of virtues and character. By recognizing that cultures build incommensurable moralities on top of a foundation of shared intuitions, we can develop new approaches to moral education and to the moral conflicts that divide our diverse society. (Haidt and Joseph, 2004: 56)

Of interest here (in addition to their claims of "incommsurability," discussed below) is how Haidt carries his intuitionism into the realm of virtue theories, which Haidt and Joseph (2004: 62) deem

> the most psychologically sound approach to morality. Such theories fit more neatly with what we know about moral development, judgment, and behavior than do theories that focus on moral reasoning or on the acceptance of high-level moral principles such as justice [like deontological and utilitarian models]

However, they find that virtue theories have previously fallen short due to their behaviorist character, where “virtues are learned exclusively from environmental inputs.”.

On Haidt's view, however, virtues are not merely inductively or behaviorally acquired—Haidt's “ethics” are in part intuitive. “Virtues...are closely connected to the intuitive system. A virtuous person is one who has the proper automatic reactions to ethically relevant events and states of affairs. ...morality as embodied in the very structure of the self” (Haidt and Joseph, 2004: 61). Virtues are “dynamic patternings of perception, emotion, judgment, and action. Virtues are social skills” (Haidt and Joseph, 2004: 61), and “virtue” is preferred over the term “values” “because of its narrower focus on morality and because it more strongly suggests cultural learning and construction” (Graham, Haidt, and Nozek, 2009: 1030). Our foundational, intuitive reactions are then couched in culture: we, as developing children, learn which feelings and intuitions are the “right” (and “wrong”) ones to have in reaction to particular situations, and so learn what it is to be a virtuous character, if not feel and act as one. Through praise and blame, the use of stories, and by the implicit example of behavior, our societies and cultures build virtues and impart moralities—and at this level much variations can arise despite shared moral foundations.

Such as cuisine and the way different flavors and tastes are used, prioritized, and exalted across cultures, so too the psychological moral foundations (Haidt and Joseph, 2004: 63-64). Moralities will vary in the ways that different cultures order the different moral foundations, or in the domains or situations to which they extend them. For instance, one society may have numerous food taboos, another sexual taboos, and a third virtually no taboos at all. The first two put to great use the "purity/sanctity" foundation (applied to different domains), while it is not prominent at the cultural level within the third. Furthermore, two cultures which exalt food taboos (even of the same foods) may yet still ascribe quite different meanings to these taboos. And even where particular cultures share virtues in common, they may differ in others, making for highly diverse "virtue complexes," which Haidt notes "express a great deal of a society's conception of human nature and moral character" (Haidt and Joseph, 2004: 64).

Remarking on the combination of nativist and cultural aspects of their theory, Haidt and Graham note that "The five foundations theory is about both directions of this causal process," and summarize how

> Virtues are cultural constructions, and children develop different virtues in different cultures and historical eras, yet the available range of human virtues is constrained by the five sets of intuitions that human minds are prepared to have. Cultures select areas of human potential that fit with their social structure, economic system, and cultural traditions, and adults work to cultivate these virtues in their children. (Haidt and Graham, 2007: 106-107)

Morality may begin with the basic yay-or-nay affective responses, but that is not all it is. We make moral judgments, and later moral reasoning, by applying to our feelings, and the eliciting situations, concepts and categories that we passively and actively acquire from culture. And collectively and culturally, feelings, intuitions, situations, and concepts are organized into norms and virtues, into virtue complexes—into morality.

<u>Incommensurability</u>

These differences in virtues and moral systems of different cultures may thus differ widely, but further, since these differences may be mirrored by foundational differences at the psychological and affective level, they can be deeply and duly called incommensurable.

Haidt found examples of this incommensurability close to home, in studying differences between political liberals and conservatives (in fact, it was noting these differences that in part clued Haidt into and then supported the fivefold distinction of foundations). Graham, Haidt, and Nozek (2009), for instance, through four different methods incorporating questionnaires, implicit belief tests, and textual analysis, found that self-reported political liberals consistently prioritized or appealed to the justice/fairness and harm/care foundations more than the the other three (ingroup/loyalty, authority/respect, and purity/sanctity). Conservatives, on the other hand, showed relatively equal use of all five foundations (with the latter three stronger or more often involved, and the former two weaker or less often involved). The gradations between "strongly liberal" and "strongly conservative" are mirrored by a shifting spectrum of the relevance of the different moral foundations.[26]

Haidt and Graham (2007: 111) suggest these differences in foundations can function as an "invisible wall" between moral interlocutors. They discuss a conversation between a (conservative) U.S. senator and a (liberal) television show host, where the host remarks, after vain attempts at convincing the senator of the injustice of his beliefs, "It is so funny; you know what's so interesting about this is ultimately you end up getting to

26 Haidt and Graham (2007) also surveyed articles from two psychological journals, the *Journal of Personality and Social Psychology* and *Social Justice Research*, and classified the percentage of (moral) articles dealing with the moral foundations. Here, as with liberals generally, most attention was given to the harm/care and fairness/reciprocity areas (55% to 80% of articles dealt with these foundations), with decreasing (in order) attention to ingroup/loyalty, authority/respect, and purity/sanctity (at a low of around 2 to 16% percent). Moral researchers do not give the same attention to these latter issues as they do to those such as justice and harm. These facts point to the same potential problems as seen in the "WEIRD" research discussed in chapter 2, calling for vigilance on scientifically backed conclusions.

this point, this crazy stopping point where literally we can't get any further. ...I literally can't convince you." The senator's moral foundations were different (in the case at hand, regarding gay marriage) from the host's, with the former's concern's centering on "traditional family structures, Biblical authority, and moral disgust for homosexual acts," and the latter's on equality and fairness of marriage for a group of people with a certain sexual orientation.

Haidt hopes for practical dividends, suggesting that Moral Foundations Theory can be a "doorway" to pass through such "invisible walls." "Liberals," for instance, "can use this doorway to step (briefly) beyond their moral comfort zone and see issues from the perspective of others" (Haidt and Graham, 2007: 111). But even before that, Haidt's Intuitionism and Moral Foundations Theory allows us to see that a wall is actually there. We can then attempt to see how others make moral judgments, and only then to understand and appreciate what might constitute a moral discourse. If one argues only within one foundational moral domain and the interlocutor within another (say, justice and purity), there may be no change of feeling and thereby no change of judgment. Moreover, claims of the other being irrational or wrong likely ensue—there is not understanding, let alone agreement or persuasion. With knowledge of the moral foundations, practical ethics becomes a more complex affair. Does it guarantee moral agreement? No, but it may provide more hope for doing so.

Part III: Moral Psychology and Anti-Evolutionism

The Social Intuitionism and Moral Foundations Theory developed by Haidt and colleagues provides a theoretical framework for examining the moral elements of antievolutionism, as well as the moral import of religion. In an analysis of moral concerns over evolution, Haidt instructs us to consider more than explicit reasoning and avowed justifications for moral judgments, and to look for moral implications beyond justice, fairness, harm, and care. Haidt's Social Intuitionism can help explain why people have moral concerns over evolutionary theory and its teaching, explain the dynamics of social activity over and against evolution, and suggests ways forward in mediating differences and disagreements. Each of the categorical moral concerns over evolution—about human-animal ancestry, religious doctrinal and narrative conflict, and effects upon the social order—has, I argue, cognitive contours and foundations in our intuitive moral psychology.

Following the structure of the discussion of Haidt's work, I first consider the general elements of intuition, judgment, and reasoning, and the theoretic contributions these provide, followed by application of the five moral foundations to particular aspects of evolutionary moral concern, and close with observation of incommensurability and provisional pragmatic hope.

Intuitive Judgments and Post-Hoc Reasoning

In Haidt's intuitionist model, moral judgment proceeds from quick, affective responses and intuitions; it is after a moral judgment is made that reasoning then occurs—moral evaluations of evolution, then, proceed along these lines. Individuals will have immediate morally-valenced affective reactions to evolutionary representations and explanations; positive affect will produce positive evaluations, negative affect producing negative judgments, and little or no affect would lend itself towards more neutral judgments.

Where reactions to evolutionary theory may differ from the general type of moral evaluations that Haidt and other moral psychologists study is that the former seems to be about what or whether to believe, judging evolutionary representations as correct or not, while moral evaluations are generally judgments about the goodness of characters and the appropriateness of actions or behaviors. However, on the other hand, concerns over evolution are indeed about actions, namely its teaching—educating students is indeed taken as a moral and ethical issue. On the one hand, "belief" can be construed as a kind of action, as something people do, but perhaps more importantly, "belief" can be understood as a part or reflection of someone's character, and this places belief in the sphere of virtue theory. Ethical virtue theories, after all, focus primarily on the development of character, and habits of actions, habits of belief, and habits of feeling are all elements of one's character. Talk of the "ethics of belief" indexes that belief also has moral, ethical hues. Evolutionary belief, then, is not simply an "epistemic" affair unconnected to morality and ethics. Individuals may then understand evolutionary belief as part of either a virtuous or vicious character.

Haidt shows, however, that judgments of Darwin and naturalistic evolution, at least initially, are not based on reflection and ratiocination over the veracity and merits of the theory; rather, they intuitively, unreflectively arise. On what basis? Unlike the arguments of the previous chapters, which specified particular maturationally natural intuitions and biases as to some degree causally influential of the beliefs we are apt to form, here I am not aware of any. Rather, in this case, the "practiced natural" intuitive and affective responses, that we develop and acquire through our cultural environment, likely work in tandem with other (unspecified) elements of our "maturationally natural" cognition. For instance, (hypothetically,) while a strong intuitionist may want to argue that humans are predisposed towards representing other lifeforms as lesser or inferior, the cross-cultural variability over such representations of human and animal connections, which seems to run the gamut, might suggest otherwise, that this area is more maturationally undetermined and culturally shaped.

Yet, the history of explicit antievolutionism is replete with arguments over the scientific validity and moral implications of Darwin's evolutionary idea. If, however, intuition and affect is doing the real work, what do we make of this rational argument? Haidt gives two possibilities. The first, based on the "moral reasoning" link from the social intuitionist model, sees reasoning as the post-hoc activity aimed at finding explicit justification for the beliefs or judgments we initially arrived at intuitively, and we seem cognitively disposed to do this (rather than consciously having feelings, beliefs, and judgments without knowing or having reasons why). In this manner, "scientific" rebuttals to evolutionary theory may be understood as justifications for preexisting belief and moral judgment. These may still be genuinely pursued and believed, but awareness of the moral and social reasons for this reasoning does suggest the former is not the sole cause or purpose. It is a way to present to self and others why evolution ought not be believed and taught. This cognitive progression matches the general pattern of much antievolutionism, such as the Anti-Evolution Crusadas of the 1920s, the "evolution" of Creation Science beginning in the 1960s, or the Intelligent Design movement over the 1990s—delving into their histories (as has happened in writings and in the courts), we find moral concerns over evolution followed by scientific and philosophical argument.

But there is also the “reasoned persuasion” link in Haidt's model. Here, reasoned arguments against evolution are not merely impotent post-hoc justifications, but potent social persuasion. Haidt noted how new reasons, generally provided by other social and moral interlocutors (for we do not go to much lengths to seek them out ourselves), can serve to inculcate new affects and intuitions in response to new information. As such, both explicit arguments and claims about either evolution's scientific, theoretical validity, or evolution's moral implications, can serve to produce like judgments in an attentive audience. Presumably, the more the audience shares in common, cognitively and culturally, the more likely agreement and similar responses are to arise—an individual's complex conceptual ecology would effect the intuitive reactions they are likely to have to explicit information, and culture (as will be shortly discussed in chapter 5) helps shape this.

If the study by Brem, Ranney, and Schindel (2003) is any measure, negative evaluations of evolutionary theory have proved most potent (if not also more intuitively natural). In the next section on moral foundations, I will discuss some particular respects why this is so. Conversely, a figure like Dawkins is apparently not very influential in his reasoned persuasion over the merits of evolution, like creating awe, wonder, and fulfillment, for a positive position like his is currently the minority (as is, apparently, his atheistic, materialist worldview in general—without a broad shared basis of beliefs, it is not surprising his particular views over evolution would not be well accepted as well).

Evolutionary Thought and its Five Moral Foundations

Each of Haidt's proposed five moral foundations may function in two ways: one, they may serve as the foundations for an individual's intuitive and affective reactions to evolution; or two, they may function as the intuitive, emotional foundation to which social reasons and social movements appeal—there is a slight difference in causal direction or emphasis between the two, the former somewhat more "intuitionist" and "bottom-up," the latter more "top-down" and granting a greater role to culture. I will discuss these five in Haid't order, and will also attend to the way in which culture shapes these foundations into the relevant virtues, along the lines of Evan's "constructive interactionism," introduced and discussed in the previous chapter.

Justice/Fairness: The efforts to promote "equal time" and "balanced treatment," to teach "both sides" of the alleged controversy illustrate the influence and potency of the justice/fairness foundation. Proponents explicitly appeal to "fairness" and academic "freedom," and polls and studies show that these arguments are widely well received—by an audience larger than those alone who doubt or are hostile to evolution. That is, even believers of (some form of) evolution and disbelievers of creationism judge it good or right to teach "both sides" in the interest of fairness—presumably, representations of fairness and arguments in favor of "equal time" often "spark" intuitions in favor of this moral judgment. Importantly, such claims of fairness are agreeable to conservatives and liberals alike, spanning groupings and boundaries of identity.

While the foundation for concerns over justice and fairness is probably innate, what conceptually counts as fair and just, or to what domains these can apply, will have cultural elements, being culturally elaborated or structured, and with culture determining the scope or importance of this foundation. Importantly, the democratic political culture of the U.S., and the appraisal of human equality and rights in the Constitution, creates a favorable cultural complex for the justice and fairness foundation, to which negative judgments over evolution can appeal. It is no accident that, as Robert Pennock notes, "By far the most common argument creationists make is to say that is is *unfair* for the law to exclude their view from the public school classroom," and concurrently appeal to academic freedom, and claim that exclusion of "both sides" is censorship (Pennock, 2002: 120). Such claims are quite pragmatic in a country where justice and fairness are a shared and pinnacle virtue. Pennock even notes that "We should agree that, at first glance at least, some of these charges exert a powerful emotional pull upon us" (2002: 121). However, a culture where, perhaps, there is greater respect for the authority of education and scientific experts, pedagogical decisions over evolution might instead be deferred to them.

Harm/Care: People care about evolution precisely because they *care* about people. That is, when we care about other persons, especially children, and perceive that evolutionary thinking and teaching can cause *harm* to those about whom we care—such as spiritual harm to an individual, or harm to a society through degeneration of its morals—then we may sufficiently be concerned over evolution to pursue measures against it.

The representation of potential harm, of various kinds, and the mobilization of care is a common element in anti-evolutionism, particularly by religious conservatives. Claims about the detrimental effects of being taught evolution was commonly one-half of Bryan's anti-evolution message, featuring large in the and anti-evolution "crusade." It is the central message of a creationist work like Ken Ham's *The Lie: Evolution* (1987), and is a core element of the background motives to the events in Dover, Pennsylvania, as tracked by journalist Edward Humes (2007). As Richard Dawkins is well aware, his claims that Darwinism led him to be an "intellectually fulfilled atheist" are often appreciated by Creationists, used as fuel for their case. [27] This works because atheism is seen by many as bad, and thus, motivated by concerns of care and harm, people take moral measures. Relatedly, Gallup and Pew polls obtained somewhat different levels of agreement with evolutionary explanations, with Gallup finding less agreement, but having asked its questions in a somewhat "anti-God" fashion, perhaps thereby sparking intuitions and affects towards a negative judgment.

