Steps to an Evolutionary Ecology of Mind and Morality

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1 Evolution and explanation

Empty is that philosopher's argument by which no human suffering is therapeutically treated. For just as there is no use in a medical art that does not cast out the sicknesses of bodies, so too there is no use in philosophy, unless it casts out the suffering of the soul.

Epicurus (341-271 BCE)

Explanation is not achieved by description of the patterns of regularity, no matter how meticulous and adequate, nor by replacing this description by other abstractions congruent with it, but by exhibiting what *makes* the pattern, i.e., certain processes.

Fredrik Barth (1966:2)

All organisms are all of the time problem-solving.

Karl Popper (1994:55)

Clarity about what it means to be human constitutes not only the highest political and therapeutic vision, but also the height of practical reason. This is because it is from conceptions of human nature that access to all social resources flows. Aristotle argued that humans become aware of their political ideals only through their understanding of shared human nature. Taking his lead, Epicurus and the Hellenistic philosophers developed the idea that both philosophy (knowledge) and politics were medicine (i.e., healing, therapy) carried on by other means (Nussbaum 1994). At some point, everything human has philosophical and political implications, but, as Western philosophers have known at least since Aristotle, in order even to see these implications it is necessary first to have knowledge of human nature - otherwise, what would the implications be for? For Aristotle and the Hellenistic philosophers, knowledge of human nature could only lead to *eudaimonia* - i.e., "human flourishing." They believed that it was only through knowledge of shared human nature that we become aware of where we want to go, the ideals at which we should aim. As Aristotle put it in the Nichomachean Ethics, illustrating the practical value of therapeutic arguments, "Won't knowledge of it [i.e., the good; the conditions for eudaimonia] make a great shift in the balance

where life is concerned, and won't we, like archers with a target before us, be more likely to hit on what is appropriate?" (quoted in Nussbaum 1994:60). Knowledge of shared human nature would establish what is appropriate for achieving human flourishing – the target which ought to guide our aim whenever we decide how best to make our way in the world.

Human nature and practical reason

Knowing how to make our way in the world is practical reason. I am grateful for Charles Taylor's (1993) conception of practical reason for it shows that rational and moral arguments share common features. (It also fits nicely with the evolutionary epistemological approach to knowledge that I shall examine shortly.) If we accept human flourishing as our target, Taylor writes,

... then the activity of explaining why things are as they are (what we think of as science) is intrinsically linked to the activity of determining what the good is, and in particular how human beings should live ... The notion that explanation can be distinct from practical reason, that the attempt to grasp what the world is like can be made independent of the determination of how we should stand in it, that the goal of understanding the cosmos can be uncoupled from our attunement to it, made no sense to the pre-modern understanding. (1993:217)

Note that explaining "why things are as they are" entails the use of facts to describe the processes that cause "things" to come into being. These facts are then used to determine "what the good is" and "how human beings should live." Practical reason thus uses facts to approach values.

For Taylor, practical reason is when "we understand an environment [and] can make our way about in it, get things done in it, effect our purposes in it" (1993:218). The environment that we need to understand is the one comprised of our individual and collective human natures, and their products and residues, so to speak, in the rest of nature, over time. For now, Aristotle's *eudaimonia* is as good a way as any to conceive of the ultimate purpose that we try to effect when we make our way and get things done in this environment. Later, however, I will develop the idea that this purpose is a deeply moral purpose and that the reason we experience it as such (i.e., as a feeling – a moral sentiment) is because these feelings were the best way that natural selection could devise to reflect or represent a value that exists in nature – the nature of evolutionary biology as it is instantiated in each of us.

To effect our purposes – to approach *eudaimonia* – it is necessary to have a concept of human nature. Without such a concept no target can be better than any other. And if all targets are equally good, how do we know where to aim? If there is no human nature, no target, then anything goes, and we can aim anywhere we please – or where our aim pleases someone else. If there is no pre-existing, a priori human nature that we can look to for guidance, then anyone with sufficient wealth, power or prestige can have us aim wherever *they* please, at the targets *they* construct. If there is no human nature, then Michel Foucault and Jacques Derrida are right: might makes epistemological right and there is no truth outside of power. But such a stance is not just wrong, it is irresponsible, a counsel of despair, and dangerous, for it opens the door to bullies and despots. As Robin Fox put it:

> If there is no human nature, then any social system is as good as any other, since there is no base line of human needs by which to judge them. If, indeed, everything is learned, then surely men can be taught to live in any kind of society. Man is at the mercy of all the tyrants – be they fascists or liberals – who think they know what is best for him. And how can he plead that they are being inhuman if he does not know what being human is in the first place? (Fox 1975:13)

