

DEMI-GODS OR SUPERCHIMPS?

A PHILOSOPHICAL EXAMINATION OF THE CONCEPT OF HUMAN
BEINGS AS DEMI-GODS OR SUPERCHIMPS

by

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INTRODUCTION

Chance events in our cosmos began with the Big Bang. Their pervasive, ripple effects shaped the universe, our own solar system and the genesis and evolution of biological life. Each individual is undeniably unique, the random outcome of an unpredictable conception. The impact of chance is a powerful challenge to the argument from deliberate design, eroding the importance and ultimate meaning arrogated to individual human life.

I will argue that Chance provides a *leitmotif* that can be traced from the genesis of the cosmos through the subsequent random evolution that produced humans - purely one of several primate lineages that emerged from a common ancestor. This logically implies that humans can be regarded as super-chimps, as evolutionary beings devoid of supernatural trappings.

This thesis challenges many beliefs, in particular the concept of deliberate design by a supernatural agent, epitomized by Aristotle's Unmoved Mover. Invisible to our limited perception of order and linear causality lies chaos, a fundamental fickleness that defies an accurate prediction of actual outcomes. Heisenberg's indeterminacy principle emphasizes the quantum uncertainties and their chance accumulation in shaping macrophysical outcomes that are clearly contingent on a multitude of chance events that could in fact have delivered a different outcome.

The evolutionary process is thus an adequate explanation of the gradual emergence of increasingly complex, ordered structures from chaotic matter and processes. We ponder whether there really is an underlying purpose to life beyond the insistent demands of survival of the individual and species. The very urgency of the survival instinct may well have translated into the hope of immortality, a vain defiance of the finality of death and decay. The extraordinary experience of consciousness, expanded into self-consciousness, is fertile ground for dualism, an apparently incongruent and inexplicable twinning of body and mind, which arbitrarily became elevated in humans to deathless spirit, or soul. The concept of

humans as super-chimps challenges the assumption of this special spiritual category, through which it became possible to endow humans with a *gravitas* and moral value denied to other biological members of the same phylogenetic tree. It also questions the notion of free will, granted only to humans, which is in conflict with both divine determinism and the indifference of genetic and environmental chance. The presence or absence of free will impacts on matters of good and evil, and on justice, which in the case of humans extends as far as the eschatological reward and punishment of immortality. Ultimately, as evolutionary super-chimps with extraordinary cognitive powers, it would be to our benefit to examine and revise the prejudicial structure of an ethics that empowers humans to the detriment of kindred life forms that share a common heritage and environment.

This thesis required the selection of source material that provided an historical philosophical framework, balanced by scientific advances that question many habitual beliefs and values. Early Greek thinkers intuitively intertwined philosophy with scientific speculation about origins, atomic matter, energy and motion, causality, and even evolution. This critical synthesis between philosophy and science was unfortunately disrupted in the conflict between Platonic idealism and Aristotelian realism that came to permeate Western philosophy. Although theology dominated Medieval philosophers such as Augustine and Aquinas, the scientific interests of Copernicus and Galileo ironically were encouraged as long as they did not challenge the religious dogma of a powerful church. Enlightenment was heralded by individualists like Descartes and Spinoza, encouraging the empiricism and greater freedom of modern philosophers such as Hume, Kant and Schopenhauer, amongst many others. The evolutionary accretion of scientific knowledge continues to impact on philosophic thinking, while metaphysics increasingly spills over into scientific areas such as physics and biology. Many modern physicists grapple with imponderables beyond the accessible world of physics, while scientific solutions to the mystery – or problem – of consciousness may explain the enigmas that have generated human belief systems.

Darwin's evolutionary argument dislodges humans from their divinely privileged position and questions an ethics that favours humans whilst excluding other

animals. Modern philosophers such as Peter Singer, Tom Regan and James Rachels – amongst many others – reinvigorate and augment relevant fragmentary arguments from earlier philosophers. There can be no doubt that all biological life is subject to birth and death. It is also true that all mammals, including humans and other primates, respond to pleasure and pain, and therefore deserve the same consideration. All are subject to the same evolutionary pressures of genetics and environment, both of which are shaped by multiple chance events that arise from a matrix of unpredictable chaos.

With these themes constantly in mind, the first chapter examines the sequential development of the cosmos through chaotic, random events that resulted in the formation of our own planet. It can be argued that the multiple operations of chance events and interactions delivered a world that just happened to provide an environment congenial to biological evolution. The second chapter discusses comparative similarities and differences in the biology and behaviour of humans and other primates, represented mainly by chimpanzees, since these are genetically closest to humans. We cannot ignore the role of chance in the evolution of the divergent primate branches as they separated from a single ancestral line. The evolution of human self-awareness and an inexplicable experience of an apparent duality of body and mind suggested an eternal human soul, providing the scaffolding for human dignity and power. The history and impact of dualism on human beliefs and behaviour are explored in the third chapter. Darwin's evolutionary argument restores the biological balance, in which humans are more modestly placed at the apex of the mammalian hierarchy, most closely shackled to the other primates. We can no longer dismiss, distort or ignore the logical conclusions that flow from the premises of evolutionary theory. The final chapter examines how human hubris and self-interest has smothered the development of philosophical theories and discourse that question the culturally transmitted myopia that has jealously guarded human rights and entitlements, to the detriment of the global ecology on which all biological life depends.

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ABSTRACT

DEMI-GODS OR SUPERCHIMPS?

A PHILOSOPHICAL EXAMINATION OF THE CONCEPT OF HUMAN BEINGS AS DEMI-GODS OR SUPERCHIMPS.

Chance events began with the Big Bang and influenced all subsequent evolutionary processes, including the genesis and evolution of biological life. The complex and versatile human brain has come to dominate the environment. Self-awareness generated the idea of spiritual identity and survival beyond death. The assumption of demi-god status gave sanctity and dignity to humans, a moral separation that justified the exploitation of other animals. But evolution has a common origin, fleshed out in the biological similarities of all mammals, including humans. Neurological and biochemical correlates suggest the omnipresence of consciousness and self-consciousness at levels that vary according to nervous system complexity. Accepting a more inclusive morality does not diminish the value of human life. It acknowledges their power to adapt to changing conditions. Human survival depends on change and human lives can only benefit from a more inclusive worldview that considers the welfare of all sentient beings and the sustainability of a shared environment.

SUPERCHIMPS OR DEMI-GODS?
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AS SUPERCHIMPS OR DEMI-GODS.

CHAPTER ONE

JUST A LUCKY BREAK?

Mademoiselle D'Épinasse: "But it seems to me that a machine as complicated as an animal, a machine originating in a single particle, in churned-up fluid, or perhaps two fluids mingled by pure chance (for at such times we don't quite know what we are doing), a machine which evolves toward perfection through countless successive stages, a machine whose regular or irregular formation depends on a collection of fine, slender, flexible threads, a sort of skein the smallest threads of which cannot be broken, smashed, displaced or missing without serious damage to the whole, such a machine would be bound to get caught up and tangled in its formative stages even more often than my silks on its spindle". Diderot: d'Alembert's dream: 190-1.

We live within a world that appears relatively predictable and orderly. We remain largely ignorant and generally unaware of complex interactions that are constantly occurring at every level, extending from vast cosmic changes to the unpredictable activities of subatomic particles. We are reassured by our limited perception of the apparent order of repetitive, large-scale patterns of cause and effect which obscure the impact of chance events on the shape and direction of the evolution of life. By definition, chance is without design, without mercy, and without conscience. Such cosmic indifference should deflate human hubris, encouraging a more courageous and realistic vision of humans as only one ephemeral part of the vast but equally impermanent fabric of biological life.

Survival versus meaning

The evolutionary development of the brain has maximised the survival of individual and species through a process of learning and adaptation to the challenges of an ever-changing environment. Over time, the increasing complexity of the human brain has exceeded this basic requirement, exploding

into a network of cognition and creativity that makes it difficult to believe that life may be accidental and meaningless, that perhaps there is “at bottom, no design, no purpose, no evil and no good, nothing but blind, pitiless indifference” (Dawkins 1996:155). From such fear arose the need for hope, for belief in a creative force that might give some meaning to our brief lives by making them part of a divine plan. However, since we are able, to some extent, to examine and explain our world and everything that exists in it – including ourselves – scientifically and quite objectively without positing anything beyond existence itself, it seems sensible and necessary to begin by examining the general assumption or belief that creation implies purpose and that human beings are the focal point in this design.

Human self-awareness and existential anxiety

Unlike in the case of other animals, the evolutionary emergence of human cognition and self-consciousness also produced an awareness of mortality. This unleashed an unconscious anxiety in response to the finality of death and the inescapable physical obliteration of the self. It is possible to alleviate this existential *angst* by investing human life with a metaphysical meaning that satisfies the insistent urge for survival even beyond the physical boundary of death. The assumption that human life has a special meaning therefore logically appears to entail a purposefully created cosmos, but this claim must be measured against the equally valid hypothesis that everything that exists ultimately hinges on the operations of Chance. In constructing theories it is generally accepted that it is folly to ignore Ockham’s *caveat*, which urges simplification precisely in order to avoid the complications that generally follow an unnecessary proliferation of explanatory entities and powers. This warning should guide our ontological and metaphysical speculations and assumptions across all dimensions, including scientific areas that presently are physically inaccessible, such as our scientific attempts at understanding or explaining events prior to the Big Bang.

Determinism or Chance?

We are ultimately confronted by a choice between Creationism and Chance. These concepts are mutually exclusive because of the conflict between the contradictory blend of determinism and free will of Creationism, and the sheer contingency and randomness that are inherent in the operations of Chance. As Christian de Duve puts it: “Life is either a reproducible, almost commonplace manifestation of matter, given certain conditions, or a miracle. Too many steps are involved to allow for something in between” (de Duve 1995:292).

Most people, including a significantly influential number of scientists and philosophers, find it difficult to accept the idea that humanity may have no real purpose beyond the meaning that individuals might subjectively create or objectively exercise within random biological and environmental parameters over which they really have no control. Most people shield their eyes from so brutal and unfashionable an explanation as Chance, since its acceptance impacts on hallowed values and beliefs, such as free will and immortality. Yet there is abundant scientific evidence for the pervasive operations of chance in every area of life. Perhaps the use of the word “contingency” has created a modern euphemism for the more unequivocal harshness of “chance”; a substitution that serves to blur the edges, despite their common implication that things could have turned out differently. Yet semantics cannot dull the reality of arbitrary chance in our daily experience.

Many of us, like Paul Davies, “cannot believe that our existence in this universe is a mere quirk of fate, an accident of history, an incidental blip in the great cosmic drama”. Fear of nothingness has forged comforting metaphysical systems, which supply “the notion that there might exist a God, or even an impersonal creative principle or ground of being that would underpin reality and render its *contingent* (my italics) aspects less starkly arbitrary” (Davies 2001:259). This credo is in direct contrast to the acknowledged uncertainties of quantum processes that are involved in the genesis of our cosmos: “The

essence of quantum physics ...is uncertainty: prediction in a quantum theory is prediction of *probabilities* rather than certainties” (Davies 2001:63).

Humans have always had a great desire to find reasons for everything they experience. Supernatural explanations for natural phenomena such as earthquakes and eclipses have been replaced by scientific knowledge, which is confined to explaining the physical world. Metaphysical questions belong to a different category and, as of old, humans fill this gap with paranormal explanations. It is widely assumed that since science fails to supply ultimate answers, there must be some other discipline that will provide the answers we long for (Dawkins 1995:113). Unlike scientific explanations, supernatural explanations are not verifiable. But they provide a variety of meaningful schemes that elevate human existence to realms beyond the laws of physics; a metaphysical move that serves to diminish feelings of impotence and fear by obscuring the often brutal aspects of chance. This is a voyage into a realm in which science forsakes us and where, in the absence of demonstration, proof of anything outside the limits of our experience and understanding must remain unattainable. We may theoretically move beyond knowledge of our phenomenal world of things as they appear to us, to the possible existence of a *noumenal* world of things as they are in themselves, but we can never access or have knowledge of dimensions that lie outside our universe of time, space and causality. Human imagination and reason may create powerful theories, but the restrictions of human perception entail that intuitive or mystical claims can never be proved. “We are truly meant to be here” (Davies 2001:259-60) is therefore unintelligible except as an expression of faith, or hope. At most it symbolizes humans as the presently most complex, adaptive outcome of a lengthy, ongoing and increasingly convoluted process of evolution.

The role of Chance

Ultimately everything that exists, from inorganic pebbles to organic people, depends on contingency, on the chance outcome of multiple probabilities. These macrostructures within the physical world of our experience are all outcomes of random, microscopic chemical reactions and interactions, caused

by the operation of unpredictable forces on the exponential complexity of evolving matter. This explains not only the gradual emergence of the cosmos from the singularity of the Big Bang, but also the consequent tumultuous evolution of earth and organic life on it, all of which remain malleable under an ongoing evolutionary imperative. However, the very existence of complex structures has often been taken as proof of design, much as Paley's watch logically suggested a watchmaker. But this beguiling analogy appears to be flawed. It compares a *static* artefact, which has been deliberately fashioned for a specific purpose by an outside agency, with the *dynamic, self-creating* processes that are operational in the evolution of the inorganic cosmos as well as in the constantly unfolding organic life on earth. A more apt metaphor to set against the determinism of a clockwork universe lies in the evolutionary emergence of a human city, full of dynamic change and unexpected novelty as the old is replaced and transformed. "No one made the city, there is no city maker, as there is a clockmaker. If a city can make itself, without a maker, why can the same not be true of the universe?" (Smolin 1998:373). In Darwin's theory of natural selection the creative force is without purpose. "It has no mind and no mind's eye. It does not plan for the future. It has no vision, no foresight, no sight at all. If it can be said to play the role of watchmaker in nature, it is the *blind* watchmaker" (Dawkins 1991:5). On this view, human life is simply the present apogee of an inexorable, unplanned evolutionary process of natural selection, operating on random genetic mutations in response to challenges from the ever-changing, dynamic natural forces of the physical environment. A backward look at the extinct species and individuals from which our present human shape emerged expresses a continuity that will flow on through future evolutionary changes about which we can only speculate.

Despite Darwin's radical and triumphant theory, and despite the lack of irrefutable evidence in support of a cosmic plan, the illusion of security that such a plan offers in an unpredictable world continues to promote belief in both blueprint and architect. But conclusions reached in even the most cogent, logical arguments must remain purely speculative unless and until such conjectures are demonstrated to be true. The same requirement should apply

to all claims to knowledge of the metaphysical, as is demanded of all scientific hypotheses.

The role of science

Scientific theories operate within the laws of physics and are subject to rigorous experimentation and peer assessment. Even when scientific hypotheses are endorsed through repetitive experimentation, they always remain vulnerable to possible future disproof, an ever-present danger that Karl Popper called the principle of falsifiability. Because of these demands, and because it operates within the phenomenal world of our experience, science presently offers the best explanations for the origins and evolution of the cosmos and life in our biosphere. The rigour of science is undeniably lacking in metaphysical systems of thought. Protected from both verification and falsifiability, their conclusions remain securely anchored in the speculative realm, easily translating into comforting illusions. One of these, the illusion of deliberate design, was successfully challenged by Darwin's theory of natural selection by modification, of individuals as well as species; a theory that resonates with chance outcomes. The scientific basis for such variation was ultimately solved by Mendel's theory of genetic inheritance. Simply put, the existence of unimaginably complicated, highly individualistic living matter can successfully be accounted for as the physical outcome of random genetic transference that underpins the process of "cumulative evolution by non-random survival of random hereditary changes" (Dawkins 2004:92).

The Big Bang, science and beliefs

Scientific knowledge presently – and perhaps for all time – hovers in time on this side of the Big Bang, a point at which physics as we know it comes into operation. This modest acceptance of the scientific limits of human knowledge and understanding is in stark contrast to an almost universal human presumption of knowledge of ethereal realms that by their very nature are even less accessible. Science and logic fail us here, and we are reduced to using occult tools in our search for answers to ultimate questions through a mystical access to what Paul Davies refers to as the mind of God (Davies 2001: 253).

Widespread belief in a creative source has produced a fundamental religious reductionism that makes everything subservient to God's will (or whim, which operates much like chance), which is then simplistically offered as a sufficient explanation for the entire complex universe. This reductionist search for an elusive First Cause resembles in principle the scientific desire to find the Theory of Everything, which physicists believe will prove to be the single source underlying the material and energetic complexity of the universe (Stewart 1997:375).

Both religious and scientific reductionism may satisfy a basic human need for a simple explanation; a need that may well have its origin in a genetically transmitted complex of essential survival instincts. These inherent abilities may have simplified complex environmental stimuli, providing the discriminatory skills that are required to avoid danger or death. It is feasible that particular cognitive evolution may well have inflated these early survival instincts into the sophisticated human concept of survival beyond the boundaries of physical extinction, creating consoling explanations to puzzling life and death questions. Unfortunately however, finding an ultimate cause or simplified explanation adds nothing to our knowledge and understanding, since vision and focus become narrowed in this act of collapsing the hierarchical layers that in aggregate produce the very complexity that such reductionism seeks to explain. In any event, even the apparent final explanation of a Theory of Everything can only take us to the limits of what we can know and understand, and even our most sophisticated reductions produce a brink beyond which lies another infinite regress of questions, which by their very nature remain unanswered at this stage of human and scientific evolution.

Common sense physics and creation

The laws of physics, with their common sense emphasis on cause and effect on the macro level, make it very difficult for us to accept the idea that there may be no reason at all, and therefore no First Cause, for why things are the way they are. From our position within these laws, which we experience daily in our

interaction with the world, it feels intuitively right to believe that the cosmos must have been created, or at least caused, by a prior event or power. Since it is impossible to avoid an infinite regress in this kind of reasoning, the human response to such metaphysical insecurity has been to create a false sense of order and security by quite arbitrarily stopping the regress at an unjustifiable First Cause, which in reality begs the question. Early cosmogony provided an instant, mythological origin, clearly echoed in the first book of Genesis, which not only forms the basis for Western Judeo-Christianity but also underpins the genesis of Islam. A scientific shift to cosmology was provided by the practical and rational pre-Socratic search for a non-theological, self-generated *arche*, or first principle, to explain the orderly beauty of the cosmos; an exploration that generated a variety of causes, both material and metaphysical.

Four material elements – earth, water, fire and air - jostled for primacy, expanding into the early atomic theories of Democritus and Leucippus, as well as the equally startling glimmers of evolutionary thinking that we find in Anaximander and Empedocles. Such remarkable intuitive theories were to be vindicated two millennia later, and the shoulders of such early giants truly became the intellectual scaffolding of future development. On a metaphysical level, Plato's *demiurge* became the creator of the universe, turning existing chaotic matter into the phenomena of the world. But these material entities were merely inferior copies of the original Ideas of the world of true, yet transcendental, reality in which the Idea of the Good was selected as the arbitrary ultimate Cause. In Aristotle's cosmology this position was filled by an equally inaccessible unmoved Mover, who became transformed into an ever more personally involved deity during the religious intensity of subsequent centuries. The sixteenth century witnessed the steady development of sporadic, largely underground scepticism, which slowly began to scrutinize, question, counter, and even defy a previously inviolate theological metaphysics.

One thread of this new thinking moved through Hume's critique of causality and induction to Kant's own Copernican revolution, which imprisoned human knowledge within the physical restraints of human perception. We are limited

by the chance structure of our perceptual apparatus and are condemned to experience the world in a particular human mode. We cannot, for instance, know what it would be like to use sonar navigation, like bats or whales, nor are we able to enhance sensory experience beyond human limitations, except with the aid of technological adjuncts such as microscopes or telescopes. Thus any knowledge that lies beyond the physical constraints of space, time and causality may forever remain outside human perception.