In regards to harm and care, the element of social reasoning is crucial. Anti-evolutionists' claims give rise to the affects and intuitions in their listeners and readers from which moral judgments against evolution will precipitate. Again, the conceptual ecology created by the conjunction of an individual and (within) her culture are requisite—a pure nativism is probably insufficient for explaining how evolution *in particular* prompts moral concerns based on perceptions of harm and care, though a nativist claim can be made about the moral foundation *in general*. The latter are the intuitive foundations which are requisite for culture and social reasoning to have the effects they have.

Ingroup/Loyalty: Appeals to group identity and ingroup loyalty can be witnessed in conservative and creationist literature, especially in its polarizing discourse. One reads or hears that one is either a creationist or an evolutionist, or that one cannot believe in

27 Dawkins is aware of this: "Now, it is true that if you want to win a court case in the United States where it's specifically on the narrow issue of should evolution be taught in the public schools, if somebody like me is called as a witness and the lawyer for the other side says, 'Professor Dawkins, is it true that you were led to atheism through the study of Darwinian evolution?' I would have to answer, 'Yes.' That of course plays into their hands because any jury is likely to have been brought up to believe that atheists are the devil incarnate. And therefore, if Darwin leads to atheism, then obviously we've got to throw out Darwinism. Well, that is exactly what Dembski is getting at. He claims to like the things that I say because I am playing into his hands by allowing people like him to make the equation between Darwinism and atheism." (2006 interview with Salon.com: http://www.salon.com/2006/10/13/dawkins_3/)

evolution and still be a (true) Christian. Biblical literalists argue further that a Christian must interpret the bible literally. Rhetoric of true and false Christian, pure and impure, and the like, may serve to mobilize, along moral lines, persons who fall in more of a middle ground, or who heretofore did not feel strongly against evolution—to be loyal to the group (whether that be church, Christianity, nation, or civilization itself), one ought to work to curtail evolutionary teaching and belief. This is appeal to the "binding" moral foundations. We can note these kinds of appeals on the pro-evolution sides as well, as when defenders appeal to other scientists, for instance, to aid the cause—those loyal to science, or to rational thought, or to human progress, ought to rise up and defend Darwin's idea (interestingly, as self-surveys generally have liberals less valuing the ingroup/loyalty foundation as do conservatives).

The simple fact of there being a discernible "group" of which people are a part may play a role in their actions—whatever one's "group" believes or however they feel will, through social persuasion and loyalty, influence one's judgments and behaviors as well. Haidt had noted also that emotional attachment to beliefs and judgments were greater when political identity is involved. Along these lines, when conservatives (political and/or Christian) implicitly or explicitly suggest that anti-evolutionism is part of that identity, individuals sympathetic to that identity will be more emotionally attached and motivated to join the cause.[28]

Authority/Respect: The "proper domain" of this module was probably originally other people, to whom one deferred. This is, certainly, still the case, as measured perhaps by the extent to which one respects the authority of academics, scientists, educators,

28 Humes (2007) describes one instance in the events at Dover, where Bill Buckland stood up before his church, noting that money was needed to purchase a creationist/intelligent design textbook for the school, asking his fellowship to pray that money would come in. It did, from his church community.

politicians, theologians, and ministers in determining whether and how evolution is a valid theory, what its implications may be, and what response should be taken. However, we may have culturally extended this domain beyond other people, in interesting ways.

In one respect, religious doctrine and theology are personified in religious teachers, especially God and Christ. Respecting their authority is also to respect the authority of their teaching. However, even the Bible, though to outward appearances simply a "book," is a source of authority and respect. While perhaps initially this is so insofar as the bible is the "word" of God, representationally the bible often takes on person-like characteristics.[29] Though written, the bible is analogous to Jesus as "the Word made flesh." In this way, the biblical narratives may be approached with or buttressed by the same kind of evolved moral emotions that were originally directed to, say, powerful or successful group leaders.

Authority on matters of evolutionary belief, then, for Christians, often is represented at God, Jesus, or the Bible, on one side, and Darwin, especially, on the other (along with "science" or scientists, politicians, or "secular humanists")—the word of Darwin versus the Word of God.[30] Such representations may bring to mind different moral-emotional attachments and concerns over authority. Additionally, "reason" seems to obtain a person-like nature, as a source of authority with moral valence.

Creationists writers have touched on this issue of authority. What are the epistemic bases for knowledge? Whom or what are we to trust, and why? Ham (1987), for example, writes how evolutionists put their faith in fallible human reason and settle

29 For a supporting study discussing the cognitive representations of and social behaviors towards the Bible, see Malley (2004).

30 "This whole issues," write Ken Ham, "revolves around whether we believe the words of God who was there [in the beginning], or the words of fallible humans (no matter how qualified) who were not there" (1998: 8).

for relative, fallible knowledge; Christians, however, can have absolute knowledge through principles revealed by God through the Bible. He writes how, early on, he knew evolution was wrong because the Bible said that God created—but not because he knew of any theoretical or empirical problems. “I did not know from a scientific perspective why I did not believe in evolution—but I knew from a Biblical perspective it had to be wrong or my faith was in trouble” (1987: xiii).

Such concerns over knowledge are not “merely” epistemic, they are moral as well. However, (often liberal) defenders of evolution may not see this. A figure like Dawkins, for instance, appeals to the power of human reason and intelligence in finding truths about the world, and takes it as a veritable crime, a vice, to subordinate reason to “faith.” A similar morally-hued attitude towards reason may pervade science and academia at large. There is commonly a nigh-ethical *ought* that we humans are to think and reason, and for many, accepting something “on faith” is a vice.

Coupled with some elements of respect for certain authorities, is a respect for the authority of the individual. American culture has made a virtue of individualism, a product perhaps of our democracy coupled with the Protestant approbation of the individual with his or her Bible. Biologist Kenneth Miller, an active supporter of evolution, believes “there is something unique in the American character that bore the seeds of this conflict and provided fertile ground in which it could flourish” (2008: 9). He cites our democratic character, home to independent-mindedness in individuals “for whom a primary virtue is disrespect for authority” (2008:11). Looking to the work of historian Gordan Wood, Miller notes a resonating observation that

> the Revolution shattered the intricate ties of obligation, deference, and respect that bound the prerevolutionary social order in colonial America. Americans changed

> from a people little different from hierarchical societies of European monarchies to one that took up the truly radical notion that individuals were both the source of a government's legitimacy and its greatest hope for progress. (Miller, 2008: 11).

Given these historical factors behind our culture, Miller finds that this has allowed individuals to push their educational agendas at the local level (and beyond, to the national as well). American individuals have felt they have the authority to shape education to their liking, rather than deferring to the epistemic authority of experts. The situation, claims Miller, is different abroad (2008: 8).

The irony for Miller, is that the cultural spirit of American individualism behind anti-evolutionism is the same spirit behind science—a spirit of questioning, a "scientific soul." "We are practical, pragmatic, demanding," writes Miller. "We want to see the evidence, and because we tend not to rely on authority, we want to see it for ourselves. We value the individual, and we lionize those who have gone against the grain to pursue a dream, to prove a point, to fight for an idea" (2008: 15). This may testify as to how culture shapes and builds upon an intuitive preparedness towards authority. We humans are apt or evolved to feel respect for authorities, but our cultures help shape to whom and to what degree this is felt, and the meanings and understandings that we apply to this.[31]

Conservative American Christian anti-evolutionists thus enjoy a wedding of religious authority (God and the Bible) with individual authority (as reader of the Bible). Other cognitive research works have focused on the role that gods have played as authorities, particularly as morally regulative of the social order, and we see this in conservative Christian faith. In the American Protestant context, biblical authority is

31 One might ask whether it is possible for an evolved respect or authority module to be directed at an individual him- or herself. I suspect it is; while human groups have often had hierarchies, where most of the members defer to matriarchs, patriarchs, elders, and the like, those leaders themselves likely recognize they are the authorities and subjects of respect. Ethologically as well, the silverback, the alphas, all have no qualms about being at the top.

couched or represented within individualistic authority: the individual reads the bible, and in conjunction with prayer and teaching by other religious persons, comes to their own spiritual and moral conclusions. This has provided for moral emotions and moral intuitions supportive of their evolutionary disbelief and activities.

Purity/Sanctity: The purity module may underwrite concerns over human ancestry with "monkeys" and "apes" expressed most often by Victorian critics and early twentieth century Americans. The evolutionary claim that humans evolved from ape-like animal ancestors seemingly produced an uncomfortable sentiment—negative affects and intuitions—in many disposed listeners. Even the term "lower order" of animals used in scientific literature testified to a judgment of rank, with humans intellectually, spiritually, and morally superior to animals, "beasts," and now evolutionarily superior as well. However, it takes conceptualizing animals as impure, lesser, and profane for one to feel such a way, and this seemingly requires a cultural basis. The cultural variability on this matter testifies to this fact, for animals and the natural world have been sacred and sanctified across cultures just as surely as they have been deemed lesser and base. Darwin's Victorian people, perhaps more than anyone else, had raised humans to such a high, dignified position—and when evolution brought them down a level, it effected sentiments with moral valence.

The creation account of Genesis, and the theological and religious interpretation of that account by many Christians, related humans with the animal world—humans were specially created last, given "dominion" over the rest of the animal and natural world (though this is not to say without certain responsibilities as well). Humans alone had a spiritual dimension to their being and the promise of a spiritual future. With our intellectual, emotional, and spiritual endowments came moral responsibility, to do and be what is good—for our own sake, for other's, and for God's will. To challenge or re-write this narrative depiction of humans may thus challenge not only the image of humans but also what they ought to do and be. By altering what conceptually served as the basis for moral character and behavior (in or through Darwinian explanations), that morality was in turn questioned.

"Purity" is often invoked in another respect, in that ideas and beliefs can be represented as the kinds of things which can be pure or impure—a theory of evolution, for example, represented as a toxic, poisoning, disease-causing substance. The popular evangelist, Billy Sunday, for instance, in one address proclaimed "Teaching evolution. Teaching about prehistoric man. No such thing as pre-historic man..." at which point, reported the *Commercial Appeal*, "Mr. Sunday gagged as if about to vomit" (in Larson, 1997: 55).

This representational attitude seems almost a kind of folk-memetics, approacheing ideas as things which might "infect" someone's mind and soul ("infect" being the very language that figures like Dawkins and Dennet have used in reference to "memes")—especially impressionable youth in schools. Just as bodily contamination from an impure substance might precipitate sickness, so too cognitive contamination from impure ideas,[32] polluting one's ideas of who they are or what they ought to do. Such may qualify as a "conceptual metaphor" (Lakoff and Johnson, 1999) or "source analogy" (Evan, 2001), properties of physical substances and bodily caution extended to a psychological, social domain.

32 Michael Behe has used this language: "The idea of intelligent design, like the wheel, is a simple, powerful, obvious idea that has been sidetracked by competition from and contamination with, extraneous ideas" (1996: 210)

Incommensurable Moralities and the "Invisible Wall"

There is some similarity, even alignment, between liberalism and conservativism, and being pro-evolution and anti-evolution; just as there may exist an "invisible wall" between the former, so too the latter.

In Haidt's findings, certain moral concerns based on particular moral foundations are more typical of conservatives than of liberals. Based both on what subjects self-report, and on analysis of what is discussed in writing and speeches, liberals are most concerned about more individualist values, like justice and fairness and harm and care, though they are concerned about the social order to the extent that it ensures or hampers such individual rights (it would be a social order that impinges on the individual that is unjust and "immoral"). Conservatives, in contrast, more equally give weight to all five foundations, individualist and social (or "binding") values alike. Conservatives, moreover, are more apt to see religion in a social, moral fashion, where religion plays the Durkheimian role of binding individuals into a moral community. As such, liberal and conservatives, proponents and opponents of evolutionary theory and its teachings, may *care* about evolution and its effects for a variety of reasons, some of which are different and not shared across these lines.

For the liberal, if evolutionary theory does not, in itself, cause harm or injustice, then it is therefore not immoral—what may be immoral is constraining the promulgation of rational, scientific thought and its findings. In this manner, rather than respect for the Word made Flesh, evolutionists are wont to exhibit respect for the *logos* prior to its theologization—to reason, to rational, logical thought. Evolution is but one child of human reason, gradually freed from individual limitations and biases by the depersonalization and public nature of the institution of science. Rational and scientific thought is something however that *ought* to be pursued; evolutionary theory is something that *ought* to be believed. “Ought” is a moral imperative that must have its roots in our moral psychology. It is arguably somewhat dishonest to claim that evolution is a scientific theory alone, for even so-called “pure” science must have some motivation, and this is potentially a value-laden affair. It may not be the (im)morality that evolution defenders protest, but critics may be onto something in claiming that evolution has a religious character, albeit also of a different sort than they claim.

The conservative anti-evolutionist, in contrast, sees evolution as having more moral consequences—for communities and society, and for individual's spiritual being. However, if the evolutionist and the antievolutionist do not share in moral foundations, they may speak past one another. One person's central concerns may be completely off their interlocutor's moral map. The same may be said of different parties epistemic foundations. When this complex of foundations is dramatically different and unshared, here Haidt's “invisible wall” arises.

Perhaps by making clear the intuitive, implicit, and often hidden dynamics of moral cognition, judgment, and reasoning, and the multiple foundations that ground our individual and cultural moralities, those concerned with evolution may be better equipped to engage in dialogue, in determining for instance how teaching evolution best fits in our democratic societies. This certainly is no panacea, but it may one tool.

Closing

In closing this chapter, I note again that evolutionary theory, as taken by people, is not “merely” an epistemic affair, only concerning knowledge of the natural world. It is, or readily becomes for many people, an issue of moral concern. Haidt's moral psychology, based on a social-moral intuitionism and Moral Foundations Theory, helps illustrate and explain the cognitive contours to this moral phenomena. There are perceived moral implications to evolutionary explanations and to teaching evolutionary theory that make people *care* about evolution, and for anti-evolutionists to pursue the continuous and at times extreme measures that they have and surely will continue to do against naturalistic evolutionary explanations. Moral concerns grounded in affect and intuition aid in bringing criticism of evolution out of the theological and academic domains, into broad popular concerns and social activity. Indeed, it is the conjunction of intuitions of many kinds, in a supporting cultural context, that elicits the skepticism and concern that “fuels” anti-evolutionary activity.

In this and the previous two chapters, I have aimed to delve into the cognitive and intuitive dimensions of Darwin's doubted idea. In the process of exploring the role of cognition, and pursuing the intuitionist perspective, simultaneously the role and import of culture has been (re)affirmed as well. Maturationally natural cognition is not solely responsible, but is connected and interactive with particular cultural context. The next chapter turns attention to the role of culture as developing, elaborating, and transmitting anti-evolutionist elements and culture, and the interactive and foundational role which cognition and intuition here serve.

Chapter 5
The Missing Link: Cultural Transmission and Darwin's Doubted Idea

Each of the past three chapters, in essence, took what I've referred to as the strong "intuitionist" perspective in the analysis of particular types of evolutionary disbelief, both delving into its theoretical richness and contributions while also noting its explanatory limits. Universal, maturationally natural cognition (in particular, those elements we call intuitions, preparedness, and bias), while indeed constraining and canalizing of belief and moral judgment, does not fully account for the actual and differential patterns of culturally situated beliefs about and attitudes towards naturalistic evolution, "Darwin's doubted idea." In each case, it was determined that "culture," in some fashion, plays a causal role. To play in anti-/evolutionary parlance, it might be said there is a "missing link" between cognition and culture.