Likewise, Noam Chomsky observed that

... one can easily see why reformers and revolutionaries should become radical environmentalists, and there is no doubt that concepts of immutable human nature can be and have been employed to erect barriers against social change and to defend established privilege. But a deeper look will show that the concept of the "empty organism," plastic and unstructured, apart from being false, also serves naturally as the support for the most reactionary social doctrines. If people are, in fact, malleable and plastic beings with no essential psychological nature, then why should they not be controlled and coerced by

those who claim authority, special knowledge, and a unique insight into what is best for those less enlightened?... The principle that human nature, in its psychological aspects, is nothing more than a product of history and given social relations removes all barriers to coercion and manipulation by the powerful. This too, I think, may be a reason for its appeal to intellectual ideologists, of whatever political persuasion. (Chomsky 1975:132)

And Charles Taylor argued that without a theory of value (i.e., without a rational basis for moral action) only power remains:

In a neutral universe, what agreement there is between attitudes seems merely a brute fact, irrelevant to morals, and disagreement seems utterly inarbitrable by reason, bridgeable only by propaganda, arm-twisting, or emotional manipulation. (Taylor 1993:213)

In a similar vein, Karl Popper labelled "intellectually evil" the belief that all rational arguments inevitably rest on a framework of assumptions that are beyond examination:

> What I call "the myth of the framework" is a very widely held and often even unconsciously accepted view, that all rational argument must always proceed within a framework of assumptions - so that the framework itself is always beyond rational argument. One could also call this view "relativism", for it implies that every assertion is to be taken as relative to a framework of assumptions ... A fairly common form of the myth of the framework also holds that all discussions or confrontations between people who have adopted different frameworks are vain and pointless, since every rational discussion can operate only within some given framework of assumptions ... I regard the prevalence of this myth as one of the great intellectual evils of our time. It undermines the unity of mankind, since it dramatically asserts that there can, in general, be no rational or critical discussion except between men who hold identical views. And it sees all men, so far as they try to be rational, as caught in a prison of beliefs which are irrational, because they are, in principle, not subject to critical discussion. There can be few myths which are more

destructive. For the alternative to critical discussion is violence and war. (Popper 1994:137)¹

Finally, consider Nancy Scheper-Hughes' recent deductions concerning our moral nature:

To speak of the "primacy of the ethical" is to suggest certain transcendent, transparent, and essential, if not "precultural," first principles . . . The extreme relativist position assumes that thought, emotion, and reflexivity come into existence with words and words come into being with culture. But the generative prestructure of language presupposes, as Sartre (1958) has written, a given relationship with another subject, one that exists prior to words in the silent, preverbal "taking stock" of each other's existence. Though I veer dangerously toward what some might construe as a latent sociobiology, I cannot escape the following observation: that we are thrown into existence at all presupposes a given, implicit moral relationship to an original (m)other and she to me. (Scheper-Hughes 1995:419; see also 1992:22–3)

If some conception of human nature is a prerequisite for the pursuit of human flourishing, as well as the *sine qua non* of practical reason and ethical action, then why are so many set against it?² I think the answer can only be that the naysayers are made anxious by the very concept of human nature because of their unexamined belief that not only does such a thing really exist, but that it is *essentially, irredeemably evil*. They believe, as William Blake wrote in *The Marriage of Heaven and Hell*:

- 1 That man has two real existing principles: viz: a body & a soul.
- 2 That energy, called evil, is alone from the body: & that reason, called good, is alone from the soul.
- 3 That God will torment man in eternity for following his energies.

In his sweeping social history, In Search of Human Nature: The Decline and Revival of Darwinism in American Social Thought, Carl Degler (1991) made the same point: that resistance to Darwinian thought (read Blake's "energy")

¹ Although not published until 1994, Popper wrote these words for a series of lectures at Emory University in 1969.

² Clifford Geertz, for example, once argued notoriously that the facts of human nature (if any existed) would amount to a "portrait of man" that was no more than a "cartoon" (1973:40).

rested on an "ideology or a philosophical belief that the world could be a freer and more just place" if only "the immutable forces of biology played no role in accounting for the behavior of social groups" (1991:viii). In short, just as Scheper-Hughes fears that the very "precultural" foundation for her ethical stance causes her to "veer dangerously toward what some might construe as latent sociobiology," so, too, do many others fear that the essence of biology – evolutionary theory – is inherently, essentially, deterministic and insensitive to historical contingencies, especially those affecting inequalities associated with race, ethnicity, class, and gender. As Brad Shore put it, "Until the issue of cultural diversity could be unhooked from its evolutionary (and racial) moorings, modern anthropologists were not free to contemplate the implications of cultural differences for an understanding of mind" (1996:17–18).