The Big Bang and the limits of human knowledge

Frustrating as it is, it is undeniable that the singularity at the heart of the Big Bang - which initiated matter and the inseparable space-time of contemporary physics - by its very nature remains forever beyond human experience since it logically falls outside the laws of physics, which themselves only came into existence at that very moment. The infinite pre-explosive compression of matter entails that space had shrunk to the point of disappearance, which in turn implies that time had also vanished. "There can be no time without space. Thus the material singularity is also a space-time singularity. Because all our laws of physics are formulated in terms of space and time, these laws cannot apply beyond the point at which space and time cease to exist. Hence the laws of physics must break down at the singularity" (Davies 2001:38). It is precisely at this explosive instant that the power of mathematics breaks down, a point where we have to fall back on quantum mechanics, which relies on the behaviour of subatomic particles within the unimaginably compressed singularity of the Big Bang. "If a way can be found to permit the universe to come into existence from nothing as the result of a quantum fluctuation, then no laws of physics would be violated" (Davies 2001:53). Heisenberg's uncertainty principle states that the position, momentum and energy of subatomic particles are subject to erratic fluctuations, which makes the outcomes of their behaviour impossible to predict. This indeterministic microworld uncouples the cause and effect that we experience in the macroworld, which means that "the actual outcome of a particular quantum process is unknown and, even in principle, unknowable" (Davies 2001:53). This suggests a spontaneous, unpredicted cosmos, contrary to Einstein's view that

God does *not* play dice with the universe. This initial unpredictability of quantum cosmology not only directed the structure and evolution of our cosmos as it emerged from its chaotic birth, but such quantum uncertainties may also have blurred the boundaries of time and space at the explosive instant of the Big Bang in such a way as to obviate the need for any kind of origin of all, thus for any kind of First Cause (Davies 2001:54).

In order to be convincing, experiments have to be repeatable and must deliver the same results every time. Since we can never replicate the Big Bang, we must accept that human limitations disallow any knowledge previous to this explosive event. We cannot know, for instance, whether the outcome was but one of many possible probabilities; whether we are one of many universes that exploded from the same matrix, or even whether such a matrix exists at all. On a metaphysical level, Schopenhauer suggested exactly such a matrix by reducing Kant's mathematical plurality of *noumena* (humanly unknowable things-as-they-are-in-themselves that lie behind the phenomena of the world) into a singular, undifferentiated *noumenon* behind the reality of these phenomena as we perceive them. Both philosophers argued that the physical universe was matter in motion; that matter and energy were transmutations of one another. Although these conclusions were reached purely through epistemological analysis, twentieth century physics has confirmed these early theories of matter and energy, remarkably developed a hundred years earlier (Magee 1987:218). Schopenhauer's interplay between the blind force, or Will, of the *noumenon* with the matter of phenomena features as a possible precursor to wave-particle duality, which similarly permits two ways of observing the same thing. It is therefore not surprising that Schrodinger, the founder of quantum mechanics, was "consciously and enthusiastically a Schopenhauerian" (Magee 1983:146). How we apprehend the world is shaped and curtailed by the way in which our perceptual apparatus has evolved, and these physical restrictions therefore impact on what we may claim to know. We are perceptually structured through accidents of evolution in such a way that we can only experience physical phenomena, all of which are the outcome of the contact of our senses with energetic particles. The inaccessibility of a

noumenon behind the reality of the physical world is as perplexing as the impenetrable barrier that confronts us at the moment of the Big Bang.

The problem of the first moment of creation could be avoided through understanding the existence and activity of black holes. These are formed in space as a result of areas of gravitational collapse which are so intense that nothing – not even light - can escape the pull of the gravity inside an area known as a black hole event horizon. An imploding star collapses gravitationally into a black hole, within which matter is compressed into great density. Our own origin lies in an explosion from exactly such a dense state, the Big Bang, from which our universe expanded. “Is it possible that these are one and the same dense state? That is, is it possible that what is beyond the horizon of a black hole is the beginning of another universe?” (Smolin 1997:109). This possibility creates an holistic vision of an endless process of cosmic birth as collapsing stars gravitate through connecting umbilical wormholes into exploding baby universes elsewhere (Davies 2001:65. Ferguson 1995:115). Under suitable conditions such universes may develop in similar fashion to our own, perhaps prompting their own future possibly intelligent beings to speculate, as we do, that they live in universes that originated in infinitely dense singularities. “But in reality they would be living in a new region of space and time created by an explosion following the collapse of a star to a black hole in our part of the universe” (Smolin 1997:110). In this explanation there is no requirement for a First Cause since the universe of space-time and matter is “internally consistent and self-contained” (Davies 1993:61). Nevertheless, if time, space and matter become interwoven in this way into what may be an infinite cosmic tapestry, we are still left with an infinite regress of perplexing questions to which we may never find answers.

Science and the Big Bang

Despite the limitations of human perception and abilities, science has made enormous strides in a very credible process of reverse engineering, which

serves to reinforce the Big Bang theory as explanation for the birth of our particular universe. In theory we are able to return close to that first microsecond of existence when space and time, matter and energy came into being, possibly from the explosive, compressed energy of a black hole as demonstrated mathematically by Stephen Hawking and Roger Penrose in 1970 (Filkin 1997:104). The unimaginable heat of this moment generated both matter and antimatter. A slight preponderance of matter gave it the edge as particles and anti-particles destroyed each other in subsequent collisions. This chance survival of particular matter provided the physical matrix from which our entire universe evolved, including our own solar system, our earth and all that has evolved on it. Intense initial temperature kept the expanding universe in an opaque plasma state, but as it cooled it allowed the uncoupling of subatomic particles, and the universe became transparent to light as photons were liberated. Uncertain quantum interactions between stable residual elementary particles of matter – protons, neutrons and electrons, neutrinos, photons and gravitons – together with the four forces – gravitational, electromagnetic, nuclear and weak – constitute the conserved matter and energy content of the Universe. After this decoupling process, only photons remained evenly distributed, whilst other matter became randomly dispersed, caught up in chemical processes more powerful than the fabled philosopher's stone, transmuting nuclear particles through atoms and molecules, and from such insignificant beginnings as dust grains, churning out increasing amounts of incrementally heavier elements, transforming matter into stars, planets and galaxies. There can be little doubt that evolution forms as much of a *leitmotif* in cosmology as it does in the subsequent development of organic life.

The coupling of chance with the operations of simplicity, chaos and complexity

The apparent simplicity and order of macro-structures, which are visible to human eyes, belies the complex and chaotic processes that forged their emergence. Unpredictable events fuelled early cosmic development, channelling evolution to where we find ourselves, on this particular planet, in this particular galaxy in a vast cosmic space that seems to speak to us in a simple

language of design and order. Our experience of large-scale chaotic events becomes reassuringly subsumed as somehow part of a simplistic plan, and most people remain unaware of constant, minute chaotic upheavals that underlie final outcomes. Chaos theory argues that chaos is not a synonym for chance; that it is “*not* just a fashionable new name for ‘random’” (Stewart 1997:279). Although unpredictable, chaos is generally regarded as necessary disorder which functions erratically within overarching deterministic laws, and the variability that such instability produces is vital in the emergence of complexity. “There is a difference between the role of chance in quantum mechanics and the unrestricted chaos of a lawless universe. Although there is generally no certainty about the future states of a quantum system, the relative probabilities of the different possible states are still determined” (Davies 1993:15).

Accordingly, it seems that although we cannot predict the outcome of quantum chaos, there is some inherent theoretical braking system that acts in some indefinable way in determining or directing the ultimate outcome from an unspecified multiplicity of probabilities. This raises serious questions as to whether the conception of the individual through sexual reproduction depends on the operations of chance or necessity. Does it mean that there is some determinism in the random nuclear changes that occur during *meiosis* that in some way narrows down its apparently limitless probabilities, thus directing the final emergence of each individual? This seems improbable when one examines the complexity and infinite variety that results from the sheer randomness of sexual interactions and blendings. During this process, the paternal and maternal chromosomes in the developing sex cells of their offspring become randomly scrambled in each and every developing sperm and ovum produced by the unborn male and female offspring, respectively, during their intra-uterine development. As a result, the genetic material of each gamete is unique. The random, often multiple transfers of genes during this process of chromosomal crossing-over is totally unpredictable, largely ensuring the diversity that is essential to life itself. This chaos of *meiosis* is an invisible sub-theme to the visible outcomes-based determinism of biological laws,

producing the infinite individual variety within each species. These overarching laws necessarily ensure the end product of complex life, a totality that transcends the multiple individual processes giving rise to it. But even if we accept that non-linear chaos plays a constructive role in the diversity of complex structures, it essentially remains random disorder, which impacts on the linear outcomes. This unpredictable shuffling behaviour of chaos – or chance – is responsible for a vast multiplication of probabilities. By definition, each and every probability stands a chance in this equal opportunity gamble. This entails that the final outcome – whether of inorganic cosmic structures, or organic humans – remains scientifically unpredictable and therefore undetermined.

Murray GellMann argues that the fundamental laws of nature are intrinsically simple. This includes the simple initial condition of the universe at the time its expansion began, as well as the potential simplicity of the proposed superstring theory in which elementary particles consistently collapse into smaller sets of subatomic particles, ultimately quarks. However, since these simple, fundamental laws are quantum-mechanical and indeterminate, a constant interplay between potential, multiple probabilities and the operations of chance influence the ultimate fine-grained outcome from what Gell-Mann calls the “alternative coarse-grained histories of the universe”. This suggests that the potential outcomes to the indeterminacy of quantum mechanics numerically exceed Heisenberg’s famous uncertainty principle. Indeterminacy can be amplified in non-linear systems, as for instance, meteorology, where the final outcome is arbitrarily sensitive to pockets of chaos that may be caused by unpredictable instabilities inherent in the initial conditions (Gell-Mann 1994:368).

Concealed disorder

Humans experience a “classical” world of stable objects, which act in fairly simple, predictable ways. Survival at the simplest level rests on the reliability of

features in our environment that behave within the surety of large-scale laws of cause and effect. Quantum physics gives another description of the world that is equally consistent with reality, but we may be sure that any creature perceptually structured to experience the world at the level of subatomic particle activity would fail to survive. Because we generally experience such large scale, orderly patterns based on causality, we are as unaware of the continuous random events occurring on the most explosive and gargantuan scale in nebular cauldrons as we are of invisible fluctuations that occur around us on a molecular level in phenomena such as waves, gases and liquids.

Similar and equally unpredictable density fluctuations in the early cosmos turned the simpler, original mix of hydrogen and helium into large-scale gas clouds, which were fragmented by the force of equally random, local areas of gravity. Chaotic, violent gravity fields separated matter and voids, inevitably affecting cosmic geography, as can be seen in subsequent variations of scale and structure of galaxies throughout the universe. Even closer to home, the planets in our own solar system are all dramatically different, depending on the position, relative to the sun, in which they finally settled after some form of equilibrium had been attained. Such scientific principles are sufficient to explain the variability of structures that emerged from these random and unpredictable cosmic actions and reactions.

Our general reluctance to jettison the comfort of some power outside human agency leads to the idea of a designed universe in which life may be seen as planned, necessary and meaningful. But the concept of a plan logically and necessarily implies a creative source outside the plan, which, as we know, leads inevitably to the infinite regression of a first cause, since each requires its own previous cause. Deterministic arguments have to explain chaos as a deliberate strategy if it is to be included as a necessary part of a controlled, cosmic master plan. This of course contradicts our normal understanding of chaos, since this by definition is unplanned, occurring, like the “butterfly effect”, in response to sometimes “minute, unmeasurable variations in the initial conditions” (Honderich 1995:129) and therefore the antithesis of order

and design. Furthermore, careful planning, which increases exponentially with the complexities of any project, is undertaken precisely to avoid accident. The ingredients in this cosmic kitchen may of necessity have produced a cake, but even foolproof recipes are subject to unquantifiable vagaries in conditions, despite using the same ingredients. Since we can never verify whether a repetition of the Big Bang under identical initial conditions would of necessity yield the same cosmos, it is probable that, given the *same* initial conditions, the physical evolution of the universe would follow a *similar* pattern, culminating indeed in the formation of stars, galaxies and galaxy clusters. However, since nothing can ever be duplicated exactly, in such a re-enactment the inherent quantum unpredictability of random turbulences would surely produce structures differing to some degree from those that actually are in existence. Such differences would necessarily have created a further ripple effect on the formation of structures such as our solar system, in turn impacting on the geography of our earth, the development of biological life and therefore on our own lives.

Our accidental solar system

The genesis of our own solar system is the result of a chance Supernova explosion in our own galaxy, one stellar blast amongst millions, significant to us only because it led to the formation of our own planet. In an explosion of this kind the violent turbulence and outward supersonic whiplash of freshly synthesized elements are manipulated and “smeared out” into uneven, irregular ripples of matter by contrary forces of expansion, compression and gravity. Opposing forces by their very nature are unruly and uncontrollable and must have had an unpredictable effect on the final details of our solar system. In the aftermath of this stellar death, random dust grain collisions formed a field of planetismals, which gravity gradually coalesced into our particular solar system, with solid planets closer to the central sun and the Jovian gas planets taking shape in the outer, cooler areas.

Given the matter and forces in operation, a solar system *would* have evolved; however, structural details such as planets, moons and orbits would have depended on probabilities provided by smaller scale erratic behaviours of matter and energy. Slight differences could have produced a larger Jupiter, for instance, giving us a double star system, which would have impacted critically on the future of the earth and emergence of organic life on it. A chance failure of planetismals to coalesce into the planet which should theoretically have orbited between Mars and Jupiter left this area of space strewn with the fragments of the Oort cloud in the shape of meteors, asteroids and comets. Such chance fluctuations in the concentration of matter and opposing forces have spawned space debris that remains a constant threat to the continued existence of organic life on earth. Their periodic, unpredictable collisions with earth have been implicated in past cataclysmic mass extinctions such as the destruction of the dinosaurs. That particular meteor impact opened an environmental niche, which allowed the flourishing of mammalian evolution and the ultimate emergence of the human species. The pock-marked surface of the moon shows eternal scars from such space bombardment, whereas similar impact craters on earth have been camouflaged by its own dynamic, regenerating activities. Evidence of recurrent accidental impacts from space suggests the possibility that we may one day suffer the same fate as the dinosaurs. As astronomers chart the orbits and trajectories of asteroids and meteors, it is clear that we are at risk of future blows from space, of collisions that may have a devastating effect on the earth and the destruction or further evolution of biological life.

Even the genesis of our moon may have been accidental, sliced off from the earth by the chance impact of a large planetismal (Kutter 1987:213). Its impact occurred at an angle and speed that sheared sufficient hot debris from earth to coagulate and coalesce into our moon. The rotational pull of the moon not only keeps the earth stable on its axis, but it also regulates the angle of tilt of the earth in relation to the sun, thereby ensuring reasonably dependable global climatic conditions. If we had no moon, our fate would be more like that of Mars, where the absence of such lunar control over its axial wobble has created

climatic conditions so extreme that land-based life is impossible. Such cosmic roulette ultimately dictated the structure and behaviour of earth itself, and its fortuitous position in relation to the sun created suitable conditions for its further evolution as a home for organic life. Ironically, the accidental genesis of our moon may ultimately hasten the earth's destruction. The moon's receding orbit spins it away from us at a rate of one and a half inches a year, inexorably increasing the length of our day. In time it will affect the tilt of the earth, impacting in turn on the climate, and therefore on the future of the earth and the biological life that it contains.

The only chance of life as we know it?

Such accidental influences and outcomes in our own solar system justifiably allow us to assume, firstly, that the emergence of life anywhere else in the cosmos would require a similar, rich evolutionary process, and, secondly, that the end product may turn out to be markedly different to our own, in response to the different triggers provided by random events. In much the same way as earth provides different ecological niches, which affect the course and diversity of biological evolution, we can imagine different evolutionary niches amongst planets circling the billions of stars just in our *own* galaxy. It is generally agreed that organic life, however different from our own, could also evolve in environments containing elements beyond basic Helium and Hydrogen, and solvents other than water, such as liquid ammonia and liquid methane. The operations of chemical bonds at much lower energy than earth's biochemistry would make such environments quite capable of sustaining evolutionary processes (Churchland 1984:151). However, any other planet with the potential for organic life would – like earth – have to be ideal in terms of both constitution and position relative to its sun so that its liquid medium is neither boiled nor frozen, as in the cases of Venus and Jupiter respectively in our own solar system.

If organic life were to evolve under initial conditions so markedly different, it could certainly not be expected to parallel ours. A striking feature of evolution

is its non-repeatability: the manifold biological and physical components which themselves all continue to evolve and interact with one another within endlessly diverse ecological niches make exact replication physically and logically impossible. Even the evolution of multi-celled, sexually reproducing life elsewhere would not necessarily entail hominid evolution, which was specific to interlinking accidental events peculiar to evolution on earth. Like the Big Bang, it is impossible to re-run the emergence of human life, which may well be a unique outcome, an event that could happen only once, thus having an *a priori* probability close to zero (Monod 1971:144). However, even the possibility that it may have been a unique event does not necessarily imply that it was in any way designed or inevitable. Nor was the chance evolution of our human, technological society either predictable, or necessarily superior to a possible evolutionary outcome elsewhere. The appearance of life, including human life, could never have been predicted as a necessary outcome from the equally unpredictable quantum uncertainties of the Big Bang. “The universe was not pregnant with life nor the biosphere with man” (Monod 1971:146).

The cosmos is filled with a pervasive cloud of inorganic carbon compounds. Biological evolution in our own biosphere is only one expression of the potential fecundity of this universal “cloud of vital dust” that “forms a huge cosmic laboratory in which life has been experimenting for billions of years” (de Duve 1995:293). Many evolutionists consider the emergence of intelligent, human life as unique, as a once-only stroke of luck. In tracing evolution over billions of years, from primitive prokaryotic cells through a slow process of increasing complexity to human life, it is clear that the entire chain of linked events depended crucially on the domino effect of specific genetic changes occurring at particular times under particular conditions. Any alternative movement of a single metaphorical domino could have changed the whole history of life. “Its conclusion is incontrovertible. Should things start all over again, here or elsewhere, the final outcome would not be the same” (de Duve 1995:294).

The paradox of individuality in diversity

Individuality is paradoxically nestled within the polarity of diversity, echoing the equally paradoxical partnership between visible order and submerged chaos. As multiple, branching randomness underlies the apparent unity and singularity of the cosmos, so also diversity is the seething bedrock from which the particular individual emerges. Diversity and individuality are hallmarks of existence. They are present everywhere and have come about because of the exponential effects of a never-ending cascade of chance events, not only shaping the evolution of the cosmos but also the infinite variety of organic life. This dynamic process remains part of our continuous evolutionary metamorphosis. Even inorganic structures, such as stars, exhibit an individuality that is dependent on the conditions of their genesis, so that their lifespan and final end depend on their size, temperature and luminosity. These factors dictate whether they are main sequence stars, red giants, yellow and red supergiants or white dwarfs; whether they explode noisily and brilliantly, hurling their evolutionarily enriched contents into interstellar space, or whether they expire with a cosmic whisper. These stellar events in turn affect cosmic geography on a larger scale, accidentally impacting on the structure, speed and direction of galaxies. Resultant galactic collisions and fusions are ongoing chaotic events that by their unpredictability make it impossible to predict the future shape of the universe.

Despite the elemental commonality that intertwines all existence, the expression of individuality is an intrinsic feature of everything that exists, from a grain of interstellar dust to a galaxy or, on our own planet, from a water droplet to a blade of grass, to an animal or human being, to the most complex individuality of each human brain, from which arises the experience of each unique consciousness. It is this very proliferation of complexity that limits the usefulness of reductionism, although there can be no doubt that this process is an indispensable aid to greater understanding of how the parts combine and interact within a total entity. Individual puzzle pieces combine to reveal a picture, but the puzzle itself cannot be the complexity of what its picture represents.