Will M. Gervais and Joseph Henrich (2010) have noted an analogous problem in the cognitive science of religion, regarding what they call "the canonical approach" therein. "One common argument," the authors write (Gervais, Willard, Norenzayan, and Henrich, 2011: 390), "is that religious beliefs arise naturally and effortlessly from the biases and tendencies of the human mind, with minimal or no need for extensive cultural scaffolding." So, just as the strong intuitionist might argue that evolutionary disbeliefs "arise naturally and effortlessly," so too with respects to religious beliefs, like gods. This "canonical" view can be held by both the religion-as-adaptation and religion-as-cognitive-byproduct schools of thought.[1] A prominent example concerns theories centering on the memorability and attention-grabbing cognitive character of counterintuitive concepts, especially of agents (perhaps as arising or supported by an evolved “hyperactive” agent detection system). The cognitive characteristics of the content of such representations are presumed to be responsible for the origin, spread, and/or recurrence of these religious beliefs. For comparison, an analogous argument would be to claim that Creationist narratives readily arise and are believed because of our natural predilection to understand the world teleologically (or as designed).

Gervais and Henrich aptly note the shortcomings with this approach. One issue concerns what some scholars have dubbed “The Mickey Mouse problem” (e.g. Atran, 2002). The so-called “problem” is that mere counterintuitiveness alone does not seem to be enough to cause or explain full-blooded acceptance and commitment to counterintuitive agents. Fictional agent concepts like Mickey Mouse or Santa Claus formally have the same minimal counterintuitive properties as many supernatural agents; however, only the latter are objects of actual religious belief and ritual interaction.

Barrett (2008; discussed also in Gervais and Henrich, 2010: 384) attempts to add other criteria that make such concepts religious. His five criteria are that supernatural agents, or “god” concepts, (1) attract attention because they are minimally counterintuitive; (2) are intentional agents that (3) possess strategic information and (4) detectably act in and interact with the world; and, accordingly, (5) their representational content motivates rituals and bolsters belief. In other words, minimally counterintuitive agent concepts who possess strategic information and detectably act in the world

1 The former argues that religion, religious beliefs, or religion's foundational cognitive mechanisms are evolved traits, because they were beneficial and useful. The latter sees religion as a by-product of adaptive cognitive mechanisms which are not specific to or evolved for religion.

automatically produce belief in their existence and ritual interactions. Such a view thus takes religious belief and in turn behavior as arising simply due to the intrinsic character or content of religious concepts (when represented in the kinds of minds we humans happen to have). This is, in many respects, a type of meme-as-virus view of cultural ideas, whereby once we come into contact with certain representations we become “infected,” thereby believing in the concept (avowing and behaving as though it were representationally real or true) and in turn transmitting it to others, whereby it persists and spreads.

However, commenting on Barrett's criteria, Gervais and Henrich note that a degree of belief must in fact be presupposed (rather than precipitated). That is, one would not care if a counterintuitive agent held strategic information nor ritually interact with them if one did not in fact already believe the agent to be real. The crux of the issue is that there is a difference between “mentally *representing* supernatural concepts as opposed to *believing* in them” (Gervais, et. al., 2011: 390), but the difference is too often lost or conflated.[2] Contra Barrett and others in the “canonical approach,” “belief in” gods does not follow solely or even primarily from aspects of their representational content; rather, “belief in” must to some degree come prior to or alongside that content.

Gervais and Henrich's solution to this “problem” is, in essence, to supplement cognitive *content* with cultural *context*. Gervais and Henrich suggest that the pertinent problem, so to speak, is not that of Mickey Mouse, but of Zeus. The author's “Zeus Problem” asks not why people believe in gods but not fictional beings, but “why people place faith in some god concepts but not others, such as the gods of neighboring or

2 This was noted in the discussion of belief in chapter 2; we can have many different attitudes or dispositions towards a representation (such as imagination or desire), only one type of which is full-fledged belief.

intermixed cultures" (2010: 385). In this case, representational content *is* shared (across many possible objects of belief, opposed to what Barrett argues regarding Mickey and Santa), but belief is not. There must be extra-representational factors involved, other than or in addition to "Content-based mechanisms or biases [which] arise from the interaction of mental representations with our cognitive machinery... [which] may affect a representation's memorability, transmissibility, believability, or intra-psychic transformations" (2010: 385). The authors then turn—and here is the key theoretic move, both for their argument and for the work of this chapter—to "context biases," which "deal with the [cultural] sources of mental representations and their integration."

Gervais and Henrich (2010: 386) note that "Content biases may explain why both religious beliefs and folk tales involve similar content, but context biases may be required to determine why people believe the former rather than the latter, or to determine which candidate god concepts are believed to exist in a given cultural context." Following this, they introduce their "updated model," where:

> (1) the cultural transmission of concepts—including supernaturalized religious concepts —are dependent on the cognitive biases that constrain and canalize their content; and (2) these concepts also depend on cultural learning biases that push individuals to selectively attend to and acquire both concepts and degrees of commitment or belief from those around them. (Gervais, et. al., 2011: 390)

Their "updated model" will serve as the the analytical backbone which brings integration and consilience to the claims of this work. Here lies the "missing link."

These context biases and the mechanisms of cultural learning and cultural transmission, and ultimately of cultural evolution, were proposed and developed largely by Robert Boyd and Peter J. Richerson, and more recently elaborated by Joseph Henrich. In brief, (these processes are the object of discussion in Part I), these theories model and explain how cultural learning and cultural transmission occur, and cognitive biases and mechanisms feature prominently as the foundation to these processes. In essence, the work of Boyd, Richerson, and Henrich gives substance and elaboration to familiar terms like "socialization" and "enculturation," while mediating between extreme sociobiologies and extreme "blank slate" culturalists. It serves to elaborate upon the idea of a "constructive interactionism" between cognition and culture (as introduced by Evans (2001) at the end of chapter 3), integrating the nativism and intuitionism that has been common and shared within the research throughout this discussion with the diverse particularities of actual cultures and histories.

Evolutionary belief and disbelief, creationism and antievolutionism—these spring not from maturationally natural cognition alone. It is part representational content, part selective learning biases, and part cultural transmission that together explain the cognitive and cultural trajectories of Darwin's doubted idea.

Part I: Cultural Transmission

As the topic of this chapter is of cultural transmission, it may be helpful to briefly and provisionally[3] discuss "culture." I understand "culture" as an abstraction, as it is "abstracted" from groups or populations of individuals. What is abstracted, as the salient features of these people, are ideas, knowledge, beliefs, values, skills, attitudes, behaviors, practices, and symbols and symbolic structures. Richerson and Boyd call these "cultural information" and "cultural variants," as these are the particular kinds or items of information which can vary across cultures.

3 "Provisionally," for I must agree with Bruce Lincoln, that "whenever I have tried to think through just what it ["culture"] means or how and why we all use it, the exercise has proved both bewildering and frustrating (2000, 409).

There follows certain ways one can speak of culture. The *general* sense is that proposed above. When particular ideas, beliefs, values, and so on are specified, this is culture in a *particular* sense, or a particular culture. This could be a demographic application, as in the culture of a specified group of people, like “Amish culture” or “Fijan culture.” It may also be a typological or categorical application, as in “modern culture” or “traditional cultures.” In each case, “culture” is an analytical tool of the scholar, in redescriptive enterprises of definition, comparison, classification, and ultimately explanation and theory building.

Social groups may be more or less insular and bounded, more or less interactive with other groups; thus the culture(s) abstracted may be more or less defined and more or less overlapping. For instance, a secluded tribe, where members mainly interact only with each other and occasionally with neighboring tribes, is more insular, and their culture thus potentially more defined, than, perhaps, a neighborhood community in a borough of New York City. With the latter, we may be more apt to see the social group as nested within concentric and overlapping societies and cultures—cultures and subcultures—perhaps marked by ethnicity, religion, blue-collar work, political leanings, borough, city, state, nation, language, and so on. At each level, each social circle or subculture, there are salient aspects of culture—comparative similarities and differences—that we focus on for description and explanation.

It might be noted I appeal to a substantive (rather than functional) conception, through focusing on the “information” that makes culture. This also is a cognitive focus, as human minds are the means and mediators of culture, through cognitive processes of cultural learning, acquisition, transmission, and over time of evolution. Such a view undergirds the theoretical enterprises that follow.

The question at hand is, in essence, How is culture transmitted? How are the ideas, beliefs, values, preferences, skills, and so on, passed on from one individual, or group, or generation, to another? To simply say that it is by a process of "enculturation" or "socialization" is much like Monty Python's fictional "Ann Elk," whose "theory of the brontosaurus is that it is skinny on one end, fat in the middle, and skinny on the other end" (discussed in McCutcheon, 2001: 105). Elk (re)describes, but does not explain anything. Explanations by "enculturation" and "socialization," moreover, may implicitly suppose a somewhat passive, absorptive, "blank-slate" conception of the mind. More precise, and more explanatory, would be to determine the causal processes, the cognitive and social mechanisms, involved in this transmission and construction. For the theoretic task at hand, this ultimately amounts to asking how particular representations and valuations of biological origins are acquired by one person—from another. We know they do not utterly spring from the maturationally natural foundations of the mind; other people, our cultures, play the part as well. We learn—selectively—from those around us.

Selective Learning Biases

In developing their "dual-inheritance theory" of "gene-culture coevolution," Richerson and Boyd strove, for the sake of integration and melioration, to make two main points: one, that "Culture is crucial for understanding human behavior," and two, that "Culture is part of biology" (2005; 3-4). The former, directed at sociobiologists and evolutionary psychologists, argues that "People acquire beliefs and values from the people around them, and you can't explain human behavior without taking this reality into account" (3). That is, actual culture is potent as well; it is not only genes and evolved cognition which create or "evoke" culture. The latter point, that "culture is part of biology," is directed at the (for lack of a better term) culturalists and postmodernists, who would view biology as irrelevant for understanding the particulars of culture. Rather, culture—or cultural learning—depends upon evolved, biologically-based (genetically structured) innate or natural psychological learning mechanisms. Moreover, culture, as part of the (new, constructed) environment in which people live, in turn effects natural selection and our biological evolution—a feedback loop develops, and culture, environment, and biology all become causally interconnected, in or as "gene-culture coevolution."[4]

I focus here on the nature and role of the psychological learning mechanisms responsible for acquiring and transmitting (and in turn transforming) culture. In Richerson and Boyd's view, culture is an aggregate, so culture can transmit piecemeal rather than as a monolithic whole. "Culture," write Richerson and Boyd, "is information capable of affecting individual's behavior that they acquire from other members of the their species through teaching, imitation, and other forms of social transmission" (2005: 5). By the "information" that is culture they mean "any kind of mental state, conscious or not, that is acquired or modified by social learning and affects behavior. ...everyday words like *idea, knowledge, belief, value, skill, and attitude*..." Richerson and Boyd later refer to these kinds of items as "cultural variants" (63), because these are the states that

4 In another discussion of "Dual Inheritance Theory," Henrich and McElreath (2008) summarily distill "three key concepts" from the approach, relatively analogous to the formulation by Richerson and Boyd. Their key concepts are: (1) cultural capacities as adaptations (i.e. human cognitive and psychological capacities for culture are the adaptive products of biological evolution), (2) cultural evolution (i.e. cultures evolve), and (3) Culture-gene Coevolution (i.e. cultures and human biology both evolve, influenced by each other).

vary among people and cultures—it is these variables that we analytically abstract and aggregate into (a) "culture." They note that their definition "is rooted in the conviction that most cultural variation is caused by information stored in human brains—information that got into those brains by learning from others."[5] Cultures, or people in different cultural groups, then differ because of the different information they have acquired. These elements of their theory thus place their position much in line with the other research and models from cognitive science discussed prior. Thus, this work of cultural learning is meant to complement and complete the prior intuitionist explanations, not supplant it.

The heart of Richerson, Boyd, and Henrich's work aims at explaining how and why individuals learn what they do from who they do, amongst the many possibilities available. After all, there is not complete uniformity amongst cultural variants—these "variants" are "variable." The cultural learner has options, both of *what* they can learn and from *whom* they can learn. The cultural learner does not select at random; rather, Richerson and Boyd see evidence and a role for selectivity and bias in our cultural learning, through evolved, innate, psychological learning mechanisms. They term this resultant process "biased transmission":

> Biased cultural transmission occurs when people preferentially adopt some cultural variants rather than others. Think of it as comparison shopping. People are exposed to alternative ideas or values and then choose among them (although the choice may not be a conscious one). (2005: 68-69)

I suspect one can think of many times when one consciously seeks out and selects

5 Physical items like artifacts, architecture, symbols like writing, even bodily actions, may all aptly be said to be part of culture too—but it also takes minds to mediate and interpret these objects and events as informationally meaningful. Such falls into the category of "extended" or "distributed" cognition, where some information storage and processing if offloaded from our brains onto other parts of our environment.

("comparison shops") some information over others, or of which kind of information to choose to learn.[6] However, key is that this type of selectivity is ongoing, whether or not we are aware of it. Recognizing evolutionary and creationist dis/beliefs as cultural information, from which individuals select and adopt, we can here begin to recognize the theoretical importance of selective and biased learning mechanisms for the study at hand.

The researchers broadly divide learning biases into two types, *content* biases and *context* biases (and this is a crucial theoretic move). Content-biases, or direct biases, index our cognitively-based predilection to find some information more utile, plausible, and memorable than other information, based on the content of that representation. This essentially is the foundation of the strong intuitionist model, or the "canonical approach" within the cognitive science of religion. Henrich and McElreath note that "Content biases may be either reliably developing products of our species-shared genetic heritage (i.e. innate) or they may be culture specific" (2008: 557)—a difference which maps onto McCauley's distinction between maturational and practiced cognitive naturalness. That is, some content biases naturally develop independent of any particular cultural learning or acquisition, while other content biases may develop due to the representational content acquired from culture through cultural learning. Regarding the latter, "On the cultural side," write Henrich and McElreath,

> people may culturally learn beliefs, values and/or mental models that then act as content biases for other aspects of culture. That is, having acquired a particular idea via cultural transmission, a learner may be more likely to acquire another

6 Academia provides numerous reflective instances of this. The first-year college student needs to determine what to major in, what courses to take, and who (which professors) to take them with. Therein, they must often determine what to research, which works to read and study. These decisions are amplified for those pursuing graduate work. In turn, professors or researchers must continually debate to what sources and to what fellow (past or present) scholars and writers to devote time and attention. Essentially, these processes also occur on the implicit and unconscious level, permeating our everyday lives as cultural beings.

> idea, because the two "fit together" in some cognitive or psychological sense. (2008: 557)

This seems to be another way of approaching the idea of a background "conceptual ecology" (as, for instance, discussed by Evans (2001), and Brem, Ranney, and Schindel (2003)), which, discussed at the end of chapter 3, serves to constrain and canalize what we are apt to believe in addition to that which we are naturally predisposed.

To summarize, we develop direct, content biases of learning in two ways: one, as a result of maturationally natural cognition; two, as a result of the representations that we already hold, *either* through developed maturationally natural cognition (as in the former manner), *or* through acquired cultural learning, both of which in turn bias us towards future representations on the basis of some sort of "cognitive fit."