Despite the obvious misuse to which evolutionary theory has been put (and by some still is) I believe that this is wrong and that we have nothing to fear from evolutionary biology. On the contrary, I believe that viewing human nature as a manifestation of our evolutionary biology is the height of practical reason and our best hope for making our world "a freer and more just place." In this I again follow Robin Fox, who argues that

> ... to look hard at, and accept the limitations of, human nature as a basis for political action, may turn out to be the least reactionary and most strenuously radical act of the twentieth century. But it will, in the nonpejorative sense of the word, be also a truly conservative act. (1989:51)

In the same vein, and fully in the spirit of Huxley's evolutionary humanism, Jerry Fodor observes that "Naturalism might turn out to be more of a humanism than, until quite recently, anyone had dared to hope" (1994:103).

Science and wisdom

If some conception of human nature is a prerequisite for rational, moral political action, this raises the question: who gets to define human nature? If human rights derive ultimately from concepts of human nature, then this is a question of some weight, for, threatened as we are by our deteriorating social and physical environments and expanding population, we cannot afford to define ourselves wrongly much longer. It goes without saying, therefore, that I immediately reject science's traditional antagonists, magic and received religion, for they depend for their

existence not on rational argument but on the power, prestige, and wealth of their practitioners (Taylor's "propaganda, arm-twisting, [and] emotional manipulation"). This leaves science – but what kind of science? To put the question another way: if I am going to do justice to my central argument that viewing human nature as a manifestation of our reproductive strategies provides a rational basis for a theory of value and a rationally compassionate ethical philosophy, then I should explain why I think the foundation for my argument is sound.

My argument rests on a foundation of two interlocking parts: (1) evolutionary epistemology and (2) an emerging approach to science that is based on what Nicholas Maxwell (1984) called the "philosophy of wisdom" (some call it postpositivism or postempiricism). After a brief look at the anti-science sentiment that has lately become so pervasive, I will begin with the philosophy of wisdom, for, of the two elements in my foundation, it confronts most directly this growing antipathy toward science.

Anti-science

In recent years, the opponents of science have included not just the usual suspects, magic and received religion, but also some adherents of a branch of humanism that has come to be known as postmodernism. All scientists and most philosophers view reality as an "out there" (or "in here" - i.e., the very real [to us] quality of our sensations and feelings) that really exists. Some extreme postmodern interpretivists and deconstructionists, on the other hand, view reality not as something "out there," but as something that is inherently "constructed" by the inevitable interaction between data and observer. Knowledge, or truth, for them, is thus always "negotiated" and ultimately cannot exist except in its interpreters. While this is true in the sense that it certainly takes a knower for something to be known, it strikes me as a narrow view of knowledge because it comes down unfairly on the side of unknowability; it emphasizes our imperfection as observers and interpreters at the potentially catastrophic expense of failing to understand adequately the reality that really exists (either "out there" or "in here").³

This postmodern emphasis on our ultimate incapacity for perfect

³ One almost suspects that postmodernism itself developed as a psychological defense against the painful realization that we cannot have perfect knowledge. It is as if someone who wished to be god was so upset on learning that he could not have god's perfect, pure knowledge that he blamed reality instead: If reality does not exist, then it is not my fault that I cannot know it!

knowledge may be another manifestation of the ancient antipathy between reason and desire, or cognition and emotion, that Blake captured in his opposition between "reason" and "energy." I wonder if postmodernism gives pride of place to the internal, subjective side of the relationship between reality and its internal, subjective representations because of its unargued belief that the essence of human nature - that which all people share - is actually their *individuality*: their separateness, their particular subjective experiences, their unique histories. Paradoxically, then, in postmodernism, human nature - that which all of us share - may be precisely that which makes us *different* from each other. If this is so, then viewing people as individuals rather than as a whole, as a species, makes sense as a way of preserving their essential humanity; as Geertz put it, "Becoming human is becoming individual" (1973:52). To do otherwise, to submerge individuals in their species, is abhorrent because it seems to reduce human nature to . . . well, to nature, for, if we are stripped of our individual experience, our acts of observation and interpretation (i.e., our "reason," which is "called good"), all that will remain (they fear) is some impersonal, universal, species "energy" ("called evil"), which merely manufactures our capacity for individual experience.

After the Enlightenment, as science, technology, and commerce fuelled the quickening pace of political and economic change everywhere, and so threatened the family, kinship, and religion as the organizing principles of society, Romantic anti-science sentiments have never been hard to find. Lately, however, with looming environmental and population catastrophes, world-wide economic downturns and increasing inequalities in the distribution of wealth, greater emphasis in business and politics on short-term results and payoffs, and everywhere the rise of fundamentalism, anti-science sentiments have become fervent and epidemic. In such a climate, the "hard" sciences, medicine, and engineering have fared better than the "soft" social, behavioral, and historical sciences. Indeed, for many, scientist and non-scientist alike, the hard sciences have become the very model for all of science. One reason for this is that the reality studied by hard sciences like physics and engineering seems more obviously to be "out there" than the reality studied by soft sciences like anthropology, sociology, or psychology (which seems to range rather more freely between "out there" and "in here" than the reality of the hard sciences).