Individual identity

To our limited perception things may appear similar, but even a miniscule difference in atomic content or configuration ensures that nothing in existence is ever identical to anything else, which logically entails that nothing can ever be replicated. Perceptually blind to such microscopic differences, our impression of order and permanence is reinforced by our experience of repetitive, large-scale wave-like occurrences such as seasonal changes and the daily rising and setting of the sun. “The human mind has to learn to mistrust its native tendency to run away with itself and see pattern where there is only randomness” (Dawkins 2004:216). In actuality, even every process differs from every other one in some small detail, much as the ripples caused by a stone being thrown into a body of water differ from one another. On a microscopic and subatomic level each ripple is unique, depending on the size and shape of the stone, the angle and velocity of the throw, and its impact on the volatile structure and motion of the water. It is this state of universal flux that makes it impossible, according to Heraclitus, to step into the same river twice. Even each daily revolution of the earth differs in some respect from every other. Such repetitive macroscopic patterns, despite their inherent microscopic differences that lie beyond human perception, create an illusion of recurrent identity, reinforcing our belief in the security of immutable natural laws (Brill 1956:9).

The impact of chance on reproduction

Despite clear and objective evidence that humans are governed by the same laws as all other life, we succumb easily to the allure of explanations that give our lives greater meaning and a moral worth that is denied to non-humans. The strange dualism we experience in being self-conscious has become fertile ground for the belief in an immaterial identity, which will survive the laws of physics by transcending death through some mystical gateway available only to humans. This sense of mystery easily translates into a subjective feeling that existence implies design on a personal level, a belief which can only truly be sustained by ignoring the enormous role played by chance in the reproduction of each unique individual.

Sexual reproduction slowly evolved over time and its convoluted operations are responsible for introducing diversity into the genotypes and phenotypes of offspring. Simply put, DNA consists of corresponding pairs of chromosomes that carry the genes, and an individual randomly inherits one of each pair of chromosomes from the father and one from the mother. This means that each offspring has totally different sets of chromosomes from other siblings who emerge from the same parental lottery, whilst they are all different from both parents. In addition to these accidental variations, sexual reproduction introduces further genetic shuffling during a process known as “crossing over”, when a pair of corresponding chromosomes – one from each parent - may randomly exchange material during the formation of a sperm or an egg in the new offspring. This crossing over of chromosomal material in the gametes of the new offspring creates an unpredictable mixture from both maternal and paternal lines, specifically from four grandparents. By providing such endless variety amongst the individuals of each species, this totally randomized process increases their chances of survival, for instance, by making it difficult for potential enemies, such as parasites, to adapt to the ever-changing conditions in the individual members of successive generations (Gell-Mann 1994: 253).

It has been suggested that even sexual reproduction itself arose purely by chance through a primitive form of cannibalism. It is possible that the DNA of early prokaryotic cells, which cloned themselves through asexual cell division, may have been damaged by ultra violet radiation prior to the formation of the protective ozone layer around the earth. The solution to extinction lay in cannibalising neighbouring cells, using all or part of the newly ingested DNA in order to effect the necessary repair. With subsequent cell division the new blend of DNA was passed on to the next generation, becoming a possible precursor to the development of sexual reproduction in the more complex eukaryotic cells (Small 1993:19).

True determinism

It is only after the convoluted accidents that precede fertilization that absolute determinism takes over, since the mingled genetic material present in the nucleus of the fertilized ovum dictates the outcome. The absolute individuality of such genetic randomness means that we cannot choose to be other than what we are: we cannot choose to alter gender, race or attributes such as eye colour or height, nor can we choose to be an Einstein, Mozart or Shakespeare. Conception is affected by a great number of factors, but it is a race to the solitary female egg that can only be won by a single sperm from approximately 500 million starters in a single ejaculation. The wasteful prodigality of sperm to ensure that fertilization – *any* fertilization – takes place, should serve to undermine the myth of a designed life, for which the prescient and deliberate production of only one specific sperm in fusion with an equally specifically chosen ovum would be required. If each human life that survives the intense difficulties of fertilization and gestation is in fact planned by some form of Intelligent Design, we are faced by the logical corollary that those fertilized ova or embryos that die were therefore either unplanned and therefore accidental, or else part of an unnecessarily cruel deterministic process.

The new science of cloning is truly deterministic, since it quite deliberately produces an exact physical replica of the DNA donor because it intentionally excludes the extremely unpredictable genetic blending that occurs during sexual reproduction. The number of ways in which genetic material can be presented in human eggs and sperm is breathtakingly estimated to be about 10 to the power of 2000; numerical probabilities that exceed and are even more difficult to comprehend than the staggering number of protons in our universe, which is put at a fraction of this, at 10 to the power of 80 (Kutter 1987: 259).

Fateful fertilization

This chance meeting of two gametes is itself preceded by a historical river of chance meetings and choices to mate, increasing exponentially in a backward direction, infinitely increasing the sheer accident of birth for each and every individual. Fertilization itself functions like a miniature Big Bang, since at that

moment space, time and matter similarly come into being on an individual level. As in the case of the cosmic Big Bang, there is no method of replicating each individual event. The closest we come to this is in the case of identical twins, clones at a macro level, issuing from identical initial conditions as the fertilized ovum splits into two individuals that thus have identical DNA. However, even in this case there are differences. Apart from the individuality of the fingerprints of such monozygotic twins, there are other, often subtle, differences in such identical siblings that seem to occur in response to differences in individual sensitivity to chemical influences and other events during uterine development. If it were possible to re-run the fertilization of any individual from the original gametes, in the original uterus, we would find that, although the end result seems identical, variables in operation during the gestation process could affect the final outcome. Accidental chance mutations, or disruptions in chemistry could be severe enough to recreate an individual sufficiently different or damaged to impact enormously on its future development. It is difficult to attribute such crippling physical and mental outcomes to anything other than accidental outcomes of an unpredictable series of events.

Cultural chance

After a hazardous beginning through this random process of fertilization, the individual is faced by a life fraught with chance, such as surviving gestation and birth without defects; hosts of viruses and bacteria; accidents and genetically inherited diseases. Genetically determined race and gender also have an enormous effect, both on our own conduct, as well as on the attitudes and conduct of others. History is laden with human action dictated by prejudice, bigotry and hatred of the “other”. Such behaviours have largely been shaped by the historical, cultural and religious beliefs of the group into which we happen to be born.

Geography plays an equally accidental role. It dictates the language and tribe or nationality that we inherit at birth, which may at some time involve the dangers of conflict that could escalate into terrorism, warfare or genocide. Such

accidents of birth led to the fearful extermination of nearly a million Tutsis in Rwanda, or six million Jews during the Second World War, inarguably the pinnacle of historical pogroms directed against them. An ironic twist is provided in the historical tales of the Old Testament, the basis of three major religions, in which Yahweh instructed his chosen people to destroy all men, women, children – and even their animals – in groups whose accidental nativity placed them outside the pale of his protection. Divine sanction similarly brought the deliberate extermination of each and every Egyptian first-born – human and animal – during the Exodus. Hatred and persecution has a long history and remains visible in our own time where our accidental nativity may make us either predator or prey.

Where we are born may also hold environmental dangers such as famine, epidemics, earthquakes, floods, violent storms, or the savage destruction of sudden tsunamis arising from submarine faults. The unpredictability and impartiality of such natural disasters highlights the decisive and accidental role that geographic locality plays in the lives of individuals. In addition to the chance effects that group membership and geographical locality may have on the future and fate of the individual, the social milieu within the natal culture often dictates the shape of individual lives, particularly where there is little hope of breaking through social stratification and prejudice. An extreme example is to be found in the rigidity of caste in India, which stigmatises millions of *untouchables*, condemning them to unbearable conditions purely through the accident of their birth. No amount of rationalization can make such dire punishments of helpless creatures the outcome of a carefully constructed plan.

Chance and free will

Chance plays an invasive, intricate role in our entire life cycle. We have no choice or free will in our own conception and very little control over our own death, unless we commit suicide or arrange our own euthanasia. In addition, the choices we make between these polarities are unarguably affected by a vast network of genetic and environmental chance, shaping not only who we are,

but the nationality, culture, religion and ethics we embrace, generally by no other virtue than their very propinquity. There is also increasing support for the thesis that genetically individualistic brain structuring shapes intellectual ability, as well as temperamental and behavioural predispositions. These may in turn be altered or affected positively or negatively by internal or external events or influences, most of which would be considered to be accidental.

The individuality of brain structure

Although a whole history of evolution has shaped the genetic blueprint for the structure and general wiring of the brain, no two individuals have the same neuronal connections, not even identical twins. Although the human brain contains the sum total of its neurons at about five months before birth, the connections between the neurons change during embryonic, and even more so, during postnatal development. An extraordinary natural selection takes place in the brain as certain circuits are strengthened through repetitive usage whilst others fall away, a life-long sculpting process in which the “Darwinism of the synapses replaces the Darwinism of the genes” (de Duve 1995:241). Dubbed “neural Darwinism” by Gerald Edelman, the selective processes that shape the unique brains of genetic individuals in response to chance stimuli in utero continue to be heavily influenced by the accidental nature of the post-natal environment, which shapes the cultural, religious, social, emotional thinking and behaviour of the individual. The way we nurture our children shapes the nature of future generations.

Unplanned but inevitable complexity

There seems to be a growing consensus amongst scientists and philosophers that the appearance of conscious intelligence can be regarded as a natural outcome of billions of years of chemical, biological and neurophysical evolution during which suitable matter became sufficiently sophisticated for the emergence of such complex neurological development (Churchland 1984: 147). Evolution is driven by random mutations and adaptations and, although the brain is the most dramatic physical outcome of this biological process, brain activity is that part of this evolutionary outcome that is not directly observable.

Such access is restricted by the structure and limitations of human perception, in the same way as direct apprehension of many other entities, such as subatomic particles or other supernatural creations of the brain, lie beyond human ability. The evolution of cognition, imagination, memory and consciousness within the brain become extensions of an unpredictable and unplanned evolutionary selective process that underpins the power of survival.

Consciousness

Consciousness has until recently seemed impregnable and irreducible, and has commonly been seen as a mysterious link that binds humans to an even more mystical and exalted spiritual plane. Other animals undeniably exhibit consciousness, but the problem of other minds and their inherent inaccessibility even in our own species necessarily reduce our ability to quantify the difference between human and animal consciousness. We are undeniably, and in some cases spectacularly different, but the principle of a continuity of sorts argues in favour of a difference only in degree. The chemical structure and functioning of DNA is invariant and applies to all life forms, from bacteria to humans. Since the basic matter and processes of life are universal, the great variety of species is produced by differences in genetic complexity, much as different cutters can produce a multiplicity of biscuits from the same basic dough. Obvious differences between genetically close species, such as chimpanzees and humans, are merely due to chance events that drove human evolution along a different route, at a different pace.

Conscious intelligence

Conscious intelligence is not the prerogative of humans, since its simplest definition, as complex responses to changes in the environment, could apply to a broad spectrum of creatures. A more acceptable version, which includes developmental learning and creativity, narrows the field considerably, but certainly does not limit it to humans, as multiple studies of related primates continue to reveal. Despite the fact that higher apes undeniably display self-conscious behaviour, our anthropocentrism encourages a schism, which not only averts our eyes from an uncomfortable identification with them, but

elevates human consciousness into theological teleology. If we accept the reductionistic sentimentality that claims that we are all stardust, adding a pleasing glow to an accidental carbon alchemy in the interior of stars, we should remember that we are presently, and perhaps only briefly, the perceived apex of an endless morphogenesis as the “selfish gene” asserts the real purpose of life. “In a universe of blind physical forces and genetic replication, some people are going to get hurt, other people are going to get lucky, and you won’t find any rhyme or reason in it, nor any justice” (Dawkins 1995:155).

The extinction of several earlier hominid lines undermines the illusion of deliberate design, which, by definition, logically precludes such multiple experimental stages. This leaves us with Darwin’s “dangerous idea”, that humans are descended from ancestral apes. The next chapter will narrow our gaze to the evolution of terrestrial life forms, examining in particular the key differences and similarities between human primates and other ape lineages, which by chance meandered along other evolutionary byways.

CHAPTER TWO

WHO'S APING WHOM?

A comparative examination of the similarities and differences in human and animal biology and behaviour, with particular emphasis on chimpanzees.

"All creatures are involved in the life of all others, consequently every species ... all nature is in a perpetual state of flux. Every animal is more or less a human being, every mineral more or less a plant, every plant more or less an animal ... There is nothing clearly defined in nature ... so nothing is of the essence of a particular being ... No, presumably because there is no quality which any given being does not share with some other, and it is the greater or less proportion of that quality which makes us attribute it to one being to the exclusion of another"

Diderot: D'Alembert's Dream :181

Introduction

This chapter will show that humans are arguably the apex of the evolutionary pile. Despite very real differences, particularly in cognitive function, their similarities in biology and behaviour can be used to demonstrate that present day ape lineages, including humans, are simply divergent outcomes of random evolutionary selection in response to differing environmental pressures. That accidental differences in brain structure qualitatively changed and increased the cognitive abilities in humans certainly does not constitute either necessary or sufficient reason to categorize human cognitive complexity as a supernatural force or essence that is denied to other sentient beings.

As argued in the previous chapter, our own solar system may be considered as one of the chance outcomes of the Big Bang, which brought into existence the space, time and matter of our cosmos. The variety of the universe evolved over time as chemical changes transmuted the original hydrogen and helium into the heavier elements that are part and parcel of our own solar system. Since the earth is a fragment of this cosmic outcome, it remains subject to these same forces, and changes occurring within it and on its surface are part of an ongoing process of evolution. This terrestrial metamorphosis may take a

different direction, or be totally obliterated at any time by unforeseen, chance events occurring on earth itself, or initiated from without by cosmic cataclysms.

Organic life arose on earth about 4 to 5 billion years ago. It is generally believed that this was due to an evolutionary transition from inorganic to organic life, although some scientists – among them Fred Hoyle and Francis Crick – suggest panspermia, which proposes that the earth was seeded with life that originated from somewhere else in space (Kutter 1987:304). Recent discoveries by Deep Impact appear to bolster this thesis, suggesting that the presence of water and carbon-based molecules within the structure of comets may indicate an origin to organic life from impacting asteroids, comets or meteors. Whether earth-bound, or initiated from space, organic life is ultimately a complex, evolutionary variation of the same basic chemical atoms and subatomic particles and bonds of inorganic life.

Emerging order

The origin of life, in which order emerged from the disorder of earth's evolution, was made possible by the fact that it is a semi-closed system which allows a constant flux of energy as the heat from the sun washes through it on its way towards the frozen darkness of space. Had things been otherwise, earth would either have subsided into the inertia of universal equilibrium, a state in which nothing happens, or its initial disorder could have accelerated to the point of destruction. However, the inertia of the second law of thermodynamics applies only to closed systems in which energy and matter are totally contained. This may well be the case in the cosmos as a whole, which could therefore be rushing to a final disorder of obliteration. However, in systems such as the earth, which are open to the flow of energy and matter, it is possible for order to arise from disorder, and for systems – over vast expanses of time - to become increasingly ordered and even more complex. This could indeed explain how something as intricate as the human brain could have evolved from the primitive stirrings of unicellular life in primeval puddles.

Living things

Each living thing, like the earth itself, can be defined as “any semiclosed physical system that exploits the order it already possesses, and the energy flux through it, in such a way as to maintain and/or increase its internal order” (Churchland 1984:153). This broad definition of life spreads beyond multicelled plants and animals, logically including not only the biosphere itself, but even inorganic structures and processes such as termite colonies, beehives and candle flames: “There is no metaphysical gap to be bridged: only a smooth slope to be scaled, a slope measured in degrees of order and in degrees of self-regulation” (Churchland 1984:153). If all phenomena are in fact structural variations of the same basic matter, then it can logically be argued that even the enormous difference between non-living and living systems is really only one of degree. Even minimal requirements for life, such as self-replication and evolutionary adaptation, would oblige the inclusion of certain clays that not only reproduce themselves by a process of accretion from their surroundings, but that also participate in an evolutionary process of crystalline change that allows them to survive by adapting to environmental pressures within particular ecological niches (Tudge 1995:327).

However, although such an awareness of the continuity of life forms extends our understanding and adds flexibility to our thinking, the limitation of human perception, together with the practical demands of survival, promote a narrower definition of life that essentially discriminates between the intrinsic passivity of inorganic life, and dynamic, energy-processing organisms. “On a commonsense level, we recognize a difference between ourselves and rocks, trucks, and thermostats. Things may happen to rocks, but rocks do not experience them happening” (Peterson 1999:287). So it has become inevitable that life is generally equated with biologically mobile, breathing organisms, in particular, with animals and humans. It is precisely this narrowing of vision that has encouraged the perception that the experience of consciousness is so uniquely human as to elevate human life to an unnaturally different and superior level.

Unfortunately, this commonsense view of the radical differences between organic and inorganic life is generally extended to include all species that lie below the hallowed human category. Speciesism, as defined by Peter Singer, “is a prejudice or attitude of bias toward the interests of members of one’s own species and against those of members of other species” (Singer 1977:7). The inability to understand and appreciate the continuities that link all life forms, particularly mammals and specifically higher primates, has produced “a speciesist world indeed, dominated by the discontinuous mind” (Dawkins 2004:29). The clarity of Darwin’s vision has not yet truly illuminated the world. He felt sure that the explanatory power of what he called the “community of descent”, based on the commonality of structure and development of man and other mammals, would replace the common belief “that each was the work of a separate act of creation”. For Darwin, “only our natural prejudice, and that arrogance which made our forefathers declare that they were descended from demi-gods” stands in the way of accepting the common ancestry of all animal life (Darwin 1981:32).

Practical classifications

Our first practical classification certainly is provided by the distinction between organic and inorganic life. The simplicity of the two traditional organic kingdoms of plants and animals has over time, through increasing knowledge, broadened into five categories of monera, protists, fungi, plants and animals. This has helped to create a smoother and more accurate scale of living organisms, on which structural complexity appears to run parallel with an increasing intricacy of nervous system development. Bacteria, amoeba, moulds and plants, representative of the four lower kingdoms, are inarguably alive as semi-closed living systems. They interact and thus evolve within our shared environment, impacting on our own lives in myriad ways, both harmful and beneficial. Yet the absence of nervous system and brain in these four kingdoms signals a great divide between the way in which we are required to consider and behave towards these organisms as compared to members of the animal kingdom, which all display clear evidence of nervous system development, from

the simpler, functional nervous system of invertebrates to the complex, central nervous systems of vertebrates.

Primitive consciousness

Like life itself, consciousness seems to operate along a continuum of increasing complexity. The simplest expression of consciousness may be seen in the proprioception of primitive organisms, an innate bodily awareness in response to stimuli, whether external or internal, which directs action to maximise survival. Since it operates in such cases at an existential level there seems to be no necessity to postulate mental states. Such behaviour occurs in the simplest organisms, empowering even an amoeba or paramecium to “swim towards food, or away from danger. It can negotiate obstacles and even learn by experience. Clearly it is capable of complex and sophisticated activity; yet it does not possess a single neurone” (Penrose 1995:22). This essential consciousness is therefore a widespread phenomenon, which, with the development of sophisticated central nervous systems, becomes expanded into increasing levels of self-awareness in the higher primates, and, in some cases, to a consciousness of other minds.