However—and here is where the cognitive model is most greatly expanded, and most fully takes on cultural contours—in addition to the content of representations, the authors also argue that the *sources* of that representational content are crucially relevant as well. That is, we cultural learners are selectively biased to pay attention to *context*, to where cultural information is coming from. Comparatively, context biases, say Hernrich and McElreath, "exploit cues from the 'individuals who are being learned from' (...'models'), rather than features of the the 'thing being learned' [the 'content'], to guide social learning" (2008: 558). Regardless, then, what certain cultural information is about, we may be biased to acquire it on the basis of the people or sources who exhibit and transmit it.

I will discuss particular context biases in the next section, but will first consider the plausibility for the general existence of selective context biases. Support comes from a combination of evolutionary logic, mathematical formal modeling, and empirical research. First, evolutionarily, the authors write how selective biases could prove adaptive, and thus plausibly evolve. “There is a great deal of adaptive information embodied in both *who* holds ideas and how *common* the ideas or practices are. … Social learners who selectively learn from those more likely to have adaptive skills (which often lead to success) can out-compete those who do not” (Henrich and McElreath, 2008: 558). The larger theoretical framework for this is that culture *is* an adaptation (the central argument to Richerson and Boyd's (2005) book, *Not by Genes Alone*), meaning that the stuff of culture that individuals learn and acquire fuels individual and group success, and that the psychological mechanisms needed to acquire culture are themselves evolved adaptations (for culture).[7] Put differently, we have the kind of psychology and cognitive structures we do because having these was advantageous; more specifically, we have minds partly so that we can acquire culture. Or, minds, or the cognitive mechanisms and systems that make up minds, evolved because of their utility in acquiring another utility, culture.

One idea behind learning biases as adaptations Henrich and McElreath term the “costly information hypothesis” (2008: 557). On the one hand, it takes time and resources to acquire and store information—cognitive resources like processing and memory, and material resources like physical effort, energy, and goods like payment; this effort is costly. On the other hand, acquiring bad information can be costly too—even deadly. Indiscriminate learning of inaccurate and unreliable information could prove poor and maladaptive, and in the long run would not help groups survive, whereas

7 One of the central arguments to culture being an adaptation comes with the fact that being able to learn a vast amount of information and skills from one's group or culture—rather than having to learn it for oneself by trial-and-error, or having it evolved to being innate—is highly advantageous, especially in light of changing environments, which many theorists believe fueled human evolution, and which any mobile person or group readily accounts for today.

selective learning would prove advantageous. Sperber, et. al. (2010: 359) argue similarly that we humans are endowed with "epistemic vigilance," "a suite of cognitive mechanisms...targeted at the risk of being misinformed by others." But there are also processing costs and limitations to epistemic vigilance (we can not indefinitely evaluate the sources and merits of the information we acquire), so evolution would favor reliable but parsimonious heuristics for selecting information and its sources.

Second, Henrich and other researchers have produced formal (mathematical) models illustrating these biases at work, showing how advantages can arise and how cultural (population-level) evolution will emerge over time. By developing rather complex formulas (barely penetrable to a novice like myself) and plotting the variables, one can see how a cultural variant like a belief or skill can spread over "generations," on the basis of certain selective learning biases. That is, when individuals favor (acquiring) certain information over other information or from other sources, over time (through successions of cultural transmission and acquisition), population-level changes occur—culture evolves.

Third, empirical evidence also supports this account of context biases, confirming "that these learning biases are indeed an important part of our cognition, that they are used by both children and adults, and have been shown to influence economic decisions, opinions, judgments, values, and eating behavior" (Henrich and McElreath, 2008: 558). For instance, a review by Heyman (2008: 344-345) shows 3- and 4-year olds preferring information sources who had previously given correct responses (75% of the time) over those who had not (who were correct only 25% of the time). That is, young children intuitively know that people may lack knowledge, or not truthfully convey what they in fact know or don't know, and display preferential bias in the sources they select as trustworthy sources from which to learn. Relatedly, second graders and older children showed skepticism towards “claims that were consistent with the speaker's self-interest,” (that is, they are more hesitant to accept claims that support a source's self-interest); Kindergarteners, however, were less skeptic, presumably having not yet developed or acquired such biases or epistemic vigilance. This and other research suggests various forms of bias and vigilance are part of our maturationally natural cognition.

Contextual Cues

What do we look for when selecting sources of information? To what are we biased to pay attention? Henrich and colleagues delineate a number of features, or cues, in our social environment which we find relevant (often unconsciously) in learning from and adapting to our cultures. Context-biases fall into two types: frequency-based biases (how often, by how many people) and model-based biases (by whom, of what status). The former is also called “conformity bias,” while the latter take shape as skill, success, and prestige biases.

Frequency-based context bias is a bias towards conformity, where one “goes with the flow,” ascribes to the majority opinion or (most) commonly held or exhibited beliefs, values, and behaviors. Henrich and McElreath note this tactic is especially adaptive in “information-poor” situations, that is, when we have no other selective cues to go by.

> One solution for dealing with...information-poor dilemmas is to copy the behaviors, beliefs, and strategies of the majority. Termed *conformist transmission*, this mechanism allows individuals to aggregate information over the behavior of many individuals. ...[It] can be the best route to adaptation in information-poor environments. (Henrich and McElreath, 2008: 562-563)

That is, when one has no other social or cultural cues or indices of what is apt to be most correct, reliable, or useful, then conforming to the majority (rather than a minority position, or choosing at random) is more often than not the better route to take. Relatedly, the more complex and difficult a problem, and the less likely we are to figure it out on our own through problem solving, the more likely we are to conform (Henrich and McElreath, 2008: 564). In these cases, we seek out those ideas, values, practices, and the like most frequently exhibited or espoused by other people. "When in Rome, do as the Romans do" does indeed capture some evolutionary, adaptive logic.

Two distinct types of conformity emerge. One is "information conformity," where "people actually [alter] their private opinions and beliefs about something." The other is "normative conformity," where, "for the purposes of going along with the group to avoid appearing deviant...people alter their superficial behavior" but often *do not* "change their underlying opinions, preferences, and beliefs." For the latter, we may "put on a good show" for social reasons, but without a "change of mind" or "change of heart." To support both of these types, Henrich and others cite multiple works showing people adopting and changing their opinions in line with the majority opinion of the group.

However, when we have more information at hand, we are instead apt to be more selective, to pick out particular persons or groups as sources based on other criteria than frequency. Rather than assessing frequency, we may instead exercise *model-based* biased selection, taking note of social "cues" which index sources that are reliable and fruitful. Explain Henrich and McElreath (2008: 558),

> The idea is that a learner should use cues from, or characteristics of, the individuals in their social world to figure out who is most likely to have useful ideas, beliefs, values, preferences, or strategies that might be gleaned, at least partially, through observation.

Here, people learn from models who have skill or competence, success, and prestige, or who otherwise share other kinds of similarity with oneself (like ethnicity). Henrich and McElreath note that skill, success, and prestige rest along a "continuum of cues from direct observation by the learner...to completely indirect assessments" (2008: 558).

To judge someone as truly *skillful* in a certain area, one has to observe their skill at work and as fruitful—seeing the abundant yields of a farmer, for instance, or the work of a master craftsman, and to be able to causally relate that success to that skill. But this takes time, and often we lack direct access to causal evidence of skill and competence, and must rely on more indirect, secondary markers like success and prestige, which may be the more efficient route. Suppose one is a novice farmer, trying to determine which agricultural techniques are best, and has in one's village many farmers from which to learn. If trying to identify the most skillful farmer, one would need to know how well they produce. This takes time. One might have to wait for the harvest period, and then judge which farmer had the better yield. Of course, there may be fluke years, when one farmer does exceptionally good and another abnormally bad. So one would want an average over many years. One might also want to pay attention to whether the farmer's practices are sustainable, or if in the longer term he is depleting the land's fertility. So direct assessment of sources' skill is tricky.

Suppose instead one looks amongst the farmers, and notes along with which ones had good yields, also those that have more wealth, better homes, larger families, and the like. These aspects of success may imply, cuing to the learner, that the farmer is the most skilled (reasoning that past farming skill has led to farming success, which has in turn translated into the success and wealth in these other areas.) These cues aren't infallible, as other factors may be involved, (perhaps a large and long-lasting family inheritance for instance), but lacking time and other cues, *success* can be a reliable sign of a good model in certain cultural areas.

In a third manner, others in the community may defer to some farmers as the experts, and try to learn from them and gain "preferred access" (Henrich and McElreath, 2008: 559), perhaps by trading goods or labor for opportunities to learn. Thus some farmers attain a high degree of *prestige* among their community. Prestige is a "freely conferred status" (Henrich and Gil-White, 2001) cued by a number of often subtle behaviors,[8] like eye gaze, tone of voice, imitation, and posture, and we are well equipped to pay attention to these. Deferential behaviors by others to prestigious individuals cue the cultural learner that here is someone of potentially valuable cultural information. (However, as will be discussed below, we may not look to a prestigious source with any particular cultural information in mind.)

After success and prestige, other markers may play some role in selecting our cultural models, such as age, sex, health, personality, ethnicity, and other types of self-similarity. These though are more minor and secondary compared to biases towards success and prestige (that is, if operative, they follow success and prestige, rather than precede them).

A field study by Henrich and Broesch (2011) set out to find and map these model-based context biases at work. Towards this end, they studied select groups of Fijan villagers and how they learn from others in the domains of fishing, yam growing, and use of medicinal plants. In these villages, men are likely to be either a yam farmer or a

8 The specific markers of prestige may be rather elusive; Henrich and Gil-White (2001) and Chudek, Heller, Birch, and Henrich (2012) provide further study and analysis of "prestige."

fisherman (providing calories and protein, respectively), so these central, widespread practices are the object of much cultural learning and model selection. (Less common is the knowledge and use of medicinal plants, which is also more often possessed by women.)

In one part of the study, the researchers asked individuals "who would you go to for advice if you had a questions about" fishing, growing yams, or using plants as medicines. In another part of the trial, actually taking place 2 years prior, villagers were asked, in each of the three domains, who they thought knew the most about fishing, or growing yams, or using plants as medicine, and who was the best line or spear fisher, or yam grower. This earlier set of questions was to measure the perception of both success and knowledge (except for medicinal plants, which was only measured by knowledge as results of success are more ambiguous). The later question simply asked who subjects would choose as a model. A third part of the study involved actually recording whom subjects were with at various times, i.e. recording from which models individuals were actually learning.

What they found was that people were very likely to select as models (in part 1) those who were broadly deemed most successful in that area (part 2). In addition, those perceived as most knowledgeable, aside from in the domain of plant use, were not necessarily the same as those deemed most successful, as in the "best" fisher or yam grower. Correlating these responses with records of actual activity, however, shows that the ideal model in some area of cultural information is not always the one that a learner can have access to—the model one actually learns from may not be the more desirable most prestigious or successful, if that model is inaccessible to the learner, when one lacks preferential access. Thus a learner may need to start with a less successful and less prestigious model, perhaps in time "ratcheting" his or her way up towards better and better models. One might start with parents, for instance, then shift to young-but-slightly-older fishers or yam growers more experienced than oneself, and so on.

Model imitation, however, can occur over a wide variety of traits. As Henrich and McElreath explain,

> Interestingly, the indirect nature of assessing another person's utility as a cultural model … do[es] not tell the learner which of the model's behavior, ideas, practices, and strategies causally contribute to his success or competence. For example, are people successful in farming because of what they plant, when they plant, how they plant, or how they make sacrifices to the spirits—or all four? Because of this ambiguity, humans may have evolved the propensity to copy successful individuals across a wide range of cultural traits, only some of which may actually relate to the individual's success. When information is costly it turns out this strategy will be favored by natural selection even though it may allow neutral and even somewhat maladaptive traits to hitch-hike along with adaptive cultural traits. (2008: 559-560)

That is, it may be ambiguous whether some feature of the farmer's agricultural practices makes him successful, or whether it is his and his family's religious devotion. Erring on the safe side, covering "all the bases," we learners may be biased to "learn" or imitate all these features of the successful or prestigious individual. In decision-making trial studies, for instance (like an economic-investment game, where players can see other's success), not only will subjects imitate the successful economic decisions of the successful models, they will also take up other unrelated beliefs (e.g. "about the state of the world"; Henrich and McElreath, 2008: 561).

Relatedly, we may be biased to selectively learn form prestigious and successful individuals simply because they are prestigious and successful, and we would (implicitly?) hope to be as well. That is, heuristically, hold the same beliefs and values and practice the same behaviors as successful and prestigious individuals, and you will be more likely to become so too. Think of the way people imitate famous actors and musicians for example, in hair and clothing style, diet, baby names, and the like. Sadly, many studies also show “that suicide rates spike more after celebrity suicides than non-celebrity suicides...even once media coverage is controlled for” (Henrich and McElreath, 2008: 562). It is noted that the individuals also tend to match their celebrity models on age, sex, and ethnicity. Clearly suicide is not an adaptive trait to learn or imitate; this shows how an evolved propensity, like others, can be hyperactive and maladaptive as well. In this respect, Richerson and Boyd (2005: 169ff) explain how success and prestige biases play a role in modern demographic shifts towards having fewer or even no children (another biologically maladaptive trait), how prestige and success shifted in most modern culture away from large families, towards wealth, leisure, and career achievements and professional success.[9]

In contrast to conformity bias, as regards model-based biases a select few may then be the models for much cultural learning. Discussing work by Rogers, Henrich and McElreath (2008: 562) note that “the diffusion of new ideas, technologies, and practices is strongly influenced by 'local opinion leaders'” These leaders tend to be “(1) locally high in social status...; (2) well respected (indicating prestige); (3) widely connected; and (4) effective social models for others.” In this manner, a select few individuals can become responsible for widespread cultural change, when many others pay attention to

9 “Such new strivings reduce the desire to have children,” a change that “is most dramatic for women” (2005: 177). They note havoing mass education provides a venue for girls to learn avenues for success, and thus inculcate desires, outside of the home and motherhood. Mass media has allowed such ideas and models to spread quickly and early to other cultures, and it is a few “rare subcultures” that are organized to resists these cultural influences, like the Amish and Hutterite Anabaptist sects. “Successful Anabaptist sects have cultural beliefs and practices that strongly bias their acquisition of culture from their host societies. For every route of exposure to fertility-reducing beliefs, there is a corresponding defense” (Richerson and Boyd, 2005: 182).

and imitate them via cues of success and prestige.[10]

The discussion of accessibility and preferred access, however, may highlight a feature of interest in modern societies with widespread literacy, publication, media, and technology. Here, information is made accessible other than through direct human interaction; it is accessible to a potentially wider audience, unconstrained by the need for "preferred access." (Instead, literacy and access to television, internet, and the like may serve as the more limiting factors.) While prestige and success certainly play a role, as we consider the sources of this widely available information, in some instances cultural information stands independently of individual sources. Here, newspapers, television channels, or internet search engines may themselves, it seems, function as successful or prestigious individuals.[11] Such low-cost access to wide amounts of information expands the opportunities for cultural learners to acquire information, and in turn the manner and directions of cultural evolution.

Thus we cultural learners attend to contextual factors to cue what information and cultural variants we ought to acquire, based on who is or are the sources of that information, in addition to only its representational content. However, there is always a chance that our cultural models are deceptive or manipulative, and so cultural learners also need cognitive capacities for epistemic vigilance.