Another reason, however, is that the hard sciences, including medicine, are often seen as value-free or neutral and therefore nonthreatening, safe

and familiar, because they are morally neutral, rational tools for solving relatively narrow, short-term, practical problems. But, when by extension all of science then comes to be seen as value-free, then science in general is seen to have failed us, and people come to distrust or abhor it, because it seems bound to treat them as providers or products and to deprive them of their humanity and what they value most – their personal, subjective experience, which is the very basis by which they value anything at all. Myth and magic then abound, and science loses (e.g., Gross and Levitt 1994; Holton 1993). Vaclav Havel, President of the Czech Republic, expressed clearly this anger and dismay in his acceptance speech after receiving the Philadelphia Liberty Medal on July 4, 1994:

The dizzying development of science, with its unconditional faith in objective reality and complete dependency on generally and rationally knowable laws, led to the birth of modern technological civilization. It is the first civilization that spans the entire globe and binds together all societies, submitting them to a common global destiny . . . At the same time, the relationship to the world that modern science fostered and shaped appears to have exhausted its potential. The relationship is missing something. It fails to connect with the most intrinsic nature of reality and with natural human experience. It produces a state of schizophrenia: man as an observer is becoming completely alienated from himself as a being . . . Experts can explain anything in the objective world to us, yet we understand our own lives less and less. (*New York Times*, Friday, July 8, 1994. p. A17)

Both playwright and politician, Havel has the gift of speaking for many; disaffection for science is indeed widespread. It is also clear to many, however, that Havel's problem – and postmodernism's – is not with science, but with *scientism*, which, in Paul Roscoe's words (he quotes from other definitions), is a version of science that "aims to construct a 'perfectly impersonal or objective,' 'value-free,' cognitive representation (or 'mental map') of reality as a whole" (1995:493). It is scientism's impersonal, value-less vision of reality that Havel, postmodernists, and humanists of all sorts (including me) abhor. But there is more to science than scientism, and epistemologists, philosophers of science, and scientists of all sorts are well along in the intellectual task of constructing a humanistic science – as are humanists (Crook 1991; Roscoe 1995; Turner 1995).

The philosophy of wisdom

For example, consider the work of the philosopher Nicholas Maxwell (1984). It was to criticize scientism and to provide a rational basis for a humanistic science that he set out to describe what a philosophy of wisdom might look like. In Maxwell's terms, scientism is standard empiricism, i.e., inquiry that is based on the traditional Western philosophy of knowledge, as developed primarily by Bacon, Newton, and Descartes. Standard empiricism holds that because human beings do not possess a priori knowledge of the world, everything that passes for knowledge, truth, or fact must be assessed empirically, impartially, through our own sensory experience. For standard empiricists, of course, sensory experience does not include emotional experience, for they do not consider emotions to be senses. (In fact, as I argue later, just as vision is a priori evidence that light exists, emotions are a priori evidence that value exists.) Therefore, standard empiricism of the traditional philosophy of knowledge sort holds that:

Only by dissociating itself decisively from the goals, values and beliefs of common social life, so that claims to objective knowledge can be subjected to scrupulously *rational* assessment, can inquiry accumulate genuine knowledge, thus ultimately being of benefit to humanity. Rational inquiry must, as it were, ignore human need in order to help fulfil such need. (Maxwell 1984:10)

On this view, and given standard empiricism's huge successes, it is no wonder that so many, scientist and nonscientist alike, accept uncritically the view that:

> Feelings, desires, human social interests and aspirations, political objectives, values, economic forces, public opinion, religious views, ideological views, moral considerations, must not be allowed, in any way, to influence scientific or academic thought. (1984:16)

As a consequence, we are now in the curious position that, if we sense that something is *not* value-neutral – then we fear it cannot also be true! And, if something is not true, how can it be worth our consideration? This is the position that Havel so decries, and is the reason why distrust of science is so high: when science excludes from discussion any mention of human values, wisdom, and moral sentiments on the grounds that they are beyond rational argument, then people begin to devalue rationality itself – because they *know* that these things matter. This is what happens when, like Moore, you separate facts from values. For Maxwell, this is the "major intellectual disaster at the heart of western . . . thought" (1984:7). As an antidote, he outlines a philosophy, not of knowledge, but of wisdom, in which fact and value are not separated, but joined to make inquiry *even more rational*. He argues that there is no rational, but only a historical, basis for excluding values from rational consideration, and, indeed, that to include them in the realm of rationality makes possible a new scientific inquiry with a radically different aim, viz.,