Corporeal consciousness

Maxine Sheets-Johnstone argues convincingly for a revision of the widespread belief that consciousness is a “higher-order” function that operates in upper levels of life, more particularly as a pre-eminently human endowment. Consciousness can rather be more accurately explained as “a dimension in the evolution of animate forms ... that itself evolved along with living, moving creatures themselves”. The tactile discrimination that is inherent in what she calls “corporeal consciousness” may thus be considered as the earliest locus of evolutionary consciousness, present in even the most primitive animate forms such as bacteria and protozoa. Defined as “a sense of awareness of the position and movement of the voluntary muscles of the body”, it endows all organisms with a sense of *knowing*, fundamental to survival, in respect of their own bodies as well as in relation to bodies outside their own. This makes them “sensitive to

the movement of things in their environment, including the very medium in which they live, and to the movement of their own bodies” (Sheets-Johnstone 1998:278). We take this vital proprioception for granted despite the fact that “it is fundamental both to our ability to make our way in the world – to move knowledgeably in it – and our knowledge of the world itself. Though we may have forgotten what we first learned of the world through movement and touch, there is no doubt but that we came to know it first by moving and touching our way through it, in a word, through our tactile-kinaesthetic bodies” (Sheets-Johnstone 1998:275). I would argue that an embryo probably acquires its sense of bodily awareness during its intra-uterine growth and development. Perhaps it is during this process that the intuition of space (and perhaps even time) literally become flesh, wired into the architecture of the developing brain through direct, non-conscious experience, conflicting with Kant’s *a priori* categories that lie outside experience (Kant 1996:50). Perhaps this “kinaesthetic consciousness” represents a sixth sense that may have been overlooked. Conversely, it may be an un- or non-conscious aspect of the sense of touch which, according to Aristotle, is the “primary form of sense ... which belongs to all animals ... touch can be separated from all other forms of sense” (in Hoy & Oaklander 1991:200). Contact with the external world precedes the evolutionary development of sense perceptions. “The moment of contact is the beginning of everything ... (I)t is only after the contact has occurred that the sense perceptions are brought into play. Everything then hinges upon the chance occurrence of contact of the living organism with the external world” (Brill 1956: 32).

Non-human minds and consciousness

In deciding which creatures have minds, we can only use human minds as the standard. The attribution of minds is not always clear-cut, since we may question whether mental retards, unborn fetuses, bacteria, other animals or our pets have minds. To either under-attribute or over-attribute minds can have serious moral consequences, and “the theoretical position taken in these questions has a decisive influence on the human orientation in moral questions concerning the treatment of organisms of different levels of mental

organization” (Hendricks 1999:147). There is tension between moral and scientific methods in making these decisions, since moral method dictates erring on the side of over-attribution, whilst science starts from the position of a null-hypothesis, the *absence* of mind, which then has to be scientifically proven (Dennett 1998:8).

Difficulties are compounded when we make inferences about non-human minds, where we lack the useful communicative bridge of human speech, even in the case of genetically or emotionally close species like chimpanzees or our pets. “We are conscious” says Hume, “that we ourselves, in adapting means to ends, are guided by reason and design, and that ‘tis not ignorantly nor casually we perform those actions, which tend to self-preservation, to obtaining pleasure, and avoiding pain. When therefore we see other creatures, in millions of instances, perform like actions, and direct them to like ends, all our principles of reason and probability carry us with an invincible force to believe the existence of a like cause” (Hume 1969:226). Thomas Nagel stresses these difficulties: precisely because consciousness is experienced subjectively, we can never know, for instance, what it actually *feels* like to be a bat (Nagel 1974:250). Since bats are blind and rely on echolocation, any extrapolation from our human point of view to the experience of bat-consciousness must be incomplete, since by its nature it is a different *type* of consciousness that must remain humanly inaccessible. This bars us from acquiring true knowledge about the conscious experiences of exotic or alien life forms with sensory apparatus that differs from our own. And, says Nagel, “to deny the reality or logical significance of what we can never describe or understand is the crudest form of cognitive dissonance” (Nagel 1974:251). However, although Nagel is right in insisting that the subjective nature of individual mental experience can never be objectively captured by any theory of mind, the ontology of different kinds of mind remains unscathed. But the fact that humans have acquired the capacity for imagination should allow, at the very least, a glimmer of emotional response to the similarity of reactions across many species in response to primary stimuli such as pain and pleasure. As J M Coetzee’s imaginary author, Elizabeth Costello, says about the power of human imagination and sympathy,

which enables readers to identify with a fictional character: “If I can think my way into the existence of a being who has never existed, then I can think my way into the existence of a bat or a chimpanzee or an oyster, any being with whom I share the substrate of life” (Coetzee 1999:35). Imagination at this level has most brilliantly been employed in literature as far back as the second century A.D. in Apuleius’ *Golden Ass*, where a human mind magically migrates into the body of an ass. A more recent thought experiment is to be found in Kafka’s *Metamorphosis*, which investigates the experiences of a human mind trapped in the carapace of a beetle.

Simple and complex consciousness

There is neurological evidence for the separation of consciousness into *simple* or *complex* kinds. *Simple* or *core consciousness* neatly links into Sheets-Johnson’s “corporeal consciousness” and is biologically essential to the survival of any organism in its environment. It provides a sense of self in the here and now, “is stable across the lifetime of the organism; it is not exclusively human; and it is not dependent on conventional memory, working memory, reasoning, or language” (Damasio 1999:16). *Complex* or *extended consciousness* develops over the lifespan of the individual. Like life and intelligence, extended consciousness operates on a sliding scale across and within species: it is present at simpler levels in some non-humans but only attains its highest levels in humans in a linguistically enriched, autobiographical sense of the self, of an identity that encompasses past and future. Consciousness involves highly individual, synchronized activity across the entire brain, but a “huge volume of evidence suggests that consciousness emerges from the activity of the cerebral cortex and in particular from the frontal lobes” (Carter 1998: 298). It seems logical to conclude that all life forms possessing such brain areas are solid candidates for some degree of consciousness, in some cases extending into its higher aspect of self-consciousness, which has generally been regarded as the ultimate divide between humans and non-humans.

The nervous system of animals

Nervous systems are necessary to transcend the consciousness of primitive proprioception. Nervous systems also operate broadly along a scale, from the elementary network of nerve cells of jellyfish, which have no brains, through the primitive brain and dual nerve chord of flatworm; from simple fish brains to more complicated reptilian ones; with increasing neural complexity through the upper levels of the animal hierarchy as evidenced by mammalian and, ultimately, human central nervous system development. As the human brain is considered to be the most complicated structure in the known universe, we may quite rightly consider humans to be the present apex of evolutionary development, although we would be wise to remind ourselves that this does not necessarily imply that humans are the finest, or optimal outcome of the evolutionary process.

Neural intricacy appears to run parallel to increasing biological and evolutionary complexity along the hierarchy of living organisms. We can define higher cerebral development, particularly in higher primates and humans, as a wholly natural and expected evolutionary accretion of learning and adaptation in response to environmental stimuli. Complex central nervous systems display higher evolutionary levels of neurobiological development and abilities than the simple sensory-neural interaction of lower life forms with their environment. In such higher-order life forms the brain acts as a superior survival mechanism, itself performing as a semi-closed system within the larger semi-closed totality of the body-brain unity. The importance of the brain in this symbiotic relationship is emphasized by its relatively disproportionate use of 20% of the body's energy to maintain the internal order, permitting its more sophisticated interaction with the outside environment (Churchland 1984: 54).

Intelligent life

Consciousness of some kind is a prerequisite for intelligence, which is broadly definable as “a family of intellectual traits, virtues and abilities occurring in varying degrees and concentrations” (Honderich 1995:411). At a very simple

level we may accept the following uncluttered definition: “An intelligent creature is one capable of coping with the unexpected” (Honderich 1995:411). This kind of coping with unexpected events requires at the very least what Steven Mithen calls “general intelligence” which “may well use some general-purpose learning rules such as associative learning and trial-and-error learning” (Mithen 1996:47). Since such complex behaviours are only possible in creatures of memory, they indicate the presence of conscious intelligence, made self-conscious in a small percentage of higher life forms.

There seems to be a correlation between complexity of neural development and intelligence, each of which appears to operate along a continuum, both horizontally across existing species, from simpler organisms to more complex ones, as well as vertically within a species along evolutionary time, as in the hominid line. A more complex definition of intelligence says that a living system has intelligence if it is capable of combining its inherent, perhaps instinctual, knowledge with information obtained from the environment through its sense organs, thereby increasing its store of knowledge through a process of learning. In other words, an organism displays intelligence if it shows the kind of learning that allows it to adapt its behaviour in response to its interaction with, and experience in, the outside world. This definition would therefore grant intelligence to a much wider spectrum of creatures than is generally allowed, although it is clear that this simple definition fails to capture higher, more complex, creative expressions of intelligence (Churchland 1984: 153). It is true that larger, more complex central nervous systems usually display greater intelligence, although creative octopus behaviour appears contradictory in the light of its less complicated invertebrate nervous system as a member of the lowly *Molluska* phylum. The recognition of octopus intelligence has led to the inclusion of some members of this species within the British legal framework, which insists on the use of anaesthesia when required in octopus research. This concession not only highlights a startling exception to the general rule, but also raises valid questions about our accepted categories and definitions. The Animals (scientific procedures) act 1986 applies to all vertebrate animals,

plus one species of octopus, used in scientific procedures in Britain for which licenses are required.

Basic structure of the mammalian central nervous system

The basic pattern of the mammalian central nervous system has remained constant throughout its evolutionary history. Even the histological structure of areas such as the cerebral cortex has remained unaltered throughout this entire time-span, so that a basic diagram is applicable across the board to cats, monkeys or humans (Eccles 1989:43). It should come as no surprise that organisms arising from a shared ancestry reveal a common structural plan (Tattersall 1998:70).

Encephalization

Quantitative differences

Despite these similarities in central nervous systems, the *encephalization quotient* developed by Jerison (1985) showed differences in the brain-to-body ratio to be highest in humans at 8.5, with chimpanzees at only 2.3 (Eccles 1989:41). This means that human brains are three times larger than would be expected for a primate at the same weight, although all primates generally exceed the values for relative brain size of land mammals. Significantly increased energy demands of a larger brain could only have been compensated for by the advantages of an increase in intelligence and the resultant smarter behaviours that favoured survival (Tattersall 1999:69).

In addition to these increases in the body-brain ratios, a study by Stephan *et al.* (1987) carefully charted the size and weight of twelve major brain structures in a wide variety of primates, including humans. The baseline was provided by the most primitive living mammals, the basal insectivores (*Tenrecinae*), as representing the extinct forerunners of most mammals, including primates. This comparative analysis of twelve brain components shows progressive increases in every unit across the species examined. The greatest enlargements are seen to occur in the diencephalon, cerebellum, corpus striatum and

neocortex, with the latter, in humans, being triple that of the apes. Simultaneous with these increases, a progressive intra-species decrease of the olfactory bulb has been noted. This seems to indicate that the sense of smell became less vital as intelligent behaviour increased in tandem with the evolutionary expansion of the neocortex. The final *encephalization index* of this study delivers the intra-species ratios of the total increase in volume of all twelve basic brain structures. These ratios range from the baseline of 1.0 for the *Tenrecinae*, to 8.12 for Old and New World monkeys, 11.19 for chimpanzees and gorillas, to an enormous 33.73 for humans (Eccles 1989:42). “No organ in the history of life has grown faster. When true men diverged from the ancestral man-apes, the brain added one cubic inch – about a tablespoonful – every hundred thousand years. The rate was maintained until about one quarter of a million years ago, when, at about the time of the appearance of the modern species *Homo sapiens*, it tapered off” (Wilson 2001:83).

These surveys are of great importance since they seem to indicate that “the evolutionary development of the brain appears to be quantitative and not qualitative” (Eccles 1989:43). These identical basic components evolved in all primates from the same ancestral mammalian lines, enlarging at different rates in different species in response to differences in selective environmental pressures. Thus the significantly greater size and weight of these brain components in humans can only be due to the impact of greater and more rapid evolutionary changes.

A combination of factors came into play with the adoption of bipedal locomotion by early hominids as they curiously explored the wider and more challenging spaces beyond the known limits and security of their arboreal world. Such new behaviours would surely stimulate further evolutionary expansion of more complex, specifically designated but interrelated areas of the enlarging human cerebral cortex, which in time led to tool-making, expanding social communities, and the emergence of language and symbolic thought. These dramatic changes developed human consciousness and self-

consciousness to levels beyond those of other mammals, including other members of our primate family.

Qualitative differences

Differences in the overall volume or the size of various components of the brain must affect its attributes or abilities, therefore impacting on behaviour. Such qualitative differences are obvious when we compare humans to other animals, even to our genetic siblings, the chimpanzees. But it is clear that cognitive capacities and abilities vary even amongst humans, at its most dramatic in our inability to communicate with seriously brain impaired fellow humans. Even a shared biological human bond has been powerless against an innate aversion to visible differences, such as skin colour or sexuality, which have provided the primitive bases for the punitive human behaviours of racism and sexism. It is therefore not surprising that the even more obvious biological and cognitive differences between humans and other mammals served as a basis for speciesism, an extension of intra-human prejudice that has justified the self-serving exploitation of non-human animals.

From ancestral to human brain

Since there is very little difference in the size and shape of endocasts from the skulls of Australopithecines and modern apes, it has been suggested that we can safely use the chimpanzee brain as an approximate model of our common hominoid ancestor (Eccles 1989:19). Although it is likely that the brain of this common progenitor would have been even more primitive than those of present-day non-human apes, this model enables us to appreciate the subsequently enormous evolutionary change in human brain development when compared to relatively minor changes in ape brains over the same time frame. It also shows that certain major evolutionary changes had already taken place in the common ancestor, prior to the subsequent divergence of apes and hominids. This means that human evolution itself was built on existing, shared structural similarities such as the largely unchanged binocular visual system that is common to all primates, their remarkable equivalence in central

nervous system design, as well as their biochemical similarity (Eccles 1989:xii). Logical reasoning compels the conclusion that the instincts, perceptions, emotions and behaviours that underlie human chemical, biological and neurological structures must therefore necessarily operate in bodies that are similarly structured, even if there are quantitative or qualitative differences. This conclusion argues for the application of identical minimal ethical principles in the treatment of kindred groups, at the very least the principle of equality to the infliction of suffering. “Pain and suffering are bad and should be prevented or minimized, irrespective of the race, sex, or species of the being that suffers” (Singer 1975:18).

DNA and the molecular clock

Although the evolution of humans has outstripped that of other animals, biological similarities become increasingly greater as we move upwards along the animal hierarchy. Apart from our obvious physical, psychological and social similarities to non-human primates, we all share a distant common ancestor and thus the greater part of our genetic material.

The scientific process of DNA hybridisation makes it possible to measure the genetic distance between species, approximating the times at which they diverged from a common ancestor and from one another. Sibley and Ahlquist revolutionized the difficult field of bird classification by fusing molecular biology and taxonomy, a modern system known as cladistics, which ensures an objective and uniform classification that is based on the genetic distance, or time of divergence, between species (Diamond 1991:20). The accuracy of the molecular clock has been validated by what is known as the radioactive clock, which measures the radioactive decay of isotopes in volcanic rocks in which fossils are found (Dawkins 2004:86).

These methods have established a time of between 5 and 8 million years for the divergence of humans and chimpanzees from the same ancestral line. Even after this relatively enormous evolutionary time-span, modern apes and

humans still retain a close genetic link, with chimpanzees and humans sharing about 98.4% of their genes. This of course does not mean that humans are 98.4% chimpanzee, because if we were to count the number of whole genes that are identical in the two species, we would find a figure closer to zero (Dawkins 2004:84). Much of human DNA has been classified as “junk”, as has some of the 1.6% DNA difference between humans and chimpanzees; thus “the functionally significant differences must be confined to some as-yet-unidentified small fraction of 1.6%” (Diamond 1991:23). Although this small difference accounts for considerable physical and mental differences between these two species, these differences must at all times be measured against the backdrop of common similarities.

On another level, despite this genetic closeness, it can be argued that apes and humans are not particularly closely related apart from sharing the same ancestor some five to eight million years ago, because so much has happened to both lineages since then (Tattersall 1998:4). Humans are mysteriously different and powerful; as victors of the evolutionary battlefield, they have written an anthropocentric biological history, which has classified humans as a unique genus, ignoring the fact that humans are simply one twig on the African ape branch. “If not for the anthropocentrism of the earliest taxonomists – the scientists who devised the naming system we still use to classify living things – humans and apes would be grouped together because of our many shared traits” (Stanford 1999:7). The scientific accuracy of the molecular clock requires the correction of past taxonomic errors, giving us two options. We could reclassify the common chimpanzees as *Homo troglodytes*, and the pygmy chimp as *Homo paniscus*, thereby creating three *Homo* lineages (perhaps even more, since genetic distance may well include gorillas and orangutans). Conversely, humans could be reclassified as a third group of chimpanzees (Diamond 1991:20-21).

The obvious similarities between humans and apes have at times been directly responsible for taboos in some countries against the killing and eating of apes. Exploring the African West coast in the fifth century B.C. the Carthaginian

navigator, Hanno, encountered “savage people ...whose bodies were hairy and whom our interpreters called Gorillas”. These unknown creatures might in fact have been chimpanzees, but they were obviously so akin to humans that we are left in no doubt as to the species to which Hanno assigned them (Tattersall 1998:30). Ironically, as human predations on African apes increase to levels that threaten their extinction, we are developing a greater understanding about our links with them. Against the backdrop of a mutual ancestry and shared attributes, the differences that have evolved in the diverging lineages are crucial for interpreting the human fossil record, allowing us to measure what it is that makes humans unique, both positively and negatively (Tattersall 1998:31).

Anatomy and the advent and importance of bipedalism

As in the case of brain structure, the skeleton of a modern ape is considered to be an acceptable model for the primitive hominoid ancestor of both human and ape lineages. The adoption of a form of upright bipedal walking was arguably the crucial behavioural and anatomical shift that got the human lineage started, since this initiated a cascade of important consequences and rewards (Tattersall 1998:111). The adoption of bipedalism is thought to have occurred in response to climatic deterioration about 10 million years ago when forest areas shrank and open grasslands expanded. The upright posture required for brachiation, for swinging from branch to branch in arboreal locomotion, had preadapted apes to bipedalism, which was further reinforced by quadrupedal vertical tree climbing. Since all these activities rely on similar pelvic and lower limb structure, it is possible that hominids evolved from a line of apes that were particularly skilled quadrupedal climbers, and therefore anatomically particularly pre-adapted to greater bipedal success on the ground. Sustained bipedalism in modern apes is hampered by the relative size and weight of their upper torsos when compared to the smaller ribcage structure that has subsequently developed in bipedal humans (Kutter 1987:528). Upright walking also shifted the position of the foramen magnum, the opening on the underside of the skull through which the spinal cord passes to the brain. In humans this

is located directly under the skull, creating the necessary balance between body and head required for a sustained upright posture, whilst bipedalism amongst modern apes continues to be hampered by the forward position and weight of their skulls.

Fossils of early hominid Australopithecines from about 3.5 million years ago already show anatomical changes, particularly to pelvis and legs, as well as a shift in position of the foramen magnum and musculature occurring in response to bipedalism. Sustaining an upright posture put unusual stress on the quadrupedal skeleton, particularly on spine and joints, but the rewards were considerable. In addition to visual advantages, an upright posture reduced the area of the body that was exposed to vertical sunrays while simultaneously increasing the body surface above ground for more efficient heat loss. Gradual loss of body hair and the development of a network of sweat glands greatly improved homeothermic efficiency, making life in the open sun more sustainable whilst protecting the vulnerable brain. Hands were freed for novel uses, encouraging development of fine hand movements, which gradually became more adept; and the consequent evolution of a longer, flexible opposable thumb improved both the construction and usage of tools and weapons. The enormous advantages that flowed from bipedalism allowed hominids to expand their parameters of activity and ability, which in turn formed the basis for further evolutionary change, generating larger brains and increasingly intelligent behaviours. (Tattersall 1998:118)

Speciation

Very briefly, speciation is believed to occur through the isolation of a group of individuals from the parent species in an alternative environment, which provokes adaptive changes that are great enough to preclude future breeding between the two sibling groups, since hybrids are generally, but not always, sterile. Reproductive isolation, however, is only one marker for speciation and its emphasis may in fact obscure the subtleties of evolutionary change since it

is certainly not only our inability to interbreed with chimpanzees that makes us a different species (Brookes 2002:184).