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10 This view seems to share much with William James' response ("Great Men and Their Environment") to Spencerian sociological accounts, and his view of the "Great Man" view of history, where "Great Men," with indeed a sociological causal history of their own, nonetheless can effect great social and historical changes, akin to the "random mutations" that introduce novelty into biology and effect evolutionary change. There is probably some question, especially in the modern world, just how "local" local actually is. Because of mass-media, individuals—even "local" opinion leaders—can now exert influence over many people.

11 Consider the different attitudes individuals—cultural learners—may have towards CNN or FoxNews, for instance, or the search engines Yahoo! or Google. Relatedly, consider how a search engine like Google is able to "defer" prestige upon websites, by ranking them on its first page of search results.

Vigilance and Deception

Evaluating the possibility for dishonesty and manipulation may be easiest in practical matters like fishing (who is the better model: one who simply says they are a good fisher, or one who actually catches many fish?), but can be more difficult and risky in areas like beliefs and values. Does a cultural model actually believe and value what they claim? This is the risk to symbolic communication; while incredibly fruitful and adaptive, there is a cost. Writes Sperber, et. al. (2010: 359),

> Humans massively depend on communication with others, but this leaves them open to the risk of being accidentally or intentionally misinformed. To ensure that, despite this risk, communication remains advantageous, humans have, we claim, a suite of cognitive mechanisms for epistemic vigilance.

Henrich (2009: 244) argues similarly:

> With the evolution of substantial communicative capacities in the human lineage, cultural learners are potentially exploitable by manipulators who can convey one mental representation but actually believe something else, or at least misrepresent their depth of commitment to a particular belief.

Symbolic communication allows one to transmit a great deal of information quickly and at low costs (one only needs the time and effort to produce such utterances), but the trade-off is the possibility of "opportunities for Machiavellian manipulators to exploit learners" (Henrich, 2009: 247). Furthermore, prestige biases make it even easier for high-status individuals to deceive and manipulate.

As a solution to this problem of risk, Henrich proposes that we have evolved the cognitive capacities and dispositions, for epistemic vigilance, to pay attention to "credibility enhancing displays," or "CREDs":

> These displays provide the learner with reliable measures of the model's actual degree of commitment to (or belief in) the representations that he has inexpensively expressed symbolically (e.g. verbally). Learners should use such displays in determining *how much* to commit to a particular culturally acquired

> mental representation such as an ideology, value, belief, or preference. (2009: 244-245)

Henrich provides an example of the risk to learners with a reference to Tom Sawyer, who cleverly convinced his friends that whitewashing a fence was fun and that he himself greatly liked doing so. He did so through a combination of verbal statements, tone of voice, facial expressions, and bodily posture and actions. Had Tom only said that painting fences was fun, but was himself avoiding the action, we can see why he would be much less convincing. Relatedly, Henrich describes how a prestigious forager, who claims that blue mushrooms are more desirable than grey, but whom himself prefers the tasty grey mushrooms over the mildly toxic blue, would be less believable if he did not at times eat blue mushrooms as well. Intentionally eating the less desirable blue mushrooms is a display enhancing the credibility of his claim that blue mushrooms are desirable, despite the fact that the forager actually prefers the gray fungi.

Henrich describes our attention to CREDs as a kind of evolved "cultural immune system" against deception,

> designed to assess a potential model's 'degree of belief or commitment' to a symbolically communicated belief using the model's displays or actions. Cultural learners should look for displays that are most consistent with the expressed representation(s) and—more importantly—look for actions that would not be performed by a model believing something different from what the model expressed symbolically. (2009: 247)

This gets at the truth behind "actions speak louder than words," and to "put your money where your mouth is." But our actions, our credibility enhancing displays, also need to appear genuine and internally motivated; if we perform acts in accordance with our professed belief only because of some external threat or pressure, these would only very weakly contribute to our credibility (Henrich, 2009: 247).

Henrich (2009: 248ff) discusses some of the research findings supporting his hypothesis. In one study, only 25% of children tried a novel food offered (but not partaken) by the researcher who had been playing with them; if the researcher herself tried it, 75% did. In another study, subjects found a statement more credible when it went *against* a subject's self-interest than if in-line with it, and this was even more powerful than prestige (that is, an against-self-interest but non-prestigious individual was deemed more credible than a prestigious but self-interested person). So verbal utterances themselves act as CREDs. In another controlled study, actually giving to charity instilled giving in others; professing or preaching the virtues of charity alone had little or no effects.

Also worth noting, however, is that costliness is, so to speak, in the eye of the beholder. If Tom Sawyer really did enjoy painting fences, his doing so was really not costly (beyond the expenditure of a few calories). Similarly, if one truly believes one should be celibate, poor, or a martyr for one's god, and that one will be eternally rewarded for doing so, then again, subjectively, such acts are not costly. But for the unconvinced observer, not (yet) holding these beliefs, the acts may indeed appear quite costly, are credibility-enhancing towards the professed or inferred beliefs and values, and are perhaps quite convincing for the observing cultural learner. Henrich notes that "CREDs need not be costly but costly acts can, under the right circumstances, provide particularly powerful CREDs." Costly CREDs, Henrich further theorizes, likely play a prominent role in religion, and in group cooperation generally.

He points to the place of "prestigious paragons of virtue who made (or make) costly sacrifices," the power of martyrdom and sacrificial vows (e.g. celibacy, poverty, fasting), and the "interlacing" of ritual sacrifices with religious ideologies (2009: 257). Henrich reiterates again that counterintuitive agents need costly displays of commitment, precisely because they *are* counterintuitive (recall that cognitive attraction and memorability do not equate to belief). "The more counterintuitive the agent, the more CREDs will be required to sustain commitment" (Henrich, 2009: 258). We might reflect on the CREDs that we adults may perform to inculcate belief in children towards Santa Claus or the Tooth Fairy, but which we cease to perform over time. A "solution" to the "Mickey Mouse" and "Zeus Problem(s)," then, is that people do not believe in them because, basically, others in their social group do not believe—they are not performing CREDs of commitment to these agents, which would ratchet and scaffold belief in the cultural learner; content aside, there lacks contextual support. Representations without CREDs are not likely to be transmitted.

The idea of CREDs and of an epistemic vigilance again enriches the picture of cultural learning. What we can next do as a final step is to move from the level of individual learners to the population level of (or, that is) culture(s)—to how culture is transmitted and in turn changes and evolves.

Cultural Transmission: From Individual Learning to Cultural Evolution

Considerations of cultural learning mechanisms are ultimately a tool in the work of Richerson, Boyd, and Henrich towards theorizing cultural evolution—how cultures change and adapt over time. For the purposes here, we can think then of how cultures have changed or evolved in light of evolutionary thinking, and what role cultural learning and religious context have had in this. A combination of content-based and context-based factors in learning account for the transmission and over time the evolution of culture.

Cognitive Attractors. In their discussion of cultural evolution, Henrich, Boyd, and Richerson (2008) note that an evolutionary model of culture (unlike Darwinian evolution in biology) does not require that cultural variants like representations be discrete gene-like particles (i.e. "memes"). Unlike genes, which (except when mutating) reliably transmit from one generation to the next, mental representations are instead mediated through inference. For instance, I observe an action or hear an utterance of yours (a "public representation"), and infer the "underlying mental representation" which I may then perhaps retain, as a belief. But it may vary from yours, which you may have intended to communicate to me. This would be a problem for discrete and reliable cultural transmission, similar to how a cogent theory of biological evolution was problematic for Darwin when he conceived of inheritance as blending the traits of the parent.

However, cognitive representational content biases, functioning as "cognitive attractors," constrain the actual representations transmitted and acquired out of the many possible representations that could be so held. This allows cultural transmission to operate similarly to genetic, memetic evolution. The authors call the process "inferential transmission," which they state

> captures the manner in which cognitive processes of acquisition, storage, and retrieval alter mental representations in ways to favor some representations over others...[C]ognitive attractors will rapidly concentrate the cultural variation in a population. Instead of a continuum of cultural variants, most people will hold a representation near an attractor. (Henrich, Boyd, and Richerson, 2008: 120, 121)

Their term "basin of attraction" captures the idea well, as we may imagine some representation near the "edge" of some basin readily sliding into that basin, according to natural cognitive properties analogous to physical gravitation.

Basically, “cognitive attractors” revolves around the idea that some representations are “easier to think” (Henrich, Boyd, and Richerson, 2008: 122). We have already discussed how maturationally natural intuitions, biases, and predispositions, and culturally acquired representations (which may have a “practiced naturalness”), can play this role, as responsible for our developed, background “conceptual ecology” and “cognitive fit.” This content may bias and dispose us towards committing to some representations over others, or interpreting or inferring or remembering certain representational content, those that better fall into a “basin” of attraction, are “easier to think,” or have a better “fit” with the ecology of our other representations. The authors discuss, for instance, how “moon as person” and “moon as rock” are two cognitive attractors for moon-representations; while there is a continuum of intermediate beliefs pertaining to the agency or material nature of the moon (e.g. that its movement is governed by physical laws but its color expresses its mood), thinking of *either* the moon as a person *or* the moon as a rock is the more intuitive, and in the inferential transmission of these and intermediate representations, we are likely to favor one or the other.

Cognitive attractors within inferential cultural transmission thus maintain a degree of stability over time for a representation, amidst real and potential representational variation. Though novelty and change may be introduced to a representation through processes like communication errors or individual creativity (e.g. an individual promoting an intermediate moon belief), through “generations” of transmission content biases regularly bring those back towards attractor positions. The working of cognitive attractors are best seen across populations, where most peoples' representations cluster around these attractor positions, though individuals may have representations across the board (the moon-as-cheese camp, for instance).

In regard to the current topic, various evolutionary and creationist representations can be seen as cognitive attractors. For instance, species as essentialistic, fixed kinds is one attractor, species as mutable abstractions is another. Life as developing by purposeful design is one attractor, life as developing by physical laws another, and life as developing randomly by chance yet a third. Relatedly, we might suspect that the former teleological representation better "fits" with an ecology of beliefs including a god, whereas the latter two better accord with beliefs without a god.

Along with the attraction processes of inferential transmission is selective attention, that of the context-based learning biases discussed above. Our tendency "to pay particular attention to some individuals more than others" (2008: 122) effects also which representations are more and less likely to be transmitted. For example, if prestigious individuals tend to hold one belief, and that belief may spread (or would spread, all else being equal) via prestige bias, and then in turn if a majority believe it as well, conformist bias would also work in its favor. Conformist transmission, they note, can also "correct for" high errors in transmission (2008: 125). That is, even if representations tend to vary often during transmission and acquisition, as long as a majority holds a particular representation, stability ensues. Thus again, unlike with genetic evolution, "high fidelity" (e.g. reliable discrete transmission) is not necessary for cultural evolution.

Fitness and Prediction. It is though difficult to say in all cases how these different transmission factors compare, and to predict cultural change. There are many variables involved. For instance, for some representation there may largely be two cognitive attractors; for another three, four, or so on. (The complexity of a representation may correlate with the number of attractors it exhibits.) Cognitive attractors can also vary in their strength and weakness, that is, in inferential transformation some representations may easily and quickly fall back in line with some attractor position; others, more gradually and piecemeal. Context-based selective learning may balance this out; where attraction is weak, selective transmission may play a greater role than where it is strong (e.g. prestigious individuals may function more in spreading weakly cognitively attractive representations than strong ones, for which prestige has less influence, and representations transmit regardless of prestige).

Henrich, Boyd, and Richerson note that “In many cases, however, it is difficult to predict which representations will spread because we do not understand much about the underlying psychological and ecological processes” (2008: 129). This is unlike the evaluation of “fitness” in biology, where biologists “have *independent* means of predicting which genetic variants are more fit” (2008: 128). Knowing that New Guinean's have a preference for calories produced from farming, for instance, may explain their adopting the higher yielding sweet potato, when introduced, over the traditional yam. But when it comes to literary devices, musical forms, and religious beliefs, their “fitness” and transmission potential are harder to specify or predict. The authors claim that

> These questions are not unanswerable in principle... We believe that constructing a full-fledged theory of cultural evolution requires considering a longish list of psychological, social, and ecological processes that interact to create the differential 'fitness' of cultural variants. (2008: 129)

Novelty. In biology, evolution occurs by natural selection working on traits, but change is ultimately introduced by the novelty created by seemingly random variations and genetic mutations. What, if any, is the analogue for cultural evolution? How do new cultural variants arise?

Mutations, as in transmission errors in communication, are indeed one possibility. Perhaps you said to me, "the moon is a large rock," but what I heard was "the moon is a large sock." I now represent the moon as a rather large, filthy balled-up sock, and communicate this to others. Perhaps, due to other natural and acquired intuitions and beliefs people hold, this new moon-as-sock belief is "easy to think," cognitively "fits" with others, and has utility and inferential potential, and in turn spreads. It would help if I was successful in the relevant areas and prestigious to boot. If none of these obtain though, it is most likely that this representation will die when I do (if not sooner!).

We can also make a role for individual creative agency, through trial-and-error problem solving for instance. However, the authors caution against, for instance, the "Myth of the Heroic Inventor," on a par with the "Great Man" view of history, where, quoting Pinker, "some person knuckles down, racks his brain, musters his ingenuity, and composes or writes or paints or invents something" (Henrich, Boyd, and Richerson, 2008: 130). Citing other historiography, they note the importance of recognizing "(1) the central importance...of luck, happenstance, and recombination, and (2) that most great inventors actually make only incremental additions to the existing or emerging capacities or understandings of their times."

In a response-of-sorts to Henrich, Boyd, and Richerson (2008), Liane Gabora cautions against of opposite, of ignoring individual creativity and emphasizing instead, alone, biased and imitative social learning. Gabora claims that, "Indeed, creative individuals are the least socially tethered at all, with strong leanings toward isolation, noncomformity, rebelliousness, and unconventionality" (2011: 72). This cultural aloofness may be apt, as such personality traits are fairly well tied to genes—individuals less cognitively disposed to imitate and selectively learn may instead, presumably, be more likely to create and problem-solve themselves, or simply to go *against* social currents. Furthermore, Gabora has proposed "that what is unique to the human species, and what enabled human culture to become an evolutionary process, was onset of not the ability to imitate or influence others but the capacity to take an idea and reframe it in our own terms, to put our own spin on it." In some respects then this creativity plays the analogous role of random variation or mutation in biological natural selection, by introducing novelty—new genes or new cultural variants—into evolutionary processes. However, Gabora is at pains to argue that in the human case, the novelty is not random (and the process not Darwinian): "With respect to culture, not only is there no mechanism for cultural inheritance, but the creative processes that fuel cultural change are goal-driven, intuitive, strategic and forward-thinking, i.e., far from random" (2011: 76). This may be so, though it is important not to place these mechanisms outside or beyond natural processes. That is, goal-driven creative thought must still have a causally natural explanation.[12]

Gabora also critiques the model, or metaphor of, Darwinian natural selection espoused by theorists like Henrich, Boyd, and Richerson. In Darwinian evolution, inheritance is vertical, with one generation passing on traits to the next. However, this is not the case for cultural evolution, where instead individuals do not "inherit" cultural

12 That is, Gabora comes close to reasoning rather teleologically here, almost suggesting cultural change proceeds by "final cause."

variants, so to speak, rather, they "acquire" them (though Gabora does not say so, this is more analogous to a Lamarkian process.) Unlike the genes we inherit, acquired cultural traits are not fixed within an individuals life. As such, cultural transmission is more a horizontal and dynamic process, a lateral transfer or "communal exchange," more akin to the gene-exchanging engaged in by bacteria, or the likely original development of life prior to the origination of a self-assembling genetic code (which eventually pushed evolutionary processes over the "Darwinian threshold"; 2011: 78). Being able to acquire multiple cultural variants over the course of one's life (analogous to being able to exchange our genes) greatly expands the scope and speed of cultural evolution.[13]

Cultural Competition. The focus thus far has largely been on individuals acquiring and transmitting culture. However, this transmission can also occur within, or rather between, groups. As cultural variants differentially spread within groups, with some traits thereby enjoying a kind of success, so too cultural groups of people may obtain success and differential survival over one another, and thereby their cultural traits succeed as well. Henrich writes that "The process of competition among social groups locked in at different stable states is a kind of Cultural Group Selection (CGS)" (2009: 253). While the idea of group selection has faced many challenges within biological evolution, Henrich makes a strong case for its role in cultural evolution. Whereas the idea behind traditional "group selection" was that groups of (genetically-like) individuals can out-compete other groups, in Henrich's cultural group selection, the emphasis is more on (a) culture, and the benefits it can transmit to a group (of potentially genetically

13 Gabora also notes this process was/is more cooperative than competitive. "In other words, the assemblage of human worldviews [e.g. culture] changes over time not because some replicate at the expense of others, as in natural selection, but because of ongoing mutual interaction and modification. ...human society is more cooperative than either expected utility or natural selection on genetic variation would predict" (2011: 79).

diverse individuals), a culture which can spread and attract or be assimilated by many people and groups.