> ... to enhance personal and social wisdom. This new kind of inquiry gives intellectual priority to the personal and social problems we encounter in our lives as we strive to realize what is desirable and of value, problems of knowledge and technology being intellectually subordinate and secondary. For this new kind of inquiry, it is what we do and what we are that ultimately matters; our knowledge is but an aspect of our life and being. (1984:v)

Maxwell's philosophy of wisdom is a key part of the foundation for my central argument that an evolutionary view of human nature provides a basis for a scientific theory of value and a rational concern for human rights. The primary role of the new rational inquiry, Maxwell argues, is to give us not just truth, but valuable truth; it is to help us "discover, and perform . . . those actions which enable us to realize what is of value" (1984:66). That which is of value in a person's life comes to be judged as such only through his or her personal, subjective experience. Nor can any rational argument about value be effective unless it touches a person's personal, subjective experience (e.g., Nussbaum 1993, 1994; Taylor 1993). But this does not mean that what we experience as value bears no relationship whatsoever to anything that exists in reality. Nor does it mean that value is not a fact of nature, or that rational inquiry cannot help us learn what is of value. Indeed, a critical part of the argument of this book is that value exists in nature, that we experience this value subjectively, and that rationality evolved for value - i.e., to achieve value. Learning what is of value is the height of practical reason, for "valuable truth" helps us to make our way in the world, to make good choices, so as to better effect our purpose - which is to realize the greatest good, human flourishing. If, as Taylor put it, science is "intrinsically linked to determining

what the good is" – and thus indispensable for realizing *eudaimonia* – then our best hope, Maxwell argues, is a science of value:

What ought to have been realized long ago is that the Rationalist espousal of the philosophy of knowledge is actually irrational precisely because it excludes Romantic intellectual ideals of motivational and emotional honesty, truth to personal experience, imagination employed in the exploration of possibilities of value. The philosophy of wisdom is intellectually more rigorous than the philosophy of knowledge precisely because it incorporates such vital Romantic intellectual ideals. Aim-oriented rationalism [rationalism aimed at *eudaimonia*] heals the traditional split between Rationalism and Romanticism - the split between Snow's two cultures. It puts the two together, very much improving each as a result, the two uniting to form a coherent intellectual-cultural movement ... capable of devoting itself far more effectively to the cooperative realization of value in life. (1984:118)

But where do we start? Where should we look for a science of value? The most obvious place is with our best science. But how are we to judge science? What is good science?

Good scientific theories are like old-fashioned American football players: They play well on both defense and offense. A theory may be said to play well on defense when unremitting efforts to disprove it have failed; it is a good theory because it has not yet been scored upon (Popper 1959). A theory may be said to play well on offense when it fosters its own growth - i.e., when it is generative, when it stimulates new research and new insights, and when it "makes contact with what scientists of different sorts are thinking and demonstrating" (Plotkin 1994:x). It is a good theory because people find it useful; it is useful because it allows people "to interact successfully with and toward other scientists" (Roscoe 1995:497). What matters in science, as Roscoe notes in his spirited critique of the postmodern antipathy toward science (i.e., scientism), is precisely that which matters in postmodern interpretation - which is not pure, disinterested truth, but the success of one's ideas - with success being defined as acceptance by other scientists (Chalmers 1978; Dunbar 1995; Hull 1988; Plotkin 1994). Postmodern critics of science, Roscoe argues, have aimed at the wrong target. Scientists and philosophers have been working on the knowledge problem for a long time and are agreed (as we will see in more detail shortly): truth – pure, neutral knowledge – is a fantasy; it is simply not ours to have. Martha Nussbaum puts it this way:

> ... the error of the sceptical opponent of practical reason consists in remaining too much in the grip of the very picture of rational argument that is allegedly being criticized. While objecting to the hegemony of the natural sciences, and while seeking to restore to the human sciences their own rich humanistic character, the opponent has, presumably without full awareness, imparted into her analysis one very central part of the natural science model, namely, its understanding of what constitutes a rational argument. For she seems to assume that rational argument requires neutrality, and deduction from premises that are external to all historical perspectives. (1993:235)

By the twin criteria of (1) not yet disproved and (2) productivity or generativity, evolutionary theory is a good theory. Despite the best efforts of scientists and nonscientists alike, for well over 100 years, evolutionary theory has not been seriously challenged, let alone disproved. Quite the contrary, it has dramatically fostered its own growth, because it helps scientists of all sorts make their way in the social world of other scientists (despite the latter's concerted attempts at disproof). Indeed, so great has been evolutionary theory's generativity that scientists, philosophers, and other thinkers accept not only that "nothing in biology [bios = "life"] makes sense except in the light of evolution" (as Theodosius Dobzhansky [1973] said a quarter-century ago), but they are beginning to understand as well how and why everything comes to make sense. Therefore, unless humans are somehow apart from life, any good (rational) theory of human nature must at least be compatible with evolutionary theory if not actually an extension of it. On the face of it, then, evolutionary theory is well equipped to be our science of value.