It is possible that geographical divides such as the Great Rift Valley may have separated two hominoid groups, with slower evolution of the great apes in the equatorial forests and more rapid evolution of hominids in the more exposed eastern savannah areas. But a fossil has recently been discovered in Chad, far west of the Great Rift Valley, which may be as old as 7 million years. Such unexpected challenges to orthodox theories are to be welcomed, since they stimulate scientific research and precision (Dawkins 2004:86). Such research may in time explain the evolutionary link between orangutans and humans if they originated independently on two different continents. Like African apes, orangutans were once widespread in the forests of Asia, and are the most intelligent primate after humans, with whom they share 96% of their genes.

Evolutionary gradualism versus punctuated equilibrium

Lack of fossil evidence before 4 million years ago makes it difficult to prove whether key events such as the emergence of new species was due to the slow and steady adaptive phyletic gradualism of classical Darwinism, or whether such changes resulted from sudden flurries of evolutionary change, occurring from time to time against a general backdrop of relative stagnation. Evidence seems to support the view that adaptive evolution must be gradual and cumulative, but it is possible that unexpected rapid changes might well account for the absence of fossils during the key happenings in the evolution of species, particularly the divergence of apes and humans from the same ancestral line. It might also explain crucial evolutionary events such as the advent of language and symbolic thought, which by their very nature lie beyond what bones can tell us. Soft tissues leave no fossil evidence; therefore sudden evolutionary changes to perishable brains cannot be traced, and we are reduced to making inferences that often lead to conflicting opinions. Such rapid changes could, however, provide a possible explanation for what has become known as the Great Leap Forward: a puzzling and dramatic eruption of art and technology which occurred approximately 30,000 years ago, forming a

startling great divide between creative, inquisitive modern humans and their relatively more quiescent ancestors and other existing primate species.

Tools and art

The creative abilities that underpin technology and art constitute a critical difference between humans and apes. In the past, tool usage was regarded as one of the crucial differences. A simple definition of a tool is “an inanimate object that one uses or modifies in some way to cause a change in the environment, thereby facilitating one’s achievement of the target goal” (Hauser 2001:40). This means that a variety of animals, including some birds and mammals, like chimpanzees and the sea otter, use tools; a subject that cannot be covered in detail in this work. Animal tools generally are adaptations of natural objects like sticks or stones, usually in the pursuit of food or shelter from the elements. Our closest primate relatives, the chimpanzees, are more sophisticated in applying hammer and anvil principles to cracking nuts, using leaves as umbrellas, and sticks in a variety of ways, such as “fishing” for termites. There is corroborative film footage of the captive chimpanzee, Kanzi, being coaxed into producing stone flakes that surprisingly resemble those made by some of our early human ancestors. But in chimpanzees, as in the case of early hominids, the prefrontal cortex is not fully developed, indicating a deficiency in motivation and concentration. Although the general intelligence of early hominids may have had the edge on that of modern chimpanzees, the tool usage of our human ancestors also showed little inventiveness, appearing to depend largely on learnt, imitative behaviour as is the case in modern non-human primates. But chimpanzee tool use, however limited, together with some hunting and food-sharing behaviours, indicate that these activities “may have been part of the life style of the common ancestor of chimpanzees and humans before the ancestral hominids left the rain forest. Evidently these ancestral behaviours remained rudimentary in the chimpanzee line, whereas in our line they were increasingly elaborated” (Jolly and Plog 1987:118).

Despite their common origin, the chasm between human and chimpanzee tool making and usage widened dramatically over time. A slowly evolving creative

intelligence and trial and error practice pushed human tool-making beyond imitative behaviours, since it is clear “that man cannot, on his first trial, make, for instance, a stone hatchet or a canoe, through his power of imitation” (Darwin 1981:31). Early human *Oldowan* stone tools were objects with sharp cutting edges rather than tools of particular shapes. Widespread use of these tools throughout Europe, Africa, the Near East and north-western India, indicates a broad diffusion of learned skills (Kutter 1987:535). However, about 750,000 years ago a new kind of tool appeared in the deliberate, more precisely made *Acheulean* hand-axe and associated tool types of *Homo erectus*, who lived roughly from 1.5 million to 300,000 years ago. Although the basic functions remained the same, these tools were carefully and symmetrically crafted according to a standardized pattern and were often found in great numbers in areas that appear to have been workshops. “These tools reflect more highly developed coordination of eye, brain, and hand, as well as great advances in conceptual ability” (Jolly and Plog 1987:290).

Neanderthal advances

The next refinement came about 200,000 years ago during the *Mousterian* culture of the *Neanderthals*, one population of archaic *Homo sapiens* who may have evolved from *Homo erectus* (Kutter 1987:538). The beautifully crafted *Neanderthal* tools are deliberately shaped variations on earlier tool themes, and certainly show another level of cognitive refinement, no doubt aided in some way by a brain size that had by this stage increased to about 1450 cc; a considerable increase from the 750-1200 cc of their predecessors, *Homo erectus*, and the even smaller 650 cc of the earlier *Homo habilis*. Despite bigger brains and a greater refinement of their tools, that the Neanderthals failed to progress beyond the medium of stone and the standard categories of tools appears to indicate some kind of intellectual limitation (Tattersall 154-155). Nevertheless, a comparison of present day chimpanzee tool-usage with Neanderthal capabilities serves to highlight the enormous evolutionary changes that had already occurred in the human line at this stage.

Brains versus brawn

Like chimpanzees, all earlier hominids lacked the creative spark that distinguishes fully modern humans. Bigger brains alone do not satisfactorily explain the sudden creative explosion as modern man spread across Europe, particularly when seen against the technological and artistic stasis of the preceding million years. The brain capacity of 1400cc of *Homo sapiens sapiens*, although greater than other ancestral brains, was generally smaller than the average of 1450cc of *Homo sapiens neanderthalensis*. Ironically, the physically stronger Neanderthals proved to be no match for the slender, smaller and smarter invading fully modern humans. Since these *Homo sapiens*, also known as Cro-Magnons, generally possessed smaller brains, their abilities and behaviours allow us to infer that this decrease in volume may have been augmented by neuronal economy, sophistication and reorganization.

Symbolic thought

Genuine creativity depends on symbolic thought, “the very foundation of imagination and creativity: of the unique ability of humans to create a world in the mind and to re-create it in the real world outside themselves” (Tattersall 1998:177). It has been suggested that the presence of flowers in some Neanderthal graves can be interpreted as an early expression of symbolic thought. This has been disputed, since a more frugal explanation makes such behaviour simply the action of sentient beings sensibly protecting the group from a health hazard by burying the corpse, and at the very most, expressing personal emotions of grief or loss (Tattersall 1998:163). Similarly, some evidence of Neanderthal care of the aged or infirm could be interpreted purely as expressions of affection or empathy. Even so, these behaviours contrast sharply with similar situations in non-human primates, where the weak are generally shown no favour by the strong. However, there is increasing evidence to show some awareness and emotional response to the effects and finality of death, particularly in the reactions amongst some primate mothers to loss of their offspring, often carrying the dead infant body around for days despite its obvious lack of life (Hauser 2001:280). Matriarchal elephant groups have been shown to return to the remains of a family member for days, sometimes months, finally handling the bones. They appear to show some kind of

emotional response, or at least a recognition of the effects of death. “Feeling a loss and understanding what it means to die are two different things” (Hauser 2001:278), so at this stage we cannot be sure that even Neanderthals had developed such understanding.

It is generally accepted that language, symbolic thought and the social skills required within expanding communities were pivotal catalysts in the swift and substantial changes to the enlarged human brain that generated the rapid surge in technological and artistic creativity occurring about 30,000 years ago. One explanation for these dramatic changes is that they occurred exponentially over evolutionary time through phyletic gradualism, which created a self-feeding loop between the demands of increasing knowledge and learning in cognitive and linguistic areas, and the concomitant increase in specialized neural circuitry in coping with these developments. An opposing view suggests that, as these modern humans moved upwards along the coast from southern Africa somewhere around 100,000 years ago, their sustained intake of Omega oils from seafood had a dramatic evolutionary impact on in-utero brain development over a relatively short span of time. Such a sudden period of punctuated equilibrium may have accelerated brain development in these smaller, mobile populations and thus may have played a decisive role in their eventual superiority. Since there does not appear to be any evidence of interbreeding between the two groups, it is generally assumed that the smarter Cro-Magnons outwitted and destroyed the Neanderthals in Europe. If, as will be discussed later, the Neanderthals had only a simple language, or no language at all, their development relative to the Cro-Magnons could be compared to our present-day human/chimpanzee divide. If the Neanderthals were linguistically closer to the apes, then our understanding of chimpanzees not only assists in the interpretation of the fossil record, but may also help to bridge the gap between the Neanderthals and us. If it is true that modern humans destroyed the Neanderthals because they considered them as an inferior species, this ancient genocide may be compared to our extermination of chimpanzees and other apes.

Hemispheric asymmetry

It seems that one significant difference may lie in the functional abilities of the two sides of the brain. Each hemisphere controls the opposite side of the body, and in humans the two hemispheres do not perform identical functions, a significant cerebral asymmetry that appears to be lacking in apes. The most obvious asymmetry relates to the concentration of language and speech abilities in the left hemisphere, a pivotal difference between humans and other mammals. Handedness is a distinct feature of this asymmetry and since the left hemisphere generally is dominant, most humans are right-handed. This hemispheric specialization, together with other changes such as the deeper folding of a larger cortical area, made it possible for human cortical capacity to treble without increasing brain volume. This spatial economy allowed cognitive expansion in humans without any increase in skull dimensions, particularly in utero, which would have created an obstetric hazard. Perhaps the smaller brain capacity of modern humans was a corrective survival adaptation to the over-large Neanderthal brain, since there is evidence “that prehomimid men had brains far larger and more developed than ours at birth and that as a result, up to ninety per cent of childbirths ended fatally for mother and off-spring” (O’Hear 1989:142). This factor may also have played a role in the extinction of the Neanderthals.

Asymmetry has been demonstrated in adult, infant and foetal human brains and is linked to handedness, depending on whether the right or left brain hemisphere is dominant. Other primates are ambidextrous, indicating a symmetrical brain structure in which brain functions are duplicated in both hemispheres (Eccles 1989:195). Archaeological evidence suggests that the earliest stone tools were largely made by right-handed persons, which indicates the development of some early cortical asymmetry in the human brain (Tattersall 1998:76). This appears to be supported by the cranial endocast of a 2 million year old fossil specimen of *Homo habilis*, which, according to Phillip Tobias, shows some enlargement of Broca’s language area, in contrast to its absence in the brain structure of the *Australopithecines* (Mithen 1998:122].

Although they may differ in size, the brains of all higher primates – like other parts of the body - have been cobbled together over time in response to evolutionary stimuli of various kinds. Embedded within is the ancient, reptilian brain, which remains the primitive engine controlling basic bodily processes as well as the emotional responses that ensure survival and reproduction: feeding, fighting, fleeing and sex. The human brain does not appear to contain any new structures and, in common with all mammals, remains under the sway of the primitive, emotional brain. “So, however much we may prize our remarkable mental faculties, the old ‘primitive’ brain is always lurking there underneath: one reason, perhaps, that we’ll never be the supremely rational beings which, in moments of hubris, we like to imagine ourselves” (Tattersall 1998:72)

Language

Although an in-depth analysis of language is not possible, it is critical to examine certain salient aspects in analysing the differences and similarities between human and non-human animals. There seems to be a growing consensus that the cardinal catalyst in accelerated human evolution was the development of human language, which underpins symbolism and imagination. This suggests that the small genetic difference between humans and apes can probably be accounted for in the anatomical infrastructure that made complex, spoken human language possible (Diamond 1992:46).

Vocal morphology

Language happens inside the brain, but the sounds of articulate speech are produced by the human vocal tract, which differs significantly from that of other mammals. The lower positioning of the human larynx, which contains the vocal cords, served to extend the already longer human pharynx. Whatever the reason for this adaptation, the advantages conferred by speech greatly outweighed the risk of occasional death by choking (Tudge 1993:297). The bottom of the skull of modern human adults displays a strong downward flexion in order to accommodate the tall, looping pharynx whereas all other mammalian skull bases, including those of human babies, are flat (Tattersall

1998:168). This anatomical adaptation makes it highly dangerous for humans to breathe and swallow at the same time; a danger that obviously was outweighed by the advantages that articulate speech conveyed. Human babies are protected from this hazard since they are born with the more primitive mammalian vocal tract, which allows simultaneous breathing and swallowing whilst suckling. It thus appears that human babies, like apes, are not able to make the sounds that are required for articulate speech, since it is only from about the age of four months that the infant larynx begins its descent to the lower position in the throat that is a prerequisite for language (Hauser 2001:147).

These differences in vocal morphology mean that apes cannot produce human speech. But since humans and apes evolved from the same distant ancestor, and since soft tissues such as the larynx do not fossilize, it is difficult to know when human lineages were developed enough to be capable of human speech. It is possible that the laryngeal descent in humans may originally have been a respiratory modification, which in turn may fortuitously have increased vocal abilities. Of itself this does not unequivocally prove the simultaneous existence of language. Since all early hominid *Australopithecus* skull bases are more or less flat, we can infer that their sound production may have been little better than that of modern apes. There seems to be some dispute as to whether earlier *Homo* lineages, including the Neanderthals, had speech capabilities, and therefore language as we know it. Some increase in cranial base flexion in *Homo ergaster* and *Homo erectus* skulls from 1.5 million years ago suggests the presence of some laryngeal descent, increasing to almost modern levels in half-million-year-old European *Homo heidelbergensis* skulls. This apparently gradual modification in the peripheral vocal apparatus, which seems to have occurred more or less in step with overall brain-size increase, may have been interrupted in the case of the Neanderthals. One relatively late reconstructed Neanderthal skull appears to have only a modestly flexed cranial base, and “computer simulations of the sound-producing potential of its vocal tract suggested that in life this individual was incapable of producing certain sounds that are essential to modern speech” (Tattersall 1998:169). However, although

an earlier Neanderthal skull from Italy shows a greater degree of skull base flexion, which may indicate greater vocal abilities, the question of Neanderthal speech-potential and therefore language remains unresolved, particularly in the absence of corroborating soft tissue fossil evidence (Tattersall 1998:169). It seems possible that “both archaic *H. sapiens* and Neanderthals had the brain capacity, neural structure and vocal apparatus for an advanced form of vocalization, which should be called language” (Mithen 1996:161). But if their vocal morphology, like that of the apes, prevented the formation of differentiated vowel sounds, then it would have been impossible for Neanderthals, like other non-human primates, to convey information with all the nuances and speed of modern human speech (Jolly & Plog 1987: 320).

The matrix?

It is difficult to avoid the conclusion that articulate language was a prerequisite for the intelligent and creative behaviour of *Homo sapiens*; the matrix that shaped and expanded human behaviour beyond that of the Neanderthals and all other primates. Language is not merely a skill or means of communication, because it is able to convey an enormous complexity of thought and factual knowledge that transcends the largely emotional underpinnings of other forms of communication. It is necessary for symbolic thought; and the ability to generate and manipulate complex mental symbols provides the necessary foundation for imagination and creativity. Abundant archaeological evidence confirms the astonishing and varied accomplishments of the first modern humans who traversed Europe. Such diverse artistic and creative attributes were foreign to the Neanderthals and certainly argue at the very least for a new kind of cleverness in Cro-magnons, originating in language of a different order. If the Neanderthals were in fact a-lingual, in addition to being intellectually inferior, the Cro-magnons no doubt considered them lesser creatures. This perception may have made the Neanderthals easy targets for extinction, an early example of recurrent genocides throughout the history of groups – of humans and animals – that were considered as different, or inferior, or in competition for the same resources. These prejudices fuelled the systematic extermination of the San - the last living link with original early humans - as

they became trapped between migrating human groups from the north and south of Africa.

Language versus communication

Although a full discussion of the theory of language is not possible, it is important to note the distinction that is generally made between *communication*, which transmits information about states, conditions, or feelings, and *language*, which, in addition to such emotional content, conveys thoughts and objective factual information. *Communication* includes human and animal emotive calls and body “language”, both of which are limited to expressing the present feelings of the signaller. *Language*, however, not only allows a more sophisticated expression of these emotions, but it is capable of transmitting an infinite amount of information and is not limited by space and time (Bickerton 1996: 7-15).

Vocal communication

Vocal communication is universal in primates and is well developed in apes, particularly in chimpanzees, who use vocalizations together with a rich repertoire of facial expressions, postures and gestures in order to show submission or communicate warnings, intentions, desires and other emotions. Detailed observation of vervets has shown that they use a variety of different calls to signify different predators. It is hard to believe that this is not a rudimentary form of language; that there is no factual information being transmitted to indicate an immediate, appropriate reaction to a specific predator. Infant vervets learn the meanings of these calls, or “words”, through a process of trial and error that is similar to the learning pattern of human infants, but in their case, failure to match call and predator can cost the young vervet its life.

Such communicative signals may vary in populations. But they all appear to be generated in response to emotional states that have their origin in the older structures of the brain - the limbic system and brain stem - that are common to all mammals. The emotive call system of screams, shouts, laughter and even

crying is common to all primates, including early hominids as well as modern humans. These instinctive vocal reactions are triggered by external stimuli and originate in regions of the brain that are allied to motor areas for instant reaction. Research in the case of humans has shown that these instinctive vocal responses use wavebands that are distinct from those that are used by language (Bickerton 1996: 57).

These call systems seem to result from a kind of instinctive mental computation, what Bickerton calls “on-line” thinking, in the midst of daily activity. He compares this with a more elaborate “off-line” thinking that is made possible, and enriched, by language. Such abstract thinking is triggered by internal input and occurs in an area of the brain that is not connected to the reflex activity of the motor area, which thus allows a process of deliberation before action is taken. This useful analogy explains our ability to carry out the mental computations necessary, for instance, in driving a car whilst simultaneously thinking about, or planning, other matters. During this dual process our attention fluctuates in response to environmental stimuli. Survival depends on immediate, “on-line” thinking, whereas reflective, “off-line” thinking “needs the luxury of safety as a buffer between the thinker and possible danger”, a requirement that would seem to make it exclusive to humans. The operation of these two separate levels of representation in humans has been confirmed in neurological studies (Bickerton 1996:102). An example of the difference between these two modes of “thinking” can be seen in the focussed survival attention required by soldiers during the immediate dangers of combat; intense, primal reactions that may well overwhelm all reflective thinking. Such suppression of the prefrontal cortex by deep, emotional structures generates instinctive, reflex motor activity in response to immediate threats to individual survival. Overwhelmed by emotional responses, the temporary absence of the mediating power of rational, “off-line” thinking helps to explain how it becomes humanly possible to execute the abnormal behaviour required during the stresses and dangers of warfare, as well as the excesses that tend to take place during such crises.

Linguistic continuity

Darwin's controversial concept of the human being as a primate and near relative of the apes was an inspired deduction that has since been genetically vindicated. A major stumbling block in showing a smooth continuity between the two has always been the qualitative differences in language, particularly the absence of descriptive and reasoning linguistic abilities in non-human primates. It is generally thought that there is a continuum of increasing complexity from the simplest animal communications to the intricacies of human language, with its limitless flexibility.

In reality, however, there is no such continuity. Despite the greater repertoire of ape communication - particularly trained, captive ones - we have to conclude that the chasm between non-human communication and human language points to a difference in kind, rather than degree (Bickerton 1996:17). There is a big difference between animal calls and complex human language, which depends on later evolutionary changes to human anatomy and neurology; changes that by chance did not occur in the ape lineage. Broca's area, dealing with speech articulation, is absent in ape brains; whilst other areas involved in the meaning of language, such as Wernicke's area, are purely vestigial in some ape brains. In addition, the late myelinization and cellular maturation of these specialized areas in the human brain indicate that they are relatively new cortical regions and thus the outcome of late human evolution (Eccles 1989:89).