Culture, in a general sense, functions as a storehouse of information individuals can draw on from (and within) one generation to the next. But the specifics of culture matter too, as they can provide direct benefits to their social groups. Genetically similar groups, living in similar environments, have historically competed with one another and at times some groups were the more successful. Crucial differences can be found in their cultures, rather than in their genes or environment, as some theorists would argue. Richerson and Boyd cite the Nuer conquest of Dinka lands as an example (2005: 23-27), noting how certain differences of agricultural, marriage, and military practices and political structures gave the Nuer a comparative advantage (and where many "tens of thousands" of Dinka who remained in conquered lands in turn adopted Nuer customs).

Culture can also benefit groups more indirectly as well, particularly by strengthening group identity and loyalty, cohesion, and cooperation. Culture provides numerous materials for making ingroup/outgroup distinctions: language, clothing, bodily decorations, and shared customs and practices. The latter may work more in a second-order fashion, for instance by "elevat[ing] and stabiliz[ing] a strong commitment to a group ideology...that itself favors other group-beneficial contributions related to cooperation in war, self-sacrifice, bravery, etc." (Henrich, 2009: 253). Cultural practices, like costly CREDs and religious rituals, may increase group cooperation and cohesion, and these groups, better working together, could be more successful over and against groups that were not.

There are a few ways by which this Cultural Group Selection can happen. One is simply out-competition, as through war or expansion,

> when social groups—due to superior institutions for cooperation that create technological, military, or economic advantages—drive out, eliminate or assimilate groups at alternative equilibria... [where] "Institutions" here refers to the integrated sets of beliefs, values, and practices that organize social interaction in groups. (Henrich, 2009: 253)

In other words, the essence of this first process is a decrease in the numbers of other cultural groups. (It is the manner of the Nuer expansion in the example above.) For the second manner, demographically, the method is increase of group numbers, where one cultural group produces more "culture bearers," more offspring who remain committed to the cultures (so grandchildren are really the essential marker), or where cultural groups attract more emigrants, also increasing the size of the culture and number of culture bearers. A third manner of Cultural Group Selection Henrich refers to as preferential assimilation, where people from some cultures "preferentially imitate [assimilate] the beliefs and practices of people from groups at more group-beneficial equilibrium because they show higher payoffs" (2009: 253).

> This can cause sets of ideas, beliefs, and practices to differentially spread from more successful groups to less successful groups. This can describe how institutions spread from one social group to another, or how institutions compete for membership within a social group.

If the second method consisted of "importing" culture bearers, this third method may consist if "exporting" culture. Henrich suggests that this third manner is "perhaps the most subtle and important."

Rituals and Costly Displays. Henrich also devotes attention to the group-beneficial role of rituals. "Groups with rituals that more effectively transmit commitment to group-beneficial (self-sacrificial) beliefs will—*ceteris paribus*—outcompete groups with less effective ritual-belief combinations, causing these belief-ritual complexes to spread by the various forms of CGS discussed above" (2009: 254). He notes that other research "affirms this link between ritual participation and commitment for both in-group cooperation and out-group aggression" (2009: 255).

Effective rituals, Henrich predicts, would make use of, or exploit, those mechanisms of cultural learning and transmission discussed above: (1) prestige-bias transmission, (2) conformist transmission, (3) folk ethnicity, (4) mimicry, and (5) CREDs (Henrich, 2009: 254). Expanding on these five factors, he then describes how rituals may (1) "put key lessons or statements of beliefs in the mouths of the older, more prestigious and more successful members of the community," (2) involve "group professions of belief" to cue conformity, (3) "make use of costly-to-acquire symbolic markers that distinguish community members from other groups," (4) use "music, rhythm, and synchrony to elevate solidarity" through mimicry, and (5) "showcase practices that only deeply committed believers would engage in" (costly CREDs).

Henrich argues that because religious beliefs "involve commitments to counterintuitive agents," which "cannot be easily falsified by real-world events or experiences," costly acts will be more important than would be necessary for non-religious secular beliefs or ideologies (2009: 254). Costly acts and CREDs can "ratchet up" religious commitment. Reflecting on the mechanism of a ratchet, we see how small, incremental acts serve to lock in a belief, practice, or institution; ritual activity and other costly displays can scaffold and buttress belief. With religious belief well established, Henrich argues it has the potential to be more cooperation-galvanizing than secular ideologies, with the ability of supernatural agents to police and motivate members (a Durkheimian position similar to that of Haidt's on religion).

Summary

Throughout this discussion of the research, theories, and models provided by Henrich, Richerson, Boyd, and others, on the mechanisms of cultural learning, cultural transmission, and cultural competition and evolution, I have maintained an eye towards understanding and explaining evolutionary beliefs and disbeliefs, and commitments to religious alternatives. The above work now provides a toolkit for doing so, and we can now consider the role of cultural learning mechanisms—the different roles of representational content and cultural context—for explaining patterns of cultural transmission and evolution, namely the "cultures" or cultural variants of the different explanations for the origins and development of life.

Part II: Applications to Evolutionary Dis/belief

Evolutionary and creationist dis/belief are not ideas that individuals encounter in isolation, nor spontaneously and intuitively believe, but are rather represented and communicated by and within social groups and cultural contexts. They are not simply or merely emergent from maturationally natural intuition, but are complexes of representational commitments in conceptual ecologies and cultural contexts, and are culturally supported (or inhibited), culturally transmitted, and culturally acquired. With a richer, well specified understanding of the cognitively-based processes of cultural learning and transmission, we are now well poised to approach the richest understanding and fullest account of the nature and scope of Darwin's doubted idea.

The areas or elements of the above discussion and framework that I select as most salient, and will consider section-by-section, are content-biased transmission; conformist transmission; prestige-biased transmission; CREDs; and cultural group selection (through cultural competition). These culminate in a consideration of the cultural "evolution" of evolution—the differential cultural success of evolutionary and anti-evolutionary thinking.

Representational Content

Recall that, as developed above, content biases refer to the selective transmission bias, the attraction, of cultural variants like ideas and beliefs on the basis of the representations involved or of which they are composed (e.g. "moon as rock," "moon as person"). Insofar as public, cultural representations accord or "fit" *both* with "maturationally natural" (McCauley, 2011), predispositional, intuitive cognition, *or* with "practiced natural," acquired representations (beliefs, values, practices, which through learning and acquisition can also seem natural and become intuitive), which together make for the conceptual ecology in which representations may or may not enjoy "cognitive fit," such representations may enjoy (probabilistically) an acquisition and transmission bias in their favor.

This, then, is a fitting time to summarize and assimilate the findings of the previous chapters. This is, in ways, a conclusion to the "strong intuitionism," and a foundation for a cognitively based model of cultural transmission, expanding upon the "constructive interactionism" introduced by E. M. Evans (2001) earlier. I will proceed by identifying the potential areas of bias, and discussing in what manner maturationally natural cognition and acquired cultural information serve to constrain and canalize evolutionary belief.

Species as natural kinds with fixed essences. Research suggests there is a maturationally natural bias in favor of representing species as "fixed" kinds with particular "essences." Universal cultural indexical and linguistic practices reflect, elaborate, and reify this folk-biological intuitive predilection. When it comes to representing the origins and development of species, these natural and acquired intuitions bias individuals towards some explanations over others, and probabilistically constrain and canalize the beliefs and attitudes that emerge or are required. Namely, maturationally natural intuitions bias us *against* Darwinian evolutionary models which describe species as changing and as variable abstractions, without fixed essences. This constraint may direct people towards rejecting Darwinian explanations, or may canalize them into theistic, Larmarkian, or even "punctualist" (as proposed, for instance, by Gould and Eldridge) mis-/understandings of biological species and evolutionary processes. This constraint appears quite potent, as even students of evolution commonly misinterpret concepts of species and of evolutionary processes in essentialist manners, even when explicitly instructed otherwise. It also suggests how "macroevolution" can be deemed acceptable while "microevolution" may not.

Particular cultural representations, explanations, or teachings are very often involved as well, explicit beliefs which may become "practiced natural," fitting into our conceptual ecology and serving to constrain and canalize species beliefs. The biblical creation account in the book of Genesis is one such historically important, influential cultural teaching, as it (under many interpretations) also exhibits and in turn supports species essentialism. An anti-evolutionary account like young-earth Creationism, or a theistic evolution, may appeal to the cultural learner because of its alignment with these natural and acquired biases and beliefs.

In contrast, cultural concepts and explanations that favor Darwinian models are (probably because the are counterintuitive and cognitively unnatural) arguably less common, less appealing, readily misunderstood and misinterpreted, and harder to think, because enjoying less "cognitive fit" with our maturationally natural representational ecology. It takes explicit instruction and explicit (B-system) thought to think like a Darwinian and represent species as variable, non-essentialist abstractions. Moreover, when we can and do represent species in this fashion, such explicit concepts may nonetheless exist *in tension* with our maturationally natural intuitions.

Species, life, and the natural world, as teleological, possessing ends or purposes. It seems we have a bias or predilection towards "teleological reasoning," a "function compunction" which commonly manifests as a "Promiscuous Teleology," when not explicitly educated to reflectively believe otherwise. Not only do we readily represent human actions, artifacts, and biological parts or organs as possessing purposes or intrinsic ends or functions, but so too with respect to whole biological organisms and species, and natural objects and substances. (Note that I here distinguish this from the teleological conception of species or life as purposefully and intentionally *designed or created* by an agent—a subtle but notable distinction, which I discuss below. This is the Aristotelian, but not necessarily the Platonic, position). Cultural indexical and linguistic practices do not unequivocally reflect and reify this (recall the mothers' explicit explanations given to their childrens' questions), though many implicitly do (as when we understand a species to exist in order to fill an ecological niche). This tendency of reasoning and representation is witnessed most clearly in the implicit understanding and reasoning of young children, and because it surfaces in elderly Alzheimer's patients, and is also noticeable in adults who have, namely, not received explicit scientific instruction, it seems this is a natural “default” of reasoning. Species-as-teleological also fits with species-as-essential (for a specie's, or kind's, end can be represented as part of its essence).

In contrast to this “Aristotelian” explanation of species as existing for, or because of, some “final cause” endowing them with intrinsic purpose, Darwinian evolution is a more “Lucretian” process, where species develop in the manner they do, in essence, because of useful, beneficial traits that happen to arise.[14] It is a nomological process driven by physical properties and biological-environmental conditions, not by goals, purposes, end-states, final causes, and so on. Hence, we seem maturationally, naturally biased against such evolutionary explanations, and may instead favor and be apt to commit to those accounts which represent species as possessing purposes towards, or because of, some end. Once again, creationist, theistic, and Lamarkian accounts tend to meet and appeal to these biases.

Particular cultural representations, as above, may also be acquired and incorporated into our conceptual ecology, which in turn biases our reasoning and belief formation. Again, religious narratives are salient, as for instance the biblical depiction of creatures as being (created) “for” humans, or for a specific purpose like eating or sacrifice. While explicit cultural accounts like that appeal to and in turn favor a teleological bias, Darwinian explanations face the cognitive uphill. Level of education,

14 Notably however, there is scientific discussion regarding the proper conception of function, purpose, and design—in essence, teleology—in evolutionary explanations (Allen, Bekoff, and Lauder, 1998), and many do not rule out teleology in explanation wholesale.

in particular scientific, seems to correlate with "selective" (as opposed to "promiscuous") teleology, suggesting explicit instruction and reflective thought is needed to think in a non-teleological, Lucretian fashion. This, in fact, points to the relevance of cultural learning. However, as the Alzheimer's study, and studies of evolutionary reasoning among biology and medical students, indicate, these acquired beliefs exist alongside and in tension with other intuitive and acquired beliefs, but do not supplant them.

Species, life, and the natural world, as teleological, because designed or created by an agency for purposes. In chapter 3, a distinction between Platonic and Aristotelian teleology was noted, as only the former required or understood purpose and function as requiring an "intelligent agency" for its "design." This distinction was maintained both on the intuitive level and in respect to evolutionary dis/belief. It was not so clear that understanding teleological things, like species, as designed by an agency was a maturationally natural intuitive bias, though it may be a ready tendency of reasoning on the basis of a "source analogy" with human actions and artifacts.

Clearly, however, cultural accounts and teachings of agency and design readily contribute towards this type of teleological representation and reasoning, as seen for instance in Evans (2001) study of origins beliefs, where God as creator of species, life, and the natural world is readily appropriated by children, especially of Fundamentalist parents, to explain the origin of species. Because even young Fundamentalists are almost identical to their parents on levels of explicit creationist beliefs, while young children of evolutionist parents are not, it might be supposed that some maturationally natural bias exists in favor of creationism and against Darwinian evolution (however, context biases, below, help explain these difference too).

Certainly, however, acquired content from many religious narratives provide bias for and cognitive fit with "design." Creationist accounts (such as "young-earth" or "Intelligent Design"), classic and revised forms of "the argument from design," and elements of Larmarkism all fit with such teleological-design representations. Darwinian accounts, on the other hand, represent species, as above, as causally arising from natural, non-intentional processes—an explanation which is contrary to common religious and cultural narratives, and in addition perhaps to a predilection of analogical reasoning.

Species or life as caused versus random. Note that *both* anti-evolutionary creationist, *and* contemporary canonical evolutionary accounts represent a non-random process. Though scientists, in principle, recognize that mutations have a natural, mechanistic causal basis, and occur with predictable frequency, this often is not realized by the wider population, where Darwinian naturalistic evolution is commonly represented (portrayed or understood) as being a random or randomly-driven process. Related to the research on teleology above, we seem through maturation naturally biased *against* explanations of randomness (non-explanations), and tend instead towards causal explanations. Insofar as Darwinian evolution is understood to be random or involve chance (which many critiques explicitly state), we may then be biased against this explanation and instead find more appealing alternative causal accounts, whether that be, once again, creationist, theistic, Larmarkian, or vitalistic explanations of origins. Evolutionary belief requires explicit understanding that Darwinian evolution is still a causal, though natural (non-intentional) process.