But is evolutionary theory well equipped to include humanism's specific concerns with "ideals of motivational and emotional honesty" and "truth to personal experience"? What would it mean for a science to be "well equipped" to study human values? If we accept *eudaimonia* as our criterion, then a science is well equipped in this humanistic regard when it can conceive of values in a way that increases practical reason – that is, in a way that helps us make our way in the world and effect our purposes

in it. This is why I believe that evolutionary theory is the only candidate for a science of value, because, in *explaining* human nature – how and why our ancestors made their way in their worlds – it simultaneously helps us realize what is *good* in ours.

Evolutionary epistemology

Evolutionary epistemology (Campbell 1974) is the branch of evolutionary theory that is concerned with the origin and nature of knowledge. Its fundamental *raison d'être* is the proposition that, if knowledge is part of life, then it must be capable of explanation in evolutionary terms. I will begin this section with a brief account of evolutionary epistemology and its key principles and arguments. I will then explain why I believe that evolutionary epistemology adds a number of big rocks to the foundation of my central argument – the idea that viewing human nature as a manifestation of our reproductive strategies provides a rational basis for a theory of value.

Knowledge as adaptation

Evolutionary epistemologists are scientific realists. Martha Nussbaum refers to scientific realism as "metaphysical realism," by which she means

... the view (commonly held in both Western and non-Western philosophical traditions) that there is some determinate way the world is, apart from the interpretive workings of the cognitive faculties of living beings. Far from requiring technical metaphysics for its articulation, this is a very natural way to view things, and is in fact a very common daily-life view, in both Western and non-Western traditions. We did not make the stars, the earth, the trees: they are what they are there outside of us, waiting to be known. And our activities of knowing do not change what they are ... On such a view, the way the human being essentially and universally is will be part of the independent furniture of the universe, something that can in principle be seen and studied independently of any experience of human life and human history. (1995:68)

Scientific realists believe three things. First, they believe that the reality described by evolutionary theory corresponds to a reality that exists independently of their own thoughts and theoretical commitments. They are thus foundationalists, which means they believe that "common realities underlie the different experiences of persons, species, and forms of matter" (Turner 1995:28), and that the principles of evolutionary theory are not dependent for their justification on other beliefs. Indeed, they believe that evolutionary processes are the *ultimate* foundation for all of our other beliefs (after a long series of intermediate ontogenetic and historical steps). Second, they believe that the history of science is generally one of progressively greater correspondence between our constructions of reality and reality itself. Third, they also believe that knowledge itself is an adaptation. Viewing knowledge as an adaptation has an important consequence: if knowledge itself is an adaptation – but if no adaptations can ever be perfect (which they cannot; more on this later) – then neither can knowledge ever be perfect. Evolutionary epistemologists thus hold out no hope for complete or infallible knowledge. It could not evolve and therefore cannot exist in principle.

In denying that perfect knowledge can exist, evolutionary epistemologists are in superficial agreement with postmodern critics of science who deny the same thing. What makes all the difference, of course, are the reasons why each side denies that perfect knowledge is possible. Evolutionary scientists believe that reality exists but that the costs of knowing it, even just passably, are great – but also that knowing it passably has been good enough for enough organisms to effect their purposes such that the living world is the way it is today. Postmodernists, on the other hand, believe that knowledge is inherently imperfect because it is inevitably socially constructed. This is a difference that makes a difference, for if knowledge of reality is completely socially constructed then reality is completely determined by power, prestige, and wealth. But if, as Kitcher (1993) points out, knowledge of reality is socially constructed by those who have sufficiently similar experiences of an underlying reality that really exists, then there is hope for rational argument.

Postmodernism's error was to tie knowledge too closely to language (e.g., "thought, emotion, and reflexivity come into existence with words" [Scheper-Hughes 1995:419]). If knowledge exists only in and through language, and if language is inescapably social and thereby open to our hidden and not so hidden agendas of power, then knowledge is always, inevitably socially constructed. Postmodernists thus ask the (for them) rhetorical question: "Is there a knowledge that we can have that is independent of any social construction whatsoever? Can one imagine knowledge, for example, that exists without language?" (Wark 1996:28). One can. While it is certainly not possible to have knowledge without a *knower*, it *is* possible to have knowledge that is absolutely independent of any social construction whatsoever. The issue, of course, is how to define knowledge. If knowledge is defined as that which is known through language, then the answer, by definition, is obviously no, knowledge cannot exist without language. But where is it written that we (or any form of life) can know things only through language? Language makes it possible to *talk* about knowledge (Pinker 1994), and perhaps even to *think* about knowledge (e.g., Fodor's [1975, 1983, 1994] "mentalese"), but knowledge itself should not be confused with our capacity to talk or think about it. There are many forms of life that have no language, but I would hesitate to say that because of their silence they also have no knowledge.