Language and thinking

The absence of syntactical language does not necessarily imply the absence of thinking: as usual, absence of evidence cannot be construed as evidence of absence. Marc Hauser differentiates animals as "wild minds", empowered with fairly universal mental tool kits that equip them for survival, procreation and evolutionary adaptation within their particular environmental niches. Many animals display an ability to make intelligent mental computations and adapt their behaviour accordingly. However, studies show that many apes are able to manipulate symbols and use rudimentary syntactical skills. Various studies

show that chimpanzees reared in enriched human environments can learn to communicate through the use of pictorial and American Sign Language, which seems to indicate some increase in symbolic and referential abilities (Hauser 2001:250). Although successful communication is generally linked to food rewards, it may also be that the enculturation process of such human environments increases imitative learning to levels that are not attainable in natural habitats (Hauser 2001:163). Apes and human babies are both unable to produce articulate speech, but there is a marked difference between the early babbling of human infants and the more silent behaviour of baby chimps. Even more notable is the exponential speed, ability and flexibility of language acquisition in human children when compared to non-human primates, even when these are reared in enriched human environments. These differences do seem to support the claim for the genetic inheritance of a special human faculty for the learning of language as suggested by Noam Chomsky (Glynn 1991:331). This would help to explain the universal, basic syntactical rules on which all human language appears to rest, irrespective of culture or geography.

Self-awareness

The parallel development and increased activity of the frontal lobes and language areas in human infants around the age of two years appears to be connected with a simultaneous emergence of self-awareness, demonstrated by their ability to recognize their mirror image. Various studies have clearly shown that many primates are similarly aware that their reflection is their own, and not that of another animal. Certainty about levels of animal consciousness remains elusive, but the resemblance between humans and other mammals, particularly primates, logically argues for the presence of a mental life. Inaccessibility does not constitute a necessary or sufficient reason for negating the presence of mind. “Our royal road to the knowledge of other minds – language – does not extend to them, but this is just a limitation on our knowledge, not a limitation on their minds” (Dennett 1997: 16).

Other minds

Captive primates understand the need to inform their keepers of changes that have taken place during their absence. With gestures and vocalizations they indicate altered hiding places of food rewards, or the new location of the keys required to access such delights. These behaviours show their understanding of other minds and the need to communicate new information to other individuals. In the wild, chimpanzees show a variety of behaviours that can also only be explained by their awareness of the workings of other minds. There have been many, repeated observations of apparently intentional deceptive behaviour, such as the deliberate concealment of food for later recovery when other chimpanzees were out of sight. Scheming is constant and fluid as allegiances are forged, or betrayed, in order to acquire or retain alpha status. Power is achieved through the self-serving manipulation of what appear to be reciprocal altruistic favours involving food, sex and grooming. Further evidence for a chimpanzee theory of mind has clearly been noted in the deliberate repression of orgasmic vocalization during furtive and illicit sexual encounters. Such astute behaviour displays not only an understanding of the workings of other minds, but an awareness of cause and effect, and a careful and reasoned avoidance of certain punishment by the alpha male (Hauser 2001:196). Many of these behaviours suggest second order thinking that involves critical assessment of the possible thinking and behaviour patterns of others that is crucial to the survival of individual animals within their social groups. But such skills have been exceeded in human societies by the Machiavellian sophistication of higher levels of convoluted intentionality, manifesting in a rich diversity that extends from an intelligent avoidance of conflict to a fearsome unleashing of the darkest side of human nature in behaviours such as sadism, torture and genocide, which are specific to humans. Amongst the other primates only the common chimpanzee, *Pan Troglodytes*, has been observed to inflict deliberate and brutal violence on members of the same species.

Biochemical similarities

The behaviour of all primates may be affected by the same biochemistry. Hormones such as oxytocin affect bonding and maternal care across species,

whilst low levels of serotonin occur in all primate societies, where caste systems or status hierarchies cause low self-esteem or severe depression. Like humans, the physiological stresses that accompany low status have been linked to atherosclerosis and heart disease in baboons; and dominant males in vervet societies have been shown to have higher levels of serotonin than their subordinates (Wright 1996:242). Not only do these levels decrease markedly in alpha males when they are deposed by rivals, but they surge dramatically in the victors. The behaviours and health profiles in non-human primates in response to the rise and fall of chemical levels mimic those of humans in similar situations.

Despite evolutionary differences between humans and apes, particularly in linguistic and consequently cognitive development, we need to remain responsive to the enormous pool of similarity that underlies both species. Because of a common origin, the parallels are everywhere, through reproduction and embryonic development, physiological stages of growth and eventually ageing and death, all of which depend on the same chemical and hormonal processes. A crucial difference is to be found in the area of consciousness, since only humans seem deliberately able to reflect on their own cognitive processes and ultimately, on their own deaths.

Instincts and emotions

Although a different evolutionary path has made human behaviour more complex, more sophisticated and often consciously conscious, it is generally possible to uncover the historical animal precursors on which the more elaborate cultural, social and ideological human structures are founded. All forms of life exhibit instinctual behaviours, which not only function as self-survival mechanisms but also, as in the case of the sexual instinct, ensure the survival of the entire species, or at the simplest and most unconscious level, secures the future of Dawkins' "selfish gene". Despite the evolutionary development of cerebral areas that provided higher levels of thinking and intelligence in humans - including the ability to make rational decisions based on an enhanced ability to discriminate and categorize - there is a great sweep

of intertwined instinctual and genetically determined, emotional behaviour that operates at an unconscious level, across many species. This dark pool of urges, by definition unknowable, also drives the human will to survive, an imperative so powerful that it directs human choice and undermines the illusion of free will. The exercise of freedom of choice is considered to be a crucial difference between humans and other animals - a controversial subject that I shall revisit in the next chapter.

Although an increase in cortical ability seems to go hand in hand with some loss of instinctual behaviours, as has been noted in olfactory reduction across primates by Stephan et al (Eccles 1989:42), the survival instinct remains paramount and manifests universally in the pleasure/pain principle. This in turn fuels the emotional reactions that drive secondary instincts such as intelligent learning – common to many animals – that primarily help to ensure the survival of the individual as well as the survival of the group through communal and cooperative behaviours.

Although emotions and instincts are difficult to separate, what are known as primary emotions, particularly anger, fear, disgust and parental love, are present in complex animals in the shape of unconscious survival instincts rather than conscious feelings. Triggered by external stimuli, these emotions initiate instant, involuntary action, a process that is reminiscent of Bickerton's "on-line" thinking that acts on the motor cortex. Facial expressions of these primary emotions are universally used and identified across all human cultures, and furthermore are as expressively displayed and recognizable in many non-human animals, particularly primates. "Essentially, emotions are not feelings at all but a set of body-rooted survival mechanisms that have evolved to turn us away from danger and propel us forward to things that may be of benefit" (Carter 2000:130).

Complex emotions, by contrast, arise from the conscious mind after processing the incessant emotional conversation and bilateral influences that operate between limbic system and the asymmetrical lobes of the cortex. Subtle blends

of primary emotion produce more complex emotions such as guilt and shame, which may be further mingled with other emotions such as pleasure or anger, to produce even more complicated emotional compounds that we assume to be purely human. Other primates may also experience some of these complex emotions, such as guilt and a form of shame. Once again, however, the consciousness and intensity of such emotional experiences may differ between species, although it is clear that even human individuals differ markedly from one another in the intensity of their emotional responses. Extended human consciousness increases the subjective awareness of the “feeling” of these emotions, and perhaps the ability to reflect, analyse and understand them – a level of self-awareness that appears to be absent in non-humans.

Social groups and behaviours

The anatomical and neurobiological similarities and differences between human and non-human animals, primates in particular, naturally impact on social structures and behaviours. Although there are many differences, there is ample support for the hypothesis that precursors of many human behaviours can be observed amongst non-human species. There is an innate drive to destroy strangers and sexual rivals: human tribalism or nationalism is, in effect, an extension of the paramountcy of the animal group, potent enough to trigger xenophobic attacks on outsiders. Success not only establishes dominance but may also deliver powerful, reinforcing rewards in the form of territory, food or females. Recent studies show that hyena packs may engage in deadly battles that are comparable to primitive human warfare, whilst such familiar species as lions, hyenas and langur monkeys become involved in lethal fighting, infanticide and even cannibalism (Wilson 2001:99). It is estimated that up to a third of all adult male common chimpanzees are murdered by other chimpanzees – a violent disposition that is in stark contrast to the conciliatory, matriarchally controlled societies of the bonobo, or pygmy chimpanzees, who defuse stress and conflict through sexual promiscuity. But the eighteenth century German philosopher Johann Herder emphasized a pivotal difference

between the killing practices of humans and non-humans: “No animal devours a member of its species for the sheer fun of it; no animal murders its kind in cold blood at the command of a third party” (in Linzey & Clarke 2004:35).

Apes that hunt

It is important to examine another comparative behavioural bridge amongst apes – that of their hunting proclivities. Only humans and the common chimpanzee deliberately track, kill and consume other animal prey, although this behaviour appears to be far more opportunistic in chimpanzees. “We three hunting apes – chimpanzees, ancestral hominids, and modern foraging people such as the !kung or Ache – provide a frame of reference of our evolutionary history and therefore the roots of human behaviour” (Stanford 1999:7-8). Emphasis is generally placed on the hunt, on the provision of meat by male hunters and the subsequent development of human cognition as a result of such increased protein levels. Stanford maintains that this emphasis undervalues the historically vital role of females in the provision of protein. In addition it misses the far greater social impact inherent in the meat sharing behaviour of male hunters, a devious *largesse* through which males gain power and status and manipulate females for sexual favours – the genesis of “a might-makes-right form of patriarchy ... Meat, not only as a nutritionally desirable food item but also as a social currency that is controlled by males and therefore is a tool for the maintenance of patriarchal systems, plays an essential part in the social systems of both traditional human and some non-human primate societies” (Stanford 1999:10).

Social and sexual inequalities

Social and sexual inequalities are universal in social groups, particularly amongst higher mammals and other primates, where the dominant male is able to ensure sexual primacy by “working tirelessly to protect his rank through assault, intimidation and cunning” (Wright 1996:50). Non-human rape, or, at the very least, sexual coercion, has been observed amongst

dolphins, as well as orangutans and some common chimpanzees, as have homosexual behaviours such as the genital rubbings between female bonobo chimpanzees. There are also sufficient laboratory experiments and observations in the wild to suggest that human drug usage and addiction have animal origins. These few examples of sexual, social and political manoeuvrings that occur in primate societies are also observable in human societies, where such behaviours may remain manifestly primitive or take on a sophistication that may obfuscate their origins.

Conclusion

Despite many links between humans and other primates, we certainly are different, and “our species possesses not merely powers many orders of magnitude greater than those of other creatures, but powers that differ radically *in kind* – powers wholly without precedent in the evolutionary history of earth” (Bickerton 1996:6). Evolutionary differences in the shaping of consciousness, particularly self-consciousness, may account for these expanded powers of the human brain. The very real experience of the abstract quality of brain functioning, or mind, as opposed to the physical actions of the body, quite rationally created “the assumption that each of us contains an independent ‘I’ – the ghost in the machine that controls our actions. This notion is essentially the same as the dualism first formalized by Descartes. It has endured largely because it *feels* right – how else could mere flesh and blood produce experiences like love, meaning, passion and reverence?” (Carter 200:331). The next chapter will briefly examine the origins and perpetuation of this concept of dualism, woven into what has become known as the mystery of consciousness. Searle prefers to call it the *problem* of consciousness, which by definition places it within the world and the ambit of science. The black box of the mind continues to be unpacked as “a biological system of awe-inspiring complexity”: understanding how it operates and directs human behaviour is the holy grail of our present age.

CHAPTER THREE

CONSCIOUS MATTER

The origin and perpetuation of dualism and the problem of consciousness, self-consciousness and free will within the body-mind dichotomy.

Dr Bordeu: Have you noticed in the Zoo, in a glass cage, the orang-outang that looks like St John preaching in the wilderness?

Mademoiselle de L'Epinasse: Yes, I have seen him.

Bordeu: One day Cardinal de Polignac said to him: 'If you will speak, old chap, I will baptize you'.

Diderot: D'Alembert's dream: 233

Introduction

In the previous chapter I discussed the similarities and differences between humans and non-human animals, with specific reference to chimpanzees, which share most of our genes. Over time, different evolutionary paths produced differences in brain development across present-day primate lineages, which all arose from the same hominoid ancestor. Certainly human brains, and therefore human linguistically-boosted cognition, consciousness and self-consciousness, form the present apex of evolutionary development, surpassing that of other primates. As argued previously, however, these differences in quantity and quality can be regarded as being differences in degree. If, therefore, we explain mind and consciousness, in humans, in terms of non-physical mind-stuff or immortal soul-stuff, in some way inhabiting and interacting with the physical body, we are logically required to extend these dualistic properties to any non-human animals that show evidence of mental life or consciousness, more particularly to those that exhibit any degree of self-consciousness. Conversely, if we achieve a satisfactory, coherent explanation of mind and consciousness as emergent properties of physical states, we could see abstract mental qualities and visible physical attributes as twin

manifestations of being, applicable to all conscious organisms. This would cut the Gordian knot of the mind-body problem, reducing both human and non-human animals to complex, but purely physical phenomena, subject alike to the laws of physics, whether classical or quantum. However, at present there is no theory of mind that satisfactorily explains the regular interaction between the apparently mutually exclusive world of physical states and events, and the private world of mental states and events that we experience at a common sense level: a symbiosis that Oxford philosopher Geoffrey Warnock paradoxically admits is “unbelievable and also undeniable” (Glynn 2000:9).

The origins of the body-mind problem

This mind-body problem surely has its origins somewhere in human evolutionary development with the first glimmerings of self-consciousness, a self-recognition perhaps reflected in a watery mirror image, from which arose a slow, growing awareness of the identity of an apparently volitional, intentional self, trapped within the experiences of a body that retained separateness from other bodies. These subjective experiences are unique to each individual. With his usual clarity Schopenhauer explains that sensation of every kind, whether pleasant or unpleasant, “is and remains an event within the organism itself; but as such it is restricted to the region beneath the skin; and so, in itself, it can never contain anything lying outside the skin and thus outside ourselves” (in Magee 1983:114). Although there is no single locus for consciousness, our abstract feeling of awareness, of centrality of being, appears to be universally experienced behind the eyes, evoking the imaginary ancient seat of the mystical Third Eye. Here we find the frontal lobes of the brain “where the products of the brain’s subterranean assembly lines emerge for scrutiny. Self-awareness arises here, and emotions are transformed in this place from physical survival systems to subjective feelings” (Carter 2000:296). This subjective feeling of personal identity (a concept notoriously fraught with its own set of problems) is further intensified by the orbito-frontal positioning of the eyes, which provide immediate and dramatic visual interaction with the world.

Subject-object dichotomy

Yet it is precisely this immediate, personal experience that has blurred the distinction between subject and object, making it difficult to see ourselves as material objects, as others observe and experience us, reciprocal to our own interaction with other individuals as independent material objects. This despite the fact that we actually behave as material objects in order to avoid harm to our physical bodies within a potentially dangerous world filled with other material objects. Visually imprisoned behind our own eyes, we are all unable to see ourselves as others see us, or as we see others around us. Despite these limitations, we nevertheless do experience ourselves on what appear to be two contradictory levels: as physical objects in space, accessible to other perceiving subjects in every way that all physical phenomena are knowable to ourselves; but also from inner access to the material object that is myself. "This material object here, and this one alone, I can know with a direct, non-sensory, non-intellectual knowledge from within" (Magee 1983:122). It is not surprising that the sheer power of this universal, subjective experience came to be regarded as lying beyond the laws that govern matter, and that its ostensible dissociation from the physical world gave rise to the emergence of dualism.

Conscious evolution

According to evolutionary theory, we may assume that this feeling of abstract consciousness - however vaguely experienced and unexamined - must have been operational in early humans with sufficient cortical expansion. Doubtless the fleshing out of thought, made possible through the evolution of language within the increasing complexity of expanding social structures, generated the first primitive folklore to account for inexplicable experiences. In this way it became possible to explain the mystical quality of dreams and hallucinations, as well as fearful natural phenomena, such as eclipses, lightning, volcanic eruptions or earthquakes. It is also possible that early human experience of altered states of consciousness through the accidental ingesting of some hallucinogenic substance may have begun a cycle of deliberate, shamanic contact with what appeared to be external powers. Such powerful rituals may well have spawned the first invisible benign or malevolent entities; disembodied

beings that acted as the matrix for the emergence of an intangible, spiritual world that exerted immense and unpredictable power over the tangible, physical world. This dichotomy haunts us yet, remaining unresolved until such time as the mystery of consciousness is satisfactorily accounted for.

Dualism and power

Historically this distinction between the body and its consciousness has been exploited by a powerful and manipulative priestly caste. Mind, or spirit or soul, came to be regarded as the true identity of the individual, the real yet paradoxically ghostly and indestructible essence that would survive physical death. Once this belief was established, the twin concepts of eternal life or everlasting punishment provided powerful tools in controlling the behaviour of individuals within the group. Floral evidence from 50,000 year old Neanderthal graves, as well as grave goods from two 100,000 year old early modern human burials suggest at the very least some emerging human speculation or concern about the mysterious force of death (Tattersall 1998:162). Hope of transcending its fearful finality through spiritual survival has remained the driving force behind the development of increasingly intense and complex religious behaviour in all civilizations across the globe. Although much of early human history remains shrouded, we are able to trace supernatural dualism over at least five millennia, from the earliest written records of Sumerian and Egyptian culture and religion to present day dualism in its various forms.

From genes to memes

Supernatural dualism of some kind or another forms an unbroken chain that links such primitive origins to present-day global belief structures. Like other dynamic systems, the acquisition of knowledge, whether true or false, whether in the area of science or belief, reveals an evolutionary development. The selection of adaptations that maximise the survival of the organism in its physical environment can be seen as a mirror image to a comparable selection of ideas and beliefs that similarly may promote the psychological or cultural well-being of the individual (Blackmore 2000:200). Richard Dawkins calls these selected mental units *memes*, invoking the survival imperative of the physical

gene that selfishly ensures its own replication at any cost. This powerful metaphor helps to explain the perpetuation of a belief in spiritual dualism that promises survival in some form or other. Such soothing animist trade-offs tend to retard the competitive pace and acceptance of objective scientific ideas, which are themselves evolutionarily selected for by surviving the stringent demands of falsifiability; a process that is unfortunately impossible to apply to non-physical claims.

Scientific origins

The first stirrings of scientific objectivity displayed by the early Greek Ionian philosophers also gradually fell prey to the universal, inherent human compulsion to seek the solace offered by survivalist doctrines. Fortunately their dormant ideas were not entirely lost, becoming the rootstock from which later thought evolved once the environment became less hostile during the centuries of scientific revolution and development, followed by the increasing intellectual freedom of the Enlightenment. Science, like myths and religions, emerged from a human curiosity and need for explanations, but religion has played such a powerful role in the lives of individuals and the integration of societies, that scientific discoveries are often denounced because they threaten supernatural beliefs. But religious resistance and suspicion are overcome by the desire to participate in the products and benefits of science. It is clear that science “has conquered its place in society – in men’s practice, but not in their hearts” (Monod 1971: 169).

The role of evolution in the development of dualism

The story of evolution leads to the logical conclusion that the brain is a biological tool ensuring survival and reproduction, and that human reasoning is one of the techniques that it employs. The survival instinct is so powerful that it is quite rational for human minds to extend and transform the physical will to survive into belief systems that promise survival after death (Wilson 2001:2-3). Although religious belief and transcendental experience are generally considered to lie beyond the reach of science, neurologists have isolated a specific area in the temporal lobe of the brain that appears to be

responsible for generating intense experiences of spiritual transcendence, often linked to the idea of a mystical presence. Research shows that stimulation of this area may produce such hallucinatory feelings even in non-religious persons. This suggests that spiritual or religious beliefs may well be instinctually and therefore genetically hardwired as part of the human survival armoury (Carter 2000:13). Monod suggests that mythical or religious explanations and assurances may have created the necessary conditions for the evolution of tribal laws, setting behavioural norms for individual members of the group, thereby fostering tribal identity and cohesion. The seductive security provided by tribal religion and ritual has thus over time provided an adaptive camouflage against existential *angst*, becoming, like all successful adaptations, “inborn, inscribed somewhere in the genetic code”. This specifically human, unremitting search for the meaning of existence “has created all the myths, all the religions, all the philosophies, and science itself” (Monod 1971:167). In addition, because cultural approval encourages belief systems that promote the identity and survival of the group through the obedience of the individual, the continued existence of such belief systems is ensured in a folk-psychology that protectively and unwittingly enshrines the body-mind contradiction.