Darwinian evolution as evidentially and epistemically (e.g. logically) strong or weak. The same maturationally natural predilection towards evidence and causal explanations that in part undergird science and evolutionary theory also work against it, as the evidence and reasoning for Darwinian evolution can also be difficult to understand, as are the many cognitively "unnatural" products and processes of science. Simpler, more cognitively natural explanations for the origins of species may thus be more appealing, with better cognitive fit.

However, culturally, persons and social groups publicly represent explanations as more or less evidentially sound, logically valid, and epistemically responsible. Anti-evolutionists who claim evolution is poor science, and alternatively that some form of creationism or the like is conversely evidentially and logically strong, appeal to these natural epistemic biases. Evolutionists do as well, but because evolutionary theories are more cognitively difficult, their appeals may not have the same degree cognitive attraction or force. Each requires cultural learners to have been trained in epistemic practices, regarding for instance what counts as evidence or knowledge (e.g. observation, logic, revelation, faith, intuition), but because of the cognitive difficulty of science and evolutionary theory, Darwinian evolution may once again lack natural cognition on its side.

We also exhibit a bias for accepting evidence in favor of beliefs we already hold, our "confirmation bias," and spontaneously rejecting evidence against. Indeed, it is the explicit training of the scientist (and philosopher, scholar, academic, etc.) to be mindful of this bias, and engage in social efforts to curb its effects. However, among the non-specialist population, we might then be biased to continue to accept whatever explanation for life we intuitively or reflectively believe. Due to the maturational biases above, and the cultural explanations commonly learned by many growing up in our cultures, we are likely in this sense be biased against Darwinian evolution, simply as a "new" theory.

Moral evaluations towards Darwinian evolution. Maturationally natural moral intuitions function as bases and biases for moral judgments. However, the representational *content* upon which moral intuitions operate seems to be, in large part, explicit and culturally acquired (rather than being maturationally natural intuitions). As discussed in chapter 4, a number of religious and cultural representations of evolution, through their specific content, elicit negative moral judgments towards evolution, on the matter of human ancestry, religious or scriptural compatibility, or social and moral effects and implications. Any such judgments that culture inspires, building upon cognitive moral foundations, would bias one against commitment to Darwinian evolution (on moral and/or epistemic grounds).

At the same time, religious historical narratives, representations of creation, species, or human nature, and systematic morals may elicit positive moral judgments (through culture), and fit with the other anti-evolutionary biases and content discussed above. In contrast, representations of evolution as possessing morally positive content (e.g. as by Dawkins) are, in the data, less convincing or perhaps less natural (and are thus not often transmitted or acquired). This could testify to the effect of current cultural representational or evaluative ecologies, biasing against novel understandings of evolution.

General relevance of Darwinian representations. In their discussion of content biases regarding counterintuitive religious representations, Gervais et. al. (2011: 393) note that "cultural learners should be more likely to pay attention to, store and transmit representations when these are judged more: (1) potentially actionable; (2) fitness relevant and thus emotionally evocative; and (3) plausible or compatible." As regards religious concepts, the argument is that god-concepts, for instance, that fit with our other beliefs, that lead to new and productive inferences upon which we can act, and that are beneficial in some fashion and "emotionally evocative," are those most likely to be acquired and transmitted. That is, alongside any maturational bias towards specific content, we learners may be biased towards these general features and the overall utility of that content.

As this pertains to evolutionary explanations, characteristic (3), regarding plausibility and compatibility, is essentially to what each topic above was addressed, as plausibility and compatibility largely hinge on the "cognitive fit" with maturationally natural intuitions and our conceptual ecologies. Moral concerns over evolution, however, perhaps best illustrate characteristics (1) and (2), as cultural learners reflect on the implicated "actionability" or "fitness relevance" of Darwinian evolution—often judged in the negative. More generally, however, we might presume that those biases of cognition that we do have bias us towards that which is more actionable, relevant, and emotionally evocative (if these biases were evolved, it was because they were adaptive for the humans who possessed them, directing them towards adaptive beliefs and judgments). Alternatives to Darwinism might then be judged to better meet these criteria—Creationism, for instance, may be more actionable, fitness relevant, emotionally evocative, and plausible, as regards its teleological agency. Darwinian evolution, whether plausible or not, may simply seem less relevant for our everyday lives. Species as fixed and essentialistic, and as purposive and goal-oriented, may be more inferentially fruitful and utile than the evolutionary concepts. Indeed, proponents of evolution, as in the National Academy of Sciences and Institute of Medicine (2008) handbook, *Science, Evolution, and Creationism,* often make explicit appeal to the utility of evolution (as for instance in advances in agriculture and medicine). However, if people desire actionability and relevance for, perhaps, spirituality, meaning, and morals, then Darwinism might here come up short.[15]

This survey of the conclusions made thus far, in reference to the role of both maturationally natural and culturally acquired representational content-biases, serving as cognitive attractors or stemming from conceptual ecologies, pushes intuitionism to its limits. In each case we see both room for cultural particularities in shaping cognition, effecting belief and judgment, and for selective learning and acquisition on the basis of context and sources rather than content alone or primarily. However, the actual processes of cultural transmission and cultural evolution are more complex, and so too the explanation for the varied and differential patterns of response to Darwin's doubted idea. So to these I next turn.

Conformity

When Darwin and Wallace introduced their theory of evolution, the majority view, popularly and scientifically, was largely creationist, in a general sense. The theory of organic evolution by natural means faced an uphill battle against conformity;

15 This may explain why meliorative interpretations of God and nature seldom "catch on." For instance, the "omphalos" hypothesis, of the 1857 book by Philip Henry Gosse, held that God had created the world functional, and this included the appearance of age, or Adam's having a navel (despite not having been born). Thus nothing could count as evidence as an old earth, and everything, every appearance on an alternative explanation, in fact has some purpose by God. However, when "God just did it," everything is explained—but when everything is explained, perhaps nothing is. "God did it" lacks inferential potential and actionability.

conversely, non-evolutionary, creationist explanations could more easily, through conformist bias, maintain stability.[16] However, in the early part of the nineteenth century, in the decades prior to the publication of evolutionary theory, science was more and more becoming a specialized pursuit with an institutional structure—more and more a bounded culture unto itself, its own social group. For various reasons, evolutionary theory (though not utterly Darwinian) attained acceptance (a 15 to 20 year process), becoming orthodoxy amongst this scientific culture (itself a subculture of the wider European intellectual culture). Interestingly, this would not be due completely to a demographic shift, as in new, younger scientists replacing older, established ones; there had to have been "horizontal" transmission of evolutionary beliefs as well, and this requires more than conformity bias at work. However, once well accepted, other and incoming scientists, entering scientific culture, to some extent would be biased to more readily accept evolution.[17]

The cultural segregation, to some extent, left "the rest" of society and culture; while these two social groups were certainly connected and communicative, there were degrees of separation. If, in contrast to specializing scientists, this non-science culture was less dominated by or accepting of evolutionary theory, and remained more non-evolutionist or creationist, then conformism would perpetuate these non-evolutionary

16 Interestingly, Pinker (2003) has pointed to data noting that scientists who were youngest children in birth order (rather than oldest, first-born) were more likely to adopt or accept evolution—that is, individuals whose personalities tend to be more non-conformist generally. Such illustrates how individual differences—and biology—allow for some divergence from population-level continuity.

17 Writers within the sociology of knowledge or philosophy of science have pointed to these social aspects of science in explaining its character and history (sometimes derogatorily or to cast skepticism upon the products or practices of science), and scientists have sometimes fought against this (championing instead a truth-powered, pursuit of pure knowledge type of view). While social factors like conformity, pride, and competition have at times held back scientific progress, they have also enabled science to operate and progress; the social cuts both ways, and is a necessary element of all human activity, intellectual or otherwise.

views among non-scientists. The more bounded a culture, potentially, the more conformity bias can maintain stability. What would allow permeation of the general culture with scientific and evolutionary beliefs might be seeing science and scientists as prestigious, or by having non-scientific prestigious or successful individuals accepting of evolution, or seeing scientific explanations as useful and valuable.

Conformism might also contribute to trends in evolutionary dis/belief among religious (cultural) groups. While we can surely point to the public beliefs of Christian groups like Unitarians, Presbyterians, Roman Catholics, or Fundamentalists, high-frequency opinions regarding Darwinism could maintain stability on the basis of conformism. The more an evolutionary belief was considered part of the group identity, as it seems to have become for many Fundamentalists, the more conformity might work as well. Relatedly, the more insular a group, and limiting of belief exposure, the more a cultural learner is likely to conform.

We can also look to conformist processes to explain national differences in evolutionary belief, as in the Miller, et. al. (2006) study and survey. In countries, like Iceland and Denmark, where a majority accepts evolutionary statements as true, cultural learners therein would be biased towards conforming and thus also becoming evolutionary believers. In contrast, countries like Turkey and the U.S. where only a minority is evolutionist, or where this is not a majority belief, this bias would not work in evolution's favor (and may instead work for another majority view, if such exists). Other factors surely are involved in national differences, but, to the extent that nations represent cultures for cultural learners, conformity surely plays some role.

It has been noted that for instance the media coverage of evolution and creationism tends to portray these as the two alternatives, as (the only) opposing views on biological origins and development. This polarization may effect and structure the perceptions of cultural learners, more strongly pushing them into one category of acceptance or another, reducing the space for middle ground and minimizing positions in between. That is, perhaps in addition to any natural "cognitive attractors" or cognitive "basins of attraction" that exist, the media creates virtual or artificial majorities. For example, suppose, at one level of distinction, individuals are split three ways on evolution: they either oppose any sort of evolution, they accept an intentionally guided evolution, or they accept a naturalistic evolution. If the media portrays the options as only two, naturalistic evolution or no evolution, then potential learners of the guided-evolution may be pushed instead towards the extreme positions. Where the majority falls into the "no evolution" category, then cultural learners could be biased against both naturalistic evolution and indeed any sort of evolution (such as guided, theistic evolution).

Prestige

Particular sources and models certainly effect evolutionary dis/belief alongside frequency. Darwin, for instance, was well respected amongst the scientific community. To many, he epitomized the scientist and the gentleman—intellectually careful and detailed, charitable, humble, not brash and opinionated (quite unlike his "bulldog," T. H. Huxley). This prestige deferred upon Darwin, along with the merits of his account, likely helped usher evolution into scientific acceptance where others like Lamark or Chambers had fallen short.

One might ask, however, prestigious for whom? It was members of scientific society, and other public sympathizers and respecters of science, that would see prominent scientists like Darwin as prestigious and be biased to acquire their ideas and beliefs. While Darwin was held in prestige by many scientists, many then and now demonize the naturalist and evolutionist. Among scientists more broadly, age, research, lists of publications, years of tenure and the like provide some objective measures of scientific success, but do not unequivocally translate into prestige. "Prestige" itself is seems still a somewhat elusive category.

Just as prestige may have helped evolutionary belief along, so too evolutionary disbelief. The strongest example of a prestigious figure effecting anti-evolutionary belief might come with William Jennings Bryan. The history suggests that the public beliefs against evolution of this popular and respected figure motivated many others to commit to both his position and his cause, acting in a like manner. Other leaders like William Bell Riley and Billy Sunday would similarly help transmit anti-evolutionary beliefs during their "crusade," to those who found them prestigious and of like mind. Arguably, the Scopes Trial and its media portrayal undid the prestige previously had by many Fundamentalists, particularly of northern churches and denominations. This in part may be responsible for the recession and insulation of Fundamentalism, and with it its antievolutionism.

There may be a sense in which "science" or "religion" themselves are seen as prestigious persons, esteemed and respected—or not. This is Miller's (2008) observation in the anecdote about his British colleague. Abroad, opines his friend, the professional status of some "Oxford dons" would be enough the settle the matter of evolution versus creationism, presumably because scholars and scientists there enjoyed a higher level of prestige and authority. Americans, on the other hand, contends Miller, give less respect to the work of science and more to individual authority. Science is perhaps mostly respected for its technological fruits, for which evolutionary theory does not provide clear examples or relevance in the minds of many. However, it is notable that creationists and creationist organizations give much effort towards publicizing their scientific and academic credentials—despite the fact that they are seldom from the biological sciences.

While much American religiosity does indeed respect the individual, there are nods to figures of authority, as to the preacher who helps guide in the study of the bible, or Jesus as God and teacher, or the Bible as authoritative Word of God. Indeed, just as was noted in chapter 4, how the Bible becomes almost personified, so too it may be represented as a prestigious source model, as the stand-in perhaps for direct or "preferred access" to God. Indeed, perhaps the success of some anti-evolutionism is in representing the God or the Word as denouncing naturalistic evolution. On the matter of evolutionary belief, the popular moral decision-making concept of WWJD—"What Would Jesus Do?"—might then figure as WWJB: "What Would Jesus Believe?"[18]

Credibility-Enhancing Displays

Observers and cultural learners, endowed with some degree of epistemic vigilance, must assess people's avowed evolutionary dis/beliefs; the behaviors of their source models influence the learner's acquisition and the transmission of representations.

18 Unbeknownst to me, this had been done! After first writing this (tongue-in-cheek) suggestion, a quick google search revealed a CNN blog piece, "Jesus would believe in evolution and so should you," to which a YouTube video and other written responses were indeed titled "What Would Jesus Believe?" So, as far as Google is concerned (a prestigious search engine to which I defer), the foremost question about "What Jesus Would Believe" does indeed regard evolution!

Here there is a role for Henrich's (2009) “Credibility-Enhancing Displays” of commitment.

Any avowal of belief is a display of commitment (to some degree), but not every such display is credibility-enhancing—not every public belief is believable. Recall that statements of belief which accord with a speaker's self-interest were not (as) credibility enhancing as compared to statements that went against his or her self-interest. Thinking of the scientist who speaks or writes in support of evolution, then, we can recognize a biased disadvantage—the truth and the utility of a scientific explanation are in the self-interest of the scientist; these are their business (Dawkins is a prominent example). Conversely, the rare scientist who speaks or writes against evolutionary theory (or some aspect of it) *may* be seen by non-scientists as enhancing credibility for their belief, “martyr” that he or she is, going against established science and the safety and comfort it provides.

People may also recognize that science is, in large part, a publicly (and privately) funded institution, where the work and success of scientists (for the data, theories, and technologies they produce) may not be directly tied to their funding and support. The supported (and tenured) scientist may be perceived as having nothing at stake in evolutionary theory. That is, they may be seen as having “nothing to lose.”

As for public anti-evolutionists, they are often both seen as, and portray themselves as, speaking against mainstream culture, against the dogmatism and authority of science and secular society, standing up to these epistemic oppressors in the name of truth (or Truth, natural and spiritual), ridiculed by the media; here is the martyr motif. Anti-evolutionists, whether leaders of creationists organizations or churches, or the lay parent of a school child or students themselves, are the brave souls making a stand. Cultural learners who share enough views in common to see these as costly commitments may then themselves be further encouraged to acquire similar beliefs.[19]

More middle positions, for instance of theistic evolution in liberal Christianity, like pro-evolutionist scientists, may lack this CREDs advantage, as, again, these views may be seen as mainstream and established. Fundamentalists and anti-evolutionists further portray evolutionist, liberal Christians as weak in faith, making theological concessions, sacrificing orthodoxy under mainstream cultural pressure. As this may be seen as "easy," less rigorous faith, it may be akin to perceptions of self-interest.