In fact, all forms of life have knowledge. Indeed, there is a real sense in which organisms *are* knowledge, for, as the evolutionary epistemologists Hahlweg and Hooker (1989:23) put it (following Konrad Lorenz 1941/1982), "life itself is to be characterized as a cognitive process." The knowledge that all organisms possess is information about their ancestors' environments that has become represented materially, phenotypically, in their bodies. This knowledge is universal in living forms and totally independent of all social constructions. This knowledge is the a priori knowledge of its ancestors' environments that each organism acquires via the DNA it inherits from these ancestors (i.e., its genotype: its endowment of genetic possibilities). This view of knowledge allows at least one form of knowledge (the original) to exist in the utter absence of social construction (but, again, *not* without a knower to do the knowing – that is, a living thing to *embody* the knowledge).

Evolutionary epistemology conceives of knowledge in representational terms, i.e., as the representation of aspects of an organism's environment (reality) in that organism's body (its phenotype: the particular set of its genetic possibilities that were actualized during development in a specific environment). The laws of aerodynamics, for example, are represented in the shape of birds' wings, while the laws of optics are represented in their eyes. Thus Plotkin (1994:ix) calls gaining knowledge the "incorporation of the world" into living organisms, much as Piaget (1970) describes learning as that which happens when the thing learned has been "assimilated" into existing cognitive structures. To incorporate something is to take it "into the body," which makes the thing taken in an "embodiment" in flesh and blood of some aspect of the world. Plotkin proposes that: "To

know something is to incorporate the thing known into ourselves. Not literally, of course, but the knower is changed by knowledge, and that change represents, even if very indirectly, the thing known" (1994:ix). For Plotkin then, "knowledge is the relationship between the organization of *any* part of a living creature's body and particular aspects of order in the world outside of that creature" (1994:21) (and *inside*, he might have added; see below). Paul Volkmann had the same insight, almost 100 years earlier, in 1910:

Under the constant influences of the external necessity ... an internal necessity of thinking evolved, which is nothing else but a copy of the external necessity ... If one accepts this view as at least partially true, he would admit the fundamental importance of natural science for any logic and theory of knowledge. Natural science, indeed, would be the Archimedian point for all questions of human knowledge. (Quoted in Danailov and Tögel 1991:20)

More recently, Fodor has also emphasized the internal–external relational quality of mental representations:

... the essence of mental representations [is] that they face two ways at once: They connect with the world by representing it, by and large veridicially; and they connect with behavior by being its typical proximal cause. Because they do both of these things at once, they're custom-made to be what mediates the world's behavioral effects. (Fodor 1994:83)

Knowledge is thus an adaptation. As Plotkin (1994:xv) put it, "Adaptations are biological knowledge, and knowledge as we commonly understand the word is a special case of biological knowledge." He argues further that all adaptations have two qualities: (1) they are "for" something and (2) they are "relational." Literally, they are "fit" or "suited" (*aptus*) "to" (*ad*) some purpose or function in nature. Adaptations are "for" solving problems posed by nature. Thus wings are *for* flight. Adaptations are "relational" in that they are material representations of some aspect of an organism's environment (or that of its ancestors). By virtue of this representation there is thus a relationship between the organism's phenotype – its material, physical being – and its environment. Wings are thus the *relation* between the physical being of birds' bodies (molecules, cells, tissues, organs, etc.) and that part of the bird's environment described by

the laws of aerodynamics. An organism's environment is its total surround – including, of course, its social surround (i.e., its conspecifics). But organisms are also surrounded, so to speak, by their sensations and perceptions, which reflect their *internal* environment (conventionally divided into affective, cognitive, and sensory realms) as well as their external environment.

Nature in mind

Evolutionary epistemology is thus about nature in mind: Nature really exists, and our minds evolved to represent it (or rather, parts of it, imperfectly). Evolutionary epistemologists would thus argue (paraphrasing Geertz [1973:5]) that "man is an animal suspended in webs of significance that he *evolved to spin.*" Our minds, of course, do not represent all of nature. The question thus becomes, of all of nature's aspects, which did our minds evolve to represent, and why?