Early science and dualism

The early Ionian philosophers generally believed that the order of the cosmos was internally explicable and thus outside divine control. Their scientific search for an ultimate, single substance underlying all existence – “the everlasting something of which the world was made”, logically implied a shift from the accepted dualism of the familiar religions of their time, which considered “heavenly bodies and the heavens themselves as divine, and therefore of a wholly different nature from anything on this earth” (Burnet 1930:15). Unfortunately these early philosophers were reduced to using the already existing words of *mind* or *soul* to explain the concepts of genesis and motion. Even their use of the term *god* in their explanations appears to have had no religious significance, being used purely in the sense of “ageless” or “deathless” (Burnet 1930:14). Revolutionary concepts are often obscured by the limitations of using existing terminology to explain something new, and

newly created words may fail to express the original thought exactly. These linguistic difficulties may have clouded such novel thinking about a self-sustaining universe independent of supernatural control: a concept that became lost in the subsequent resurgence of dualism. Ironically it was precisely this separation of conscious mind and unconscious matter that legitimately allowed seventeenth century trailblazers like Galileo, Copernicus and Descartes to devote their energies to exploring scientifically accessible physical reality. Approval and encouragement of scientific endeavour was liberal, as long as the religious boundaries of the time were not directly challenged, as in fact did happen in Galileo's case. His stubborn support for the Copernican theory that the earth rotates on its axis and revolves around the sun brought suppression by the Inquisition and house arrest until his death. But despite the enormous advances in science, dualism remains a present-day obstacle "because it seems to place consciousness and other mental phenomena outside the ordinary physical world and thus outside the realm of natural science" (Searle 1997:6)

Origins and pathways from the past

The secular nature of the earliest Ionian philosophers may be due to the absence of a significant tradition of theology or mythology as a result of their geographical isolation prior to the invasion of the coast of Asia Minor by Northern Greeks (Burnet 1930:13-14). The spread of new religious ideas, through this process of conquest and colonization, influenced later Ionians such as Pythagoras, who reintroduced the dualism of invisible control of visible matter, later most aptly expressed in Aristotle's "unmoved mover": an original, divine source of change, lying beyond the celestial spheres, that itself remains eternally unchanged. Apart from the relatively brief Ionian interlude, this theme of two worlds, one physical and the other divine, still underpins modern dualistic beliefs that may have had intuitive origins in the early beginnings of human self-consciousness. It is possible to mention briefly only a few of those philosophers who have helped to shape modern Western metaphysics.

Plato 's dualism

Egyptian Osirianism and the mysticism of other new religions such as Persian Zoroastrianism and Orphism influenced Pythagorean mind-body dualism and reincarnation, cultivating the belief that the soul or mind (*Psyche*) was distinct and separable from the body. Using the voice of Socrates as literary medium, Plato claims that “the soul is un-dying” (Phaedo 105-106). But this conclusion is achieved through an invalid use of the polarities of life and death in an argument that allows the move from “the logically-established truth that life and death are incompatible to the invalid substantial conclusion that the soul, being the principle of life, cannot perish” (Hare 1982:11). Plato’s belief in reincarnation is again expressed through Socrates, when he tells Meno that the soul “is immortal and has been born many times, and has seen all things both here and in the other world “ (Meno 81C). The soul is given primacy over the flawed physical body with its base desires; it is eternal and separable from matter, and therefore can exist without the body. Dualism and reincarnation are further underscored in Chapter X of Plato’s Republic, which details an eschatology that may well have helped in fashioning later Gospel doctrine rewards and retributions (Larson 1977:167). The indestructible soul is contrasted to bodily corruption, made dangerously obvious by the visible decay of the lifeless corpse. This theme of shame and rejection of the body has even more primitive roots in early religious castration ceremonies, foreshadowing the subsequent religious emphasis on celibacy and bodily mortification as a response to the guilt and shame of human sexuality.

Not only were the soul and body separable; they belonged to separate realms, a belief that critically influenced Western thinking. Plato’s idealism is expressed metaphorically in his parable of the Cave: the flickering shadows on the cave wall become reality for its inhabitants, who remain ignorant that these are but reflections of the truth. Reality is to be found in the bright light outside the cave. This external world symbolizes true reality - the realm of the eternal soul, lodged in the invisible world of Ideas or Forms - while the cave dwellers are imprisoned in the physical, but paradoxically illusory world of the senses, in

which everything is merely a flickering instance, or second-rate copy, of the original and singular ideas of the world of Forms.

Aristotle's realism

Plato's idealism forms a contrast to the realism of Aristotle, and "the difference between these two approaches has some relation to most of the great bifurcations in the history of philosophy – rationalism versus empiricism, idealism versus realism (or in a different sense, idealism versus materialism) and so on" (Magee 1998:304). Aristotle's work was pivotal in rejecting not only Plato's Forms, but also all earlier theories about the soul. Although his own theory of Matter and Form arguably has dualistic undertones, for Aristotle the soul is not a separate entity that can survive death; rather it is the sum of the skills or powers or capacities for being a living being, and these cannot exist without a body, in the same way as individual abilities or skills cannot survive the death of the body that exercises those skills. This accords with materialist theories that link the activities of the mind to the life-serving skills of the brain and body, without which the mind cannot exist. Since the soul's life-giving capacities of movement, thinking, understanding and perceiving depend on the existence of the body, Aristotle is insistent that "we can dismiss as unnecessary the question whether the soul and the body are one: it is as though we were to ask whether the wax and its shape are one" (in Hoy & Oaklander 1991:199). It is clear that the vexing question of unity between material body and immaterial soul does not arise for Aristotle, but even he hints at immortality of a kind when he distinguishes between two different kinds of thinking – *active intellect* and *passive intellect* – and suggests that the former faculty, when separated, "is alone just what it is, and this above is immortal and eternal" (in Hoy & Oaklander 1991: 203-204).

Despite this glimmer of dualism, Aristotle himself insisted that "empirical science must pass down the principles", not only in astronomy, but "similarly in every other art and science whatsoever" (in Barnes 1982:71). Unfortunately Aristotle's brilliance failed him in a cosmology in which he was forced to move from his usual empirical rigour to fashioning theoretical constructs to explain

what lay beyond human accessibility. With hindsight, the absence of technological tools for physics and chemistry inevitably reduced early scientists to theoretical models that were necessarily flawed; but since conceptual poverty is closely related to technical poverty, it “would be absurd to blame Aristotle for his conceptual poverty: poverty is a lack, not a failing” (Barnes 1982:70). As yet unborn humans may, with future hindsight, from a position of superior technologies, consider our present level of knowledge similarly flawed. It is in this light of the evolutionary nature of knowledge that we are to measure Aristotle’s geocentric cosmology in which earth was concentrically followed by water, air and fire, beyond which lay his invention of a special fifth element, or *quintessence*, for the heavens, which obeyed different laws to those that operated on earth. By thus stressing the qualitative difference between heaven and earth, his theory could subsequently be used to endorse the body-mind dichotomy of religious dogma, which emphasized the primacy of heaven and the immortality of the soul. Aristotle’s cosmology unwittingly supported the idealism of Plato’s two world arguments and could therefore gainfully be used to substantiate the religious dualism of corruptible body and immortal soul.

The merging of medieval and modern philosophy

Medieval philosophy was deeply tied to religion, since the church was all-powerful, exercising control over every aspect of society, with unrestrained papal power over commoners and kings. After centuries of unquestioning submission, the rising scepticism and scientific doubts of the sixteenth century gradually exposed some of the flaws and vulnerabilities of accepted dogma. Papal patronage ironically encouraged scientific studies, which would surely reinforce the primacy of scriptural truth. The first great challenge came from Copernicus’ heliocentric theory, which displaced the world as the centre of the universe. A solar system was born, and further scientific research became even more irrepressible. This was the birth of modern philosophy, based on natural, scientific principles, in opposition to medieval philosophy, which depended on religious tradition as a source of information. Although Descartes is generally regarded as the first modern philosopher, his preface to the *Meditations* still shows a strong medieval influence: “I have always considered that the two

questions respecting God and the Soul were the chief of those that ought to be demonstrated by philosophical rather than theological arguments ... it certainly does not seem possible to persuade infidels of any religion, indeed, we may almost say, of any moral virtue, unless, to begin with, we prove these two facts by means of natural reason” (in Spinoza 1982:6).

Descartes' dualism

In this nascent climate of theological questioning and religious dissent, Descartes sought secure foundations to underpin science, philosophy and religion, taking care to avoid confrontation with ecclesiastical power. Starting from what has become known as Cartesian doubt, he believed he could at least establish the certainty of his own existence as a thinking thing. His “*cogito ergo sum*” gave primacy, uninterrupted identity and immortality to the human mind: “it is certain that I [that is, my mind, by which I am when I am] am entirely and truly distinct from my body, and may exist without it” (Descartes 1969:133). This separation exposed the logical puzzle of the union and interaction between the human, non-physical, immortal soul – the site of intelligence and consciousness – and its spatial, physical automaton body, a problem that still requires a satisfactory resolution. Miguel de Unamuno provides an interesting reversal of this axiom: “The truth is *sum, ergo cogito* – I am, therefore I think, although not everything that is thinks. Is not conscious thinking above all consciousness of being? Is pure thought possible, without consciousness of self, without personality?” (in Edelman 1992:3)

Having defined body and mind as different substances, once again the absence of a suitable vocabulary resulted in a purely negative description of mind as immaterial, immortal substance, a description that really failed to explain what it is. Cartesian idealism created an apparently irreconcilable split between mind and matter, subject and object, observer and observed. This dissociation has been reinforced in Western thinking and science. Science operates on the physicality of space and extension, based on geometry and mathematics, whereas subjective sense quanta are considered to occur in the mental domain as a result of the impact of the external world on individual consciousness

(Magee 1987:86-87). Modern quantum theory suggests an interrelatedness in which the observer interacts with and affects the behaviour or outcome of what is observed. Perhaps solutions to our paradoxical body-mind interactions will be provided as we achieve greater knowledge and understanding of the as yet speculative quantum structure and activity of the brain.

Like the Ionians, Descartes relied on valid reasoning as opposed to external validation. This led to his conclusion “that, far from the objective being certain and the subjective uncertain, the sole certainty we have consists in what is immediately given to us in subjective experience. Any other knowledge we lay claim to must involve inference, and therefore be liable to error”. This in turn generated a problem “which more than any other has been central to western philosophy ever since: What can I know? And how can I know that I know it?” (Magee 1983:57).

Hume’s contribution

Empiricists like Locke, Berkeley and Hume challenged Descartes’ belief that the mind is capable of attaining pure knowledge of reality. But 18th and 19th century philosophers, whether they were idealists, empiricists or sceptics, continued to perpetuate his logically irreconcilable mind-body dualism by adopting the Cartesian starting point that “what is indubitable is something mental given in present consciousness” (Hoy & Oaklander 1991:216). In other words, what we cannot doubt are the existence of experiencing subjects and their experiences. However, this means that we cannot access knowledge of what the world is like *outside* these experiences. Hume argued further that the limitations of direct experience invalidate any attempts to infer the existence not only of an independent world of matter, but also the existence of God. Using the same argument, Hume also denied the *identity* of the experiencing subject: since experience consists of bundles of sequential impressions, the experiencing subject itself cannot *be* these impressions and thus cannot be directly accessed.

Hume further argued that since knowledge is reduced to our sense impressions, these were inadequate to provide proof in support of matter, causality or identity. “We have no perfect idea of any thing but of a perception”, says Hume. “A substance is entirely different from a perception. We have, therefore, no idea of a substance”. Since we cannot infer the existence of substance, whether material bodies or immaterial souls (as well as their postulated union), from impressions that arise from fallible human sensory abilities, any question about “the materiality and immateriality of the soul” becomes unintelligible (Hume 1985:282).

A consistent empiricist argument, based on a neutral monism in which everything in the world is made of the same stuff, making experience the matrix, moves away from Cartesian dualism by thus nullifying the distinction between mind and matter. Spinoza argued that dualism and the problem of interaction between mind and matter resulted from the failure to recognize the bilingual interpretation of two aspects of the same underlying reality. From this aspect it follows that, if the only reality that we can know consists of our experience alone, then “it is merely a matter of linguistic preference whether we describe it in the language of material objects and scientific concepts or in the language of subjective sense impressions and thought. No issue about the nature of reality is at stake, for it is the same reality that is being described in either case: the question is merely which of two ways of talking we find the more serviceable” (Magee 1983:61).

Kant

Hume’s arguments impacted on Immanuel Kant’s work. The question was not about the existence of the physical world, nor about its behaviour. The world behaved according to the principles of classical physics, embracing matter, motion, gravity and causality, and our knowledge about the world could not be doubted. But Hume’s arguments eliminated both the observation of causal connection, and induction, the twin supports on which our acquisition of knowledge appeared to rest. If our knowledge of the world is not given to us by the world itself, “the question is not primarily about the workings of the world,

it is about the nature of knowledge, and thus turns out on analysis to be about the workings of the human mind” (Magee 1983:64). This focal shift from the outside world to the mind was, for Kant, analogous to the entire shift that had occurred in astronomy when Copernicus discovered that “the motions of the heavenly bodies suddenly make sense if we look at them from the point of view of the sun and not the earth as our centre of reference” (Magee 1983:64).

Kant clearly identified the problem that arose for dualism at this point. He begins his Introduction to *The Critique of Pure Reason* with: “That all our knowledge begins with experience there can be no doubt” (Kant 1996:30). But, since the experience that it is possible for us to have is dictated at all times by the abilities and range of our particular perceptual structures, the knowledge that we can acquire is clearly restricted. All the operations of our mind result from, and are limited by, the particular perceiving apparatus we have, which determines the visual, tactile, olfactory, gustatory and aural data that we are able to receive, which in turn shape our concepts and our subsequent cognitive manipulations. There simply are no other ways for us to experience being in the world (Magee1983:65). In other words, the information we receive is not the same thing as the objects in the world; there is only our way of experiencing the objects. Since we therefore can never know the objects in themselves, which lie outside human apprehension, we are limited purely to what is possible within our minds, located within our bodies. Thus even our direct experience of time, space and causal connection must be seen as part of our mental apparatus, as necessary *a priori* conditions for having all our experiences.

A crucial conclusion of Kant’s philosophy was that we cannot claim to have knowledge of matters beyond our senses, including knowledge of metaphysics and theology. This entails accepting that there can be no “proofs” for the existence of God, or the soul, or immortality, which therefore must remain matters of faith, transcending the limits of human reason. Despite these constraints there is an “inextinguishable desire in the human mind to find a firm footing in some region beyond the limits of experience”, a search for “the

possession of a knowledge in which it has the deepest interest. It enters upon the path of pure speculation; but in vain” (Kant 1996:513). Despite his own arguments that matters outside the human senses cannot be proved or disproved, Kant retained his belief in duality, which is necessary for belief in the immortality of the soul. Reminiscent of the Ionian search for a single source, Schopenhauer was to unite Kant’s pluralistic physical phenomena and inaccessible noumena into a monistic noumenon, a single substance that formed the matrix from which evolutionary Will blindly and unknowingly forged everything that exists, in all its aspects of beauty and terror, with each individual entity propelled by its own inner Will to life, to survival.

The Cartesian conundrum would remain as long as the mind was considered as something separate from physical substance, existing as a metaphysical, internal homunculus with the ability of examining and reflecting on mental entities such as ideas, images, or sensations. A modern version of this central, subjective observer is often symbolised as some constantly whirring inner film or live theatre of the mind, but this analogy also perpetuates dualism, since the observer in turn requires another observer – ad infinitum - thus failing to eradicate the logic of an infinitely regressing observer.

The search for answers

We have no doubts about the existence of our own and other bodies, since these are perceptually experienced. We also know that different physical organs of the body, including the brain, can be examined and compared with scientific accuracy, whereas “each of us knows exactly one mind from the inside, and no two of us know the same mind from the inside. No other thing is known about in that way” (Dennett 1998:4). Since we are truly restricted to our own minds and consciousness, the classical problem of the existence of other minds, and their subjective experiences, can be summed up as follows: “Belief in other minds requires inferences from behavior; such inferences require generalizations about creatures in general; such generalizations can only be justified by experience of creatures in general; but experience of one’s own case is all one can have” (Churchland 1984:68). Inevitably we observe our own wide array of psycho-behavioural interactions such as personal responses to pain,

pleasure, fear, and a great many other stimuli. These generalizations are true in my own case and allow me to assume that the experiences and behaviour of other humans are similar to my own. In addition, since many non-humans are manifestly similar to humans in many ways, I am entitled to infer a similarity of mental states from their similar behaviour.

Definitional difficulties

In our search for *knowledge* of the internal workings of conscious, intelligent minds, we are confronted by the *inaccessibility* of *other minds*, and also with the problems posed by the intractable nature of *self-consciousness*. A major difficulty is encountered in defining self-consciousness, since historically we have inherited a confusing plethora of definitions of mind and consciousness. “While a formal definition of consciousness seems lacking and, indeed, may not be possible, there seems to be little difficulty discerning what is at stake” (Peterson 1999: 288). Most of us would agree with a working definition in which conscious, everyday experience may be contrasted to various forms of lack of consciousness. Most people do seem to have an holistic, common-sense understanding of consciousness. This not only includes an awareness of what it means to lose or regain consciousness, as in some cases of illness or physical trauma, but also of self-consciousness with regard to one’s own identity, and of one’s thoughts or feelings, extending even further to include an awareness of how others will react to one’s behaviours. But difficulties arise “when attempts are made to subdivide consciousness further, or to say just what it is, how we know about it, what function it serves, or how it can be explained” (Glynn 2000:452).

There is a basic form or component of consciousness that is biologically essential to the survival of every organism in its environment. This has to do with *touch* or *feeling*, at different levels and intensities, which directs subsequent action. Like intelligence, consciousness operates on a sliding scale across and within species, from simpler levels in some non-humans to a rich, autobiographical sense in humans of the *self*; a personal identity that encompasses the past and reaches into the future. “It is usually argued that

self-consciousness is a *thing*, that one has it or not; but a more careful analysis suggests that self-consciousness is a *range* of abilities and that even human beings have different levels of self-awareness at any given time, depending on their mood, intelligence, education, and the like” (Peterson 1999: 298). Levels of self-consciousness also alter over the lifetime of the individual, changing in response to a multitude of physical and psychological stimuli. This not only implies that self-consciousness may vary between individuals, but that it may be trained. Through conscious, introspective use of our innate, discriminative skills we may expand and improve the quality and authenticity of our self-apprehension.

Brain as mental matrix

Just as there is more to mind than just consciousness, there can be mind *without* consciousness, as in dreamless sleep, anaesthesia or coma. But it is interesting that *feeling* also disappears in such non-conscious states. There can also be mind without language, and, of course, without speech; but thinking and consciousness cannot exist without mind, which in turn cannot exist without the existence of complex brains, which are lodged within physical bodies. “There is no mind without brain, but much of the brain functions without the mind. Consciousness is the tip of an iceberg”(de Duve 1995:245). Consciousness gives us our subjective awareness of personal existence in what seems to be a curious, yet logically impossible, union of mental and physical properties within the spatial boundaries of a body. We remain puzzled by our inability to explain “how, in parallel with engendering mental patterns for an object, the brain also engenders a sense of self in the act of knowing”. So, in reading, for instance, there is the mind that understands the words and what they signify; but in addition there is the subjective awareness that “*you* rather than anyone else are doing the reading and the understanding of the text” (Damasio 1999:9-10).