In a general sense, might some kinds of believers be more or less likely simply to provide displays of commitment, regardless of degree of credibility-enhancement? Recall Evan's (2001) findings regarding Fundamentalists' creationist beliefs. The high levels throughout age groups might suggest that Fundamentalist parents and teachers better transmit creationist, and possibly anti-evolutionary, belief; this may be due to more displays of commitment. As an issue of importance and potentially of religious and cultural identity (see also the following section), antievolutionism and creationism may be strongly avowed and displayed for groups like Fundamentalists, and cultural learners will witness these shows of commitment, which would encourage developing those beliefs for themselves. If however in non-antievolutionist cultural groups, who are in principle evolutionist, few explicit displays of commitment to naturalistic evolution are made, then the cultural learner might only weakly believe in (because having weak

19 If cultural learners can still acquire what they recognize as a minority opinion, does this speak against conformity bias? One possibility may be that CREDs and prestige are more potent than conformity; another is that learners may recognize themselves as part of a subculture, where the seeming majority is part of an "other" culture.

reasons for or being weakly biased towards) naturalistic evolution. In addition to the content of beliefs, level of belief—as commitment to a representation—comes in degrees, and CREDs are a prominent factor effecting this degree.

Antievolutionists, then, may obtain some advantage over evolutionists insofar as their ability to produce credibility-enhancing displays of commitment, that bolsters the cultural transmission of their evolutionary disbelief.

Cultural Identity and Cultural Group Selection

It was noted that culture (beliefs and values, behaviors and practices) provides a basis for group identity and cohesion (whether self-identity or identification by an outsider). It is plausible that anti-/evolutionary beliefs are more or less part of that core culture that provides or demarcates identity and cohesion. Patterns of beliefs about biological and species' origins may occur alongside other patterns of beliefs, making for "culture complexes" which may form the "essence" of a culture's or group's identity—young-earth creationist Fundamentalism for instance, the Intelligent Design Movement, or the evolutionist New Atheism of Richard Dawkins, Sam Harris, and similar. Based on cognitive fit, representational similarity, and cultural histories, patterns of origins beliefs may tend to occur alongside other patterns of beliefs (for instance patterns of religious beliefs), making for identifiable broad patterns or types of culture. This could be especially interesting if such patterns of belief allow prediction of other patterns of belief, value, and action (which might also suggest that anti-/evolutionary beliefs are indeed "potentially actionable," relevant and causal in real-world living).

While individual cultural learners do not adopt the entirety of the culture of their (primary) group, it is likely that they do acquire a large part of it, perhaps more so when recognizing their culture as "a" culture and as part of their identity. Thus anti-/evolutionary beliefs may be transmitted in a general fashion through the transmission of a culture, in addition to specifically (as a specific item of cultural information) through model-based selective learning, as when learners imitate many beliefs, values, and behaviors of prestigious individuals. Anti-/evolutionary beliefs that are part of more identifiable and bounded (sub)cultures, as with Creationist Fundamentalism, may thus obtain a transmission advantage over anti-/evolutionary beliefs that are part of looser, piecemeal cultures, or less definitively essential or central to identity.[20]

That is, some anti-/evolutionary beliefs may be transmitted or acquired as a culture complex, a kind of "package deal," in the manner that some genes (which may be non- or even maladaptive) are regularly inherited because of their proximity on a chromosome to other (more) adaptive, selected genes. This would mean recognizing that cultural variants are related and structured in some way analogous to the genetic variants of biology. It seems plausible that the way cultural representations cognitively "fit together" could function in this role. Thus, if certain anti-/evolutionary beliefs do indeed hold some representational or cognitive fit with certain religious beliefs, through cultural transmission both may be passed along together.[21]

Values and moral judgments are also culturally transmitted. Chapter 4

20 The formation of an "anti-evolution" social or group identity is a key component of Michael Lienesch's analysis of the anti-evolution movement, based upon the nature and stages of "social movement theory."

21 The "U.S. Religious Landscape Survey" conducted by The Pew Forum on Religion in Public Life, for instance, correlates increasing acceptance of Creationism with a literal interpretation of the Bible and church attendance, respectively. Morevoer, this Creationism also varies geographically, strongest in the American south (the "Bible belt" and other "red states"), with acceptance lessening as one moves west and northeast. This seems to show the cultural transmission of a cultural package or complex, underwriting the relevance also of our background conceptual ecology.

demonstrated the motivational potency and belief-biasing of affective reactions towards and moral judgments about evolutionary explanations. If these are culturally transmitted, through various means, this would strongly bias a particular belief towards Darwinian evolution. This is perhaps responsible for the national differences in evolutionary dis/belief, as seen in Miller, et. al. (2006). Darwinism, developed in Britain, also seems to have had received the most challenge and hostility in Britain, and later also in the English speaking United States. Both the evolutionary theory and its morally-colored reactions where "home grown." If, however, evolutionary theory spread to other countries through scientific circles and cultures, but moral anti-evolutionism did not spread, then other countries may have received Darwin's idea with more of a moral "blank slate," and the levels of evolutionary disbelief and antievolutionism would not be so great. Conversely, Darwinism's entrance into, say, the Islamic Middle-East, would have come not only as a scientific theory, but as *Western* science, following a long period of colonialism, which may have biased, with affective valence, cultural learners against Western intellectual impositions. Explicit epistemic justification would then be sought.

On one level, then, we might ask how anti-/evolutionary beliefs fit into cultural identity and the transmission of that culture to cultural learners. On a further level, we might ask whether anti-/evolutionary beliefs provide a competitive cultural advantage to groups (the way, for instance, certain cultural traits of the Nuer aided conquest of the Dinka, or, perhaps, what traits of United States' culture encourage immigration by non-Americans).

Consider American Christian Fundamentalists, for instance. There tends to be much overlap between individuals and groups who would self-identify as such, as well as with what others from outside these groups would label Fundamentalists (such as the sociologist or scholar of religion). Indeed, this self-identification initially was predicated upon commitment to "the fundamentals" articulated by certain Christians and Christian groups around the turn of the twentieth century. Beliefs and practices such as use and appeal to the bible, literally interpreted, constitute one salient marker of identity. Something we might ask is whether disbelief of naturalistic evolution, and affirmative belief in young-earth creationism, has become something of a virtual "fundamental" for Fundamentalists. Certainly, many vocal anti-evolutionist, self-identifying Fundamentalists would claim such, as might also outside parties, as in media portrayals and descriptions.

Andrew Dole[22] has suggested that anti-evolutionism might be seen as a kind of "costly signaling," displaying costly commitment to the group (Christian Fundamentalism; true Christianity) and the group's beliefs, thereby increasing sense of identity and cooperation. Members of and cultural learners within that group would then experience pressure to believe likewise to be a part of the group and retain group benefits (including spiritual and other kinds of support). This is probably valid; however, it may be questioned how "costly" this commitment is—if evolution is really and readily disbelieved by Fundamentalists (and cognitive content biases would work in their favor), and if there are perceived benefits to be obtained from this disbelief and corresponding creationist belief (e.g. spiritual or salvific rewards), then, unlike Tom Sawyer whitewashing the fence, there may not be subjective "costs" involved. However, some objective measures of costliness do exist, such as the $27 million (and counting) that has

22 Personal correspondence.

been raised through charitable donations to fund the building of the Creation Museum in Kentucky. Such may indeed serve as a collective CRED by antievolutionist Christians, bolstering the acquisition of creationist beliefs in sufficiently like-minded sympathetic cultural learners.

If evolutionary dis/belief is one factor increasing cultural group identity, cohesion, and solidarity, and if this increased cohesion aids in cultural competition, it becomes possible that evolutionary dis/beliefs could provide or are correlated with competitive group or cultural advantages. For instance, demographically, might evolutionists have more or less children than antievolutionists? If such children are reliable culture-bearers, than one anti-/evolutionary group would over time increase. Relatedly, the anti-/evolutionary component of some cultural group could play a part in emigration or cultural assimilation, and thus the spread of some ideas over others. I offer these aspects of cultural group selection as possibilities, but unfortunately lack data to support any one conclusion.

It may be well to consider these, however, when considering antievolutionism abroad, for instance with some currents of Islam. Here, does evolutionary doubt arise through the biases and intuitions of maturationally natural cognition, or from the conceptual ecology internal to Islamic tradition? Or might it, to some extent, be a kind of cultural import from or imitation of other anti-evolutionary cultures, like American Fundamentalism?

Missing Links?

I noted earlier that context-based cultural transmission might serve as the "missing link" in explaining anti-/evolutionary patterns of belief. However, we might ask whether culture is indeed the missing link, or whether we are still "missing links." What explanatory shortcomings remain?

One area that might benefit from theoretical improvement regards still the notions of a background "conceptual ecology" and "cognitive fit," or how representations or other cultural items "fit together," as explanatory of the acquisition (or not) of some beliefs (over others). The scholar would not want such explanatory concepts to be like Ann Elk's theory of the brontosaurus—they should not be merely redescription for still otherwise elusive concepts and mechanisms. In some respects, this cognitive ecological complex is the culmination and integration of maturationally natural cognition and acquired cultural information, partly determined by these and in turn partly determining of them—this is the ground upon which a "constructive interactionism" occurs. Perhaps this is to say that contextual biases such as conformity, prestige (and thus the influence of particular individuals), and CREDs of commitment act both on first- and second-orders. That is, we may acquire certain beliefs through contextual cultural learning; but these in turn effect what else we learn or develop, in varied manners (e.g. through introspective reflection or through explicit cultural learning).

Recalling also works of Damasio and Haidt, when we acquire and assimilate representational content, we do so with various degrees of emotional attachment or affective valence. This may be the too easily forgotten or underestimated element of the integrative model. Beliefs are not only represented, in a kind of propositional form; rather, they (or their representational content) are also felt, and this effects and bias subsequent acquisition and development of belief. We should explicitly recognize that this affect also structures and biases our cultural learning. Following the work of historian Daniel Lord Smail (2008), we can also move to the level of neurons and the brain, which also helps explains patterns of culture and history.

To illustrate the importance of both points, an individual maturing in an explicitly scientific cultural environment may learn (acquiring as cultural information) to always seek multiple sources of evidence in forming beliefs about to world, to commit to ideas with a degree of skepticism, and to look for naturalistic explanations of the physical world. The learner may develop positive affect towards these beliefs, as values or value-laden concepts, and perhaps feel negatively towards explanations that do not meet such criteria. Such beliefs and values become one's conceptual ecology, which in turn constrains and canalizes the beliefs and values which that individual is apt to form or acquire regarding organic evolution. This conceptual ecology was both culturally learned, but also acquired in relation to much maturationally natural cognition (e.g. as a cultural elaboration of a natural propensity to seek causal reasons for phenomena). This illustrates the complexity involved in explaining both an individuals beliefs and collective cultural patterns.

There is no explanatory silver bullet: neither maturationally natural representational content biases nor cultural context, neither implicit and intuitive cognition nor explicit and reflective thought and reasoning, neither individual predispositions and learning biases nor cultural institutions, neither propositions nor affect—none of these alone is enough to explain the patterns of evolutionary dis/belief we see in the world. To be sure, however, explanations that ignore certain of these elements are only partial; those that explicitly denounce one element, and the relevant approaches towards theorizing them, are misguided.

I have attempted through this and past chapters to specify the manner in which maturationally natural cognition and intuitive beliefs constrain and canalize, bias and structure, evolutionary dis/belief, both in regards to individuals and to differential cultural patterns. Beginning with a focus on maturationally natural intuitions—the "strong intuitionism," and arguably the "canonical" approach within the cognitive science of religion—I gradually expanded the level and methods of analysis to include emotion, morality, context-based cultural transmission, and cultural evolution, based on the discerned theoretical needs developed throughout. It is my hope that this will enrich our understanding of Darwin's doubted idea, and will be a cogent and fruitful integration of the cognitive and the cultural.

Conclusion

This work took as its topic Darwin's doubted idea, that is, why a naturalistic theory of the origins and development of living things and their kinds is doubted, disbelieved, misunderstood, and explicitly challenged to the extent and in the manners that it is. The general, formal conclusion is that Darwin is doubted because of a complex, constructive interaction between maturationally natural cognition and beliefs acquired from particular cultures. More specifically, particular intuitions and biases of natural cognition, particular selective learning mechanisms, and particular cognitive and cultural representational, conceptual ecologies interactively produce the particular beliefs and value judgments and differential patterns of belief and values that actually exist about and towards Darwin's idea.

The intention was to construct as full and rich an explanation and causal understanding as possible—the risk, however, is of being too broad and encompassing as to be too vague and unhelpful, a critique that William James raised against Spencerian philosophy in his essay, "Great Men and Their Environment" (James, 1956). In response to the question, "What are the causes that make communities change from generation to generation" (1956: 218), Spencer argued against the "Great Man" view of history, where great individuals effect such change, arguing instead that historical and social change was the result only of past conditions and current environment; individuals are merely the product of society and environment.

James agreed that individuals have a natural and social causal history inaccessible to the scholar; however, that does not mean they are not potent instruments of social and cultural change. Drawing an analogy to Darwinian evolution, James suggests “Great Men” are like the “spontaneous variations” in biology, which introduce novelty into organisms, and which can induce great biological change in conjunction with the environment. In turn, creatures too may alter their environment, altering the course of their, and everything else's, development as well. So too “men of genius” can effect great change in their social environment, when social conditions are right, and newly made or changed social environments continue to effect future cultural development. As evolution is in part the history of minute changes, so too history is the aggregation of multiple individuals and their actions.

My hope is that focusing on the particulars and the substance of evolutionary dis/belief, in addition to the general and formal features of both antievolutionism and the cognitive theory, unfruitful vagueness and abstraction is avoided, and the work makes a positive contribution towards understanding the broad responses and reactions to Darwin and his idea. As research on human cognition continues, as more intuitive predilections and biases of learning are discovered, the particulars of the explanation and the explanations of particulars may be continually expanded.

In another respect, this work may have expanded upon James's vision, and might become, or illustrate, a model useful in many areas of cultural and historical inquiry and analysis. The historical portions of this work, and the histories to which it looks, are, after all, in one way or another narratives of “Great Men” (literally “men,” as it were). Paley, Lyell, Darwin, Wilberforce, Huxley, Hodge, Bryan, Darrow, Mencken, Price, Morris, Whitcomb, Dobzhansky, Mayr, Dawkins, Johnson—to name but a few—suggest that individuals are indeed historically relevant and potent. Neither universal cognition nor cultural forces nor social environment—none of these generalities alone or in conjunction gives us a full understanding of what has transpired, or allows much prediction of what is to come.

To revise James, along the lines of the analysis and models developed here, we might see history and culture as emerging from something like "Great and Not-So-Great Men and Women and Their Cognitive, Cultural, and Social Environments" (a view that shares some with that of historian Daniel Lord Smail, 2008). Cognitive science has helped us see the role for maturationally natural and developed or acquired cognitive "environments" for constraining and canalizing human thought, and in turn culture and history. Research in cultural transmission, with a cognitive foundation, has helped to flesh out our image of enculturation, and the role that both public ideas and practices, and the individuals who hold, transmit, and acquire them, play in this process. Model-based learning biases, in particular, illustrate how certain individuals can influence vast numbers of the population, aptly warranting the label of "great" women and men. At the same time, powerful natural intuitions and biases, serving as a cognitive and cultural "environment," can constrain and canalize the shape of culture, the direction of history, and the potency of individuals.

Such a perspective may be fruitful for anyone interested in both the generals and particulars of why we humans think and behave the way we do, why cultures and societies are what they are, and why history has proceeded in the ways that it has—and to predict what any of these will become.

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