One way to approach this question is to ask what problems would organisms living in a certain environment have to solve in order to leave descendants (Dennett 1995; Parker and Maynard Smith 1990; Tooby and Cosmides 1989, 1990; Tooby and DeVore 1987). For example, consider why minds evolved at all. Plotkin (1994) suggests that the first minds evolved to represent space in order to co-ordinate movement. When the resources that are necessary for life are sufficiently constant over space and time, the primary problem posed by nature is less about obtaining resources (for they do not move very much) than about their efficient processing. Thus plants - which harvest relatively constant and predictable resources from soil, sun, and water - are immobile. Animals, on the other hand, move. Some animals make their way by eating plants, which, although they do not move, are patchily distributed in space and time; having consumed one plant, an animal has not the time to wait for another to grow in its place. And some animals make their way by eating other animals, which are not in one place for very long. The primary adaptive problems for animals were to obtain resources and avoid becoming another animal's resource. Selection thus favored anatomical and physiological mechanisms (i.e., adaptations) which made it possible for animals in general to make their way more or less efficiently in space. Making one's way in space is movement. Minds first evolved to represent space in order to solve the problem of controlling movement - which is behavior: where should I be next? What should I do next? But we are not animals in general. We are an extraordinarily intelligent and intensely social animal. What particular environmental problem did *our* minds evolve to represent and solve?

The perennial adaptive problem for any species, but especially our slowly developing, long-lived, highly intelligent, and intensely social species, is that of environmental uncertainty. This is the problem of obtaining sufficient information to make our way through complex social space in the face of virtually continuous sociocultural change. No environment is free of uncertainty, but such uncertainty has been a chronic, defining problem for our species because of an ultimate sort of environmental uncertainty that Plotkin (1994) called the "uncertain futures problem."

The uncertain futures problem arises from the biological fact of "generational deadtime."⁴ This is the time-lag between an organism's conception, when it receives its complement of genetic "instructions" for making its way in the world, and the time that it reproduces - parenthood being the state that these "instructions" were supposed to have brought it. The ultimate function of genes, after all, is to leave copies of themselves in subsequent generations. This, however, takes time. Until it can reproduce, the organism's primary adaptive problem is to survive. But it also has to grow and develop. Then it has to find a mate, reproduce, and rear its young so that they can start the process all over again. The problem is that during this "deadtime," before it reproduces, the environment may have changed, so that the genetic "instructions" that manifestly worked well enough for one's parents might not work so well for one's own survival, growth, development, mating, or parenting. The essence of the uncertain futures problem is how to produce an adaptive match between organism and environment when the organism takes time to "build" but the "instructions" for building it are received all at once and the organism's environment is changing the whole time.

If reproductive success depends on some degree of match between organism and environment, but the organism's environment is changeable and uncertain, then selection may be expected to favor mechanisms which enabled developing organisms to track their environments – to aim at a moving target, as it were. And, indeed, the broad solution to the uncertain futures problem has been to equip organisms to track their environments, so that their adult, fully reproductive phenotypes are co-constructed by "instructions" from their environments as well as their

⁴ Plotkin attributes the phrase to Konrad Lorenz (Plotkin 1994:137).

genes (e.g. Oyama 1985; Slobodkin and Rapoport 1974; Stearns 1982). There are many examples of adaptations that allow developing organisms to track their environments (some to come in later chapters), but, because our concern just here is with representations of nature in our own minds, we must be concerned with *representations* of risk and uncertainty that enable us to reduce *actual* risk and uncertainty.

The adaptation that allows us to represent and reduce environmental uncertainty is our intelligence – in which I specifically and emphatically include the intelligence of emotion (i.e., the "reasons that reason does not know at all" [Pascal 1670]). As Plotkin put it, "Intelligence is an adaptation that allows animals, including ourselves, to track and accommodate to change that occurs at a certain frequency" (1994:150). All adaptations are *for* something and are *relational*; intelligence is a mechanism *for* gaining knowledge in order to reduce uncertainty, and it is the *relationship* between the material being of our neuroendocrine systems and the real risk and uncertainty that really exists in nature. For evolutionary epistemologists, the way that intelligence reduces uncertainty is clear. Kim Sterelny put it this way:

... to the considerable extent that our behaviour is adaptively flexible and informationally sensitive, to that extent it must be directed by representations. There can be no informational sensitivity without representation. There can be no flexible and adaptive response to the world without representation. To learn about the world, and to use what we learn to act in new ways, we must be able to represent the world, our goals, and options. Furthermore, we must make appropriate inferences from these representations. (Sterelny 1990:21)

and Popper this way:

[Intelligence] allows us to *dissociate ourselves* from our own hypotheses, and to look upon them critically. While an uncritical animal may be eliminated together with its dogmatically held hypotheses, we may *formulate* our hypotheses, and criticize them. Let our conjectures, our theories die in our stead! We may learn to kill our theories instead of killing each other. (Popper 1978:354)

On this view, our minds evolved to represent reality (however imperfectly) and to perform mental operations (however imperfectly) on these