This immediate experience of the subjective self, or thinking mind, as central to individual life and site of immortal identity, was bolstered by the Cartesian primacy of mind that has dominated Western thought for more than three centuries. This traditional view holds that our knowledge of the external world

may be dubious, since it relies on the mediation of our senses, which often create illusions. This means that in our contact with the outside world there may be discrepancies between appearance and reality. But since the Cartesian mind “knows itself first, in a unique way, and far better than it can ever know the external world”, we have direct and unmediated access to our inner states. According to Descartes, then, it is logically impossible for us to have false mental impressions, or to be mistaken about our mental states. But we know that cognitive accuracy may in fact be impaired, giving rise to illusory and delusory mental states. But since each individual is convinced of the truth of his mental impressions, the world is filled with conflicting truths. In an era of increasing focus on individual rights and freedom, relativism has encouraged the idea that reality, truth and morality may be made subservient to individual perception and experience.

Theories of mind

Because bias is a part of human nature, it seems almost impossible to remain strictly objective when developing a theory of mind. What follows is a very brief overview of the historical variety of such theories. Traditionally there is a basic distinction between *dualists*, who consider minds and bodies as two fundamentally different phenomena, and *monists*, who think that the world is made of only one kind of stuff and that therefore the mind and its abstract workings must be reduced in some way to the same matter.

Dualists subdivide into “*substance dualists*” who think that “mind” and “body” name two different kinds of substances, and “*property dualists*”, who think “mental” and “physical” name different kinds of properties that feature simultaneously in the same substance, as in the case of human bodies and human minds, or souls. Monists in turn are either *idealists*, for whom everything ultimately becomes mental or spiritual, or *materialists*, who believe that everything is ultimately physical or material. Unfortunately, the accumulation of knowledge operates on ongoing evolutionary principles: humans are trapped within their own time scale and therefore largely confined to their own era of cognitive and scientific development. Because we cannot know what we do not yet know, our optimal present resolution of the body-

mind dilemma hinges on finding a theory of mind that can be shown to be “the most reasonable theory on the evidence, to have the greatest explanatory power, predictive power, coherence, and simplicity” (Churchland 1984: 7).

Dualism

Although dualism is no longer the most common theory of mind amongst philosophers and scientists, it remains entrenched in the world at large. Some form of intuitive dualism has historically dominated and directed the evolution of human cognition, providing those in power with fertile ground to develop and promote belief systems that could be used to control the behaviour of human groups, whether tribal or national.

Substance dualism as a theory has its roots in Cartesian arguments that separated body and mind into two different substances; positively described spatial, physical body-stuff and its polar, negatively described non-spatial, non-physical mind-stuff, interacting across the divide through the pineal gland. This created an apparently irreversible split that has become entrenched in Western thinking. But modern quantum physics requires a revision of our accepted spatial definitions of matter. The indeterminate wave-particle nature of sub-atomic matter has neither spatial extension nor determinate spatial positions. “If there truly is a division between mind and body, it appears that Descartes did not put his finger on the dividing line” (Churchland 1984:9). It may ultimately be impossible to find such a dividing line. In popular dualism true identity is spiritual, still literally Ryle’s “ghost in a machine”, reminiscent of Descartes’ use of the metaphor of a pilot guiding a ship as a way of explaining the interaction of the two logically disparate substances of mind and body respectively. Current neuroscientific evidence suggests that supernatural dualism of any kind is wrong, since it has clearly shown that specific mental activities, such as language and reasoning that historically have been presumed to belong only to the soul, are connected with quite specific areas of the brain. “It is not simply the case that when a person receives a blow to the head, the soul is temporarily disconnected from the body and is able to go about its business until the body recovers. The soul is knocked out too. Drugs that alter the chemistry of the brain alter conscious states as well” (Peterson

1999:288). The corollary also may hold equally well: that endomorphic changes to the chemistry of the brain may similarly alter conscious states and resultant behaviour.

But, riding on the wave-particle dichotomy of quantum physics, dualists are able to claim that mind-soul and body-machine are similarly capable of interacting by virtue of being different manifestations of energy. By thus placing the spiritual energy of the mind beyond the reach of science it appears to make it logically impossible to counter the further claim that mind or soul might therefore survive the death of the physical body by virtue of its specific form or levels of energy. However, lying as it does beyond any means of verification as we understand it, such promise of survival, however logical, “might be a reason for *wishing* dualism to be true, but it does not constitute a reason for *believing* that it is true” (Churchland 1984:10).

As a dual substance interactionist, Descartes had believed that mental things both cause and are caused by physical things. For him, the pineal gland became the smallest point for the two opposite substances of mind and body to interact. *Property dualism* therefore is an attempt to overcome this interaction problem, by allowing unitary substance to have both physical and mental properties at the same time. But although the properties of the physical body are scientifically explicable, it then becomes difficult to explain mental properties except as *epiphenomena* that arise from, or are caused by, physical brain activity, but which themselves are unable to cause any further actions. These mental phenomena emerge in brains of sufficient complexity, are caused by brain activity, but rather impotently have no causal effect on the activity of the brain. This view tries to avoid dualism by restricting causality to physical phenomena only, but at the cost of negating the causal link between human actions and will.

Another attempt to solve this problem can be seen in a theory of dualist-interactionism as refined by Popper and Eccles. Brain and mind become separate entities, with brain in the physical World 1 and mind in World 2 of subjective or mental experiences. Interaction takes place in both directions

across the barrier between these two worlds, but this interaction “can be conceived as a flow of *information*, not of energy” (my italics). Interaction could therefore take place without impacting on the conservation laws of classical physics that completely sealed off World 1 of matter-energy. Irrespective of the great variety of attempted explanations, “the mysterious evolutionary emergence of mental experiences in a world hitherto purely physical in its attributes” remains an enigma, presenting a challenge to all materialist theories of mind (Eccles 1989:178). Spirit or soul has been used to explain the as yet scientifically inaccessible mental activity of brain matter. Spinoza believed that body and mind could be explained as two aspects of the same universal matter, and perhaps this is where our explanations will ultimately come to rest. But the search continues for the most coherent, comprehensible, non-contradictory theory that ultimately solves what has become known as the “hard problem”, of how particles of matter translate into cognitive abstractions.

The qualia of dualism

Some variation of dualism remains the prevailing global view. In addition to accepting that our bodies are physical objects, subject to the same general laws of cause and effect, we are conscious that we have experiences that appear to be radically different to physical experiences, and that we do not seem able to explain these differences in the same physical terms. It is precisely these abstract *qualia*, the subjective experience of what things *feel* like, that continue to reinforce the idea of a transcendental separation between mind and body. Our subjective mental experiences defy material descriptions, giving rise to the intuitive conclusion that there are twin roots to our existence, dependent on some indefinable union, or interaction, between physical and mental properties. This intuition is dramatically reinforced by the reality of death, which seems to offer us visible evidence that some immaterial quality has disappeared from the physical remains.

Materialism as response to dualism

Research in Artificial Intelligence through sophisticated development of computers to mimic the most vital aspects of conscious intelligence, together with an expanding cooperation amongst different branches of the

neurosciences, appear to be pointing philosophers and scientists towards two or three competing versions of materialism, since these are more consistent with modern science. Despite this trend, there are some philosophers and scientists who find it difficult to reject some form of spiritualism. Sudden flashes of insight, producing brilliant solutions to intransigent problems, are often considered to be transcendental in origin and nature, when it is quite possible that ongoing, but non-conscious, operations of mind-brain interaction have finally delivered an unexpectedly lucid solution. According to Paul Davis, Fred Hoyle describes such a moment of inspiration “as a truly religious (as opposed to a merely Platonic) event. Hoyle believes that the organization of the cosmos is controlled by a ‘superintelligence’ that guides its evolution through quantum processes ... that by acting at the quantum level this superintelligence can implant thoughts or ideas from the future, ready-made, into the human brain. This, he suggests, is the origin of both mathematical and musical inspiration” (Davies 2001:256-257). For Richard Feynman such experiences felt “as if a huge brilliant light had suddenly been switched on”. He discussed with Hoyle what such “a moment of inspiration feels like, and of it being followed by an enormous sense of euphoria, lasting for maybe two or three days” (in Davies 2001:256). The most startling case is that of Sir John Eccles, who brilliantly and scientifically examined and underscored the physical dynamics of evolution and then denied a materialist conclusion, much as Kant had transcended the conclusions of his own theory, according to which the existence of anything supernatural lies beyond human apprehension. Eccles does a similar leap of faith. “Since materialist solutions fail to account for our experienced uniqueness, I am constrained to attribute the uniqueness of the Self or Soul to a supernatural spiritual creation. To give the explanation in theological terms: each Soul is a new Divine creation which is implanted into the growing foetus at some time between conception and birth “ (Eccles 1989:237).

Materialist theories require some form of reductionism in order to develop an objective explanation of consciousness that will successfully incorporate the two apparently insoluble problems of *qualia*, or first-person subjective experience, and *intentionality*, the ability of the mind to refer to objects outside

of itself. These two problems have had an important impact on the emerging theories of mind by perpetuating the qualitative gap between mental objects of thinking and physical phenomena.

Reductionism and its problems

It can be argued that all attempts to understand complex phenomena inevitably require some degree or form of reductionism. But “reductionism has become a dirty word in the context of the human species...we feel flattered by the thought that we are really very complex creatures ...(a) mystery that requires patient unravelling in an awed hush of self-reverence” (Bickerton 1996:7). Yet dualism itself is also a method that tries to explain the contradictory nature of psycho-physical experience by reducing its vast, as yet not fully understood, complexity into two more accessible, but conflicting, units of physical body and spiritual mind. Reductionism has proved to be a potent scientific tool in tracing phenomena to their atomic and sub-atomic roots, producing a wondrous understanding of the world in which we live without necessarily losing our holistic appreciation of the richness of phenomena. In fact, the sheer complexity may actually enhance our sense of wonder. The same reductive process appears to be equally useful in gaining greater understanding of the brain and consciousness, with the caveat to avoid “reductive megalomania” (Midgley 1995:132) and guard against “silly reductionism” (Edelman 1995:200). Paul and Patricia Churchland defend the historically valid scientific value of inter-theoretic reductionism, with similar warnings against a narrow-minded, bullish “nothing-but” psychological reductionism that is likely to be “insensitive to emergent complexity and higher-level organization. It is an approach to be resisted” (Churchland 1995:64).

All of our conscious life is caused by lower-level brain processes “but we have only the foggiest idea of how it all works” (Searle 1998:4) because of the practical difficulties encountered in brain science. We may be awed by images of the sheer enormity of space, or at a more mundane level, by sights such as the 30,000 lights illuminating the Rockefeller Christmas tree in New York each year. But we generally remain blissfully unaware of the vast brain network of

over 100 billion neurons, each of which has from hundreds to tens of thousand synaptic connections with other neurons: all this crammed into a cranial space that is smaller than a soccer ball. Sheer complexity makes it difficult to work on the brain without damaging these micro-elements or even killing the organism (Searle 1998:4). In addition, working on human subjects is made ethically even more difficult because of the belief in human uniqueness, a *locus humanus* that would give human beings the spirituality denied to other animals, often in the form of a theological *image of God* (Petersen 1999: 298).

Mind, consciousness and the unconscious

It has been suggested that Freud's theory of the unconscious was actually based on earlier insights of Schopenhauer, who clearly understood the relative superficiality of consciousness and the scope and power of the unconscious: "Consciousness is the mere surface of our mind, and of this, as of the globe, we do not know the interior but only the crust" (in Magee 1983:133). Because consciousness, and in particular, self-consciousness, are considered as distinguishing and superior hallmarks of the human mind, we fail to acknowledge the power and supremacy of what lies below this crust: a plethora of self-serving impulses, suppressed within the unconscious, that exercise ultimate control over both consciousness and self-consciousness.

It is generally accepted that *mind* and *consciousness* are the product of evolution, and that *self-consciousness* probably arose as a more extravagant part of an evolutionary survival mechanism. The emergence of this self-awareness can be seen as a conscious adjunct to the multitudinous, unconscious actions and interactions that occur continuously in order to ensure ongoing maintenance and survival of any organism, such as those that take place in homeostasis. In addition to these automatic physical operations of which we remain largely unaware, there are myriads of mental operations – drives, impulses, repressions, justifications – that occur continuously at a subconscious level. These operations, by definition below consciousness, require deliberate and discerning attention if they are to be examined at a rational level. If our behaviours are directed by inaccessible mental operations,

and by our ignorance of unexamined impulses, we have to consider whether our apparently conscious choices and actions are truly an expression of free will, a problem that will be touched on later.

Evolutionary consciousness

Evolutionary theory argues that brains, and therefore minds, were selected for. Survival and reproductive success were increased in individuals who were able to understand, manipulate and thus exercise some control over their environment, a *troika* of abilities that logically were more important and urgent than the luxury of subjective introspection. Self-perception, or self-consciousness, may have developed as an adjunct to external perception, and would therefore have been selected for, particularly if it enhanced the brain's ability to gather knowledge of the environment. In such a supplementary role, self-perception may not be fundamentally different in kind from external perception, making it equally fallible. Self-consciousness "is just a species of perception: *self-perception*. It is not perception of one's foot with one's eyes, for example, but is rather the perception of one's internal states with what we may call (largely in ignorance) one's faculty of introspection. Self-consciousness is thus no more (and no less) mysterious than perception generally. It is just directed internally rather than externally" (Churchland 1984:75-76).

External animal perceptual consciousness probably emerged from the restrictions of primitive proprioception, an evolution that allowed increasingly sophisticated animals to make judgements through the causal connection that operates between brain and environment via the senses. A further evolution from *external* to *internal* introspective consciousness similarly allows humans, and to some extent other higher primates, to make judgements through information that is gathered through the interaction between different, specialized parts of the brain. Since both external and internal perception combine in this task, the traditional view that gives primacy to mind cannot be sustained. "Born from the brain, critically dependent on the brain at every instant, crippled together with the brain in all sorts of weird fashions directly related to whatever brain area is maimed, the mind is without any doubt a product of polyneuronal functioning" (de Duve 1995:245). Having self-

consciousness means to have knowledge of oneself, which includes having knowledge of both physical states and mental states. In tandem with the conscious awareness and assessment of the outer reality of the physical world, self-consciousness appears to act as an ongoing apprehension of inner mental states and activities. According to some definitions it appears that, in order to qualify for self-consciousness, it is not enough just to *have* mental states, but also be able to *discriminate* one state from another and to *catalogue* them in order to judge the mental or emotional state one is experiencing, for instance, anger, belief, fear, wonder or regret. This of course implies that conscious non-humans do not necessarily qualify for self-consciousness, although numerous animal studies reveal that all apes behave in ways that are possible only through a sense of self-awareness. But it is important to realise that the stringency of this definition of self-consciousness would also exclude many impaired or undeveloped humans.

Naturalist theories explain the presence of consciousness as part of the evolutionary process; a transition from primitive forms of sensation to the greater discriminatory skills provided by the development of specialized perceptual structures and abilities that were selected for because they enhanced survival. In unconscious trauma states, perception disappears: this is seen in brain monitoring in extreme and often irreversible cases where the purely reflexive, non-conscious activities of a vegetative state may continue to function, giving the appearance of conscious participation at some level. Conversely, perception may occur without consciousness, as in cases of visual *agnosia*, which may affect some stroke patients, or occur in the early stages of dementia or Alzheimers, leaving such unfortunates unable to even recognize everyday objects, despite their ability to see them. Persons and animals with such extreme deficits are naturally severely disabled in their environment. But apart from such extreme cases, levels of self-consciousness are kaleidoscopic by nature, constantly shifting in response to personal levels of physical and psychological focus and attention. Dennett suggests that the developing human mind may from birth internalise the sounds and associations of human speech with increasing sophistication and meaning. Both vocabulary and concepts are internally expanded through learning and repetition, “building up recognition

links and association paths between the auditory properties and concurrent sensory properties, internal states and so forth”. This ongoing internal commentary “could have the effect of initiating a habit of what we might call *semi-understood self-commentary*”. This ability to turn conversations inwards appears to be lacking in other species and may play a role in the development of self-consciousness (Dennett 1998:197).

The hard problems of consciousness

It is clear that having conscious experience has an adaptive advantage for humans and a great number of other animals. Although evolution explains the value of consciousness and why it would flourish once it arose, for some it fails to explain what have become known as the Hard Problems of *how* it arose and *what* it is. It does not explain “how *consciousness comes upon the scene at all*: it does not tell us (a) how the mutation that first conferred consciousness came about, or (b) how some feature of DNA gives rise to consciousness in beings who possess it” (Horst 1999:44). For some, the physical and structural explanations of biophysics, biochemistry and embryology fail to provide absolute clarity “about how particular biological properties might be the right sort of thing to produce consciousness in the first place – and this is precisely where the hard problems lie” (Horst 1999:44). These gaps challenge materialist theories, which generally rely on reducing mental events to physical phenomena, which are then in turn used to explain the appearance and operations of the mind. “Not only does an evolutionary account not succeed where a reductionist account fails; the evolutionary account presupposes the possibility of a reductionist account” (Horst 1999:40).

Naturalistic theories of consciousness

Advances in the cognitive sciences tend to encourage a naturalistic account of consciousness, in other words “in terms of known or possible quantities as described by the sciences, even if the account must leave some areas incomplete or take a ticket on the future, hoping that new empirical discoveries will confirm the theory posited” (Peterson 1999:289). Naturalistic theories exclude supernatural mind-body dualism and superstition, and as such are monistic, materialistic theories. But even the most successful reductionism

and brain mapping still remain incomplete and fail to answer the apparently insoluble Hard Problem of consciousness: “How is it possible for physical, objective, quantitatively describable neuron firings to cause qualitative, private, subjective experiences? How, to put it naively, does the brain get us over the hump from electro-chemistry to feeling? That is the hard part of the mind-body problem that is left over after we see that consciousness must be caused by brain processes and is itself a feature of the brain” (Searle 1997:28). Until we solve this problem our theories remain incomplete.

Mystery or problem?

John Searle maintains that our solution to the “mystery”, or what he prefers to call the “problem”, of consciousness is hampered by our use of a set of obsolete categories, together with religious and philosophical presuppositions inherited from the past. The vocabulary of dualism placed consciousness and other mental phenomena outside physical reality, and therefore beyond the reach of science. A sensible starting point would be to abandon dualism and start with the assumption that the brain is an organic machine, like any other organ of the body; and that consciousness is an ordinary biological phenomenon, comparable with other equally “invisible” processes, like growth or digestion, or, as the French physician-philosopher La Mettrie put it: “the brain secretes thought like the liver secretes bile”. Darwin used the same analogy a century later: “Why is thought being a secretion of the brain, more wonderful than gravity a property of matter?” (in Eccles 1989:173).

Although it feels strongly counter-intuitive, it is rational and ontologically economical to consider that consciousness is caused by lower-level neuronal processes in brain tissue. This makes consciousness a feature of the brain, in the same way as digestion is caused by lower-level processes within the digestive system and is a feature of that system. Searle believes that this approach to the body-mind problem avoids both dualism and materialism since it allows us to think of consciousness as an “emergent property” of the brain. “An emergent property of a system is one that is causally explained by the behavior of the elements of the system; but it is not a property of any individual elements and it cannot be explained simply as a summation of the properties of

those elements. The liquidity of water is a good example: the behavior of the H₂O molecules explains liquidity but the individual molecules are not liquid” (Searle 1997:18).

Historical philosophical reliance on mutually exclusive categories for “mental” and “physical” has hampered our understanding of the biological nature of consciousness and other mental phenomena which do not properly fit into either of the traditional categories. Some argue that it is difficult to apply scientific reductionism to mental phenomena without losing the rich, intricate variety of each individual, but this is not necessarily so. Diversity is certainly not lost, for instance, in Edelman’s theory of Neural Darwinism, extending Darwin’s theory of natural selection to the brain, which then also operates as a self-organizing selective system. Although the large-scale arrangement and inter-connectivity of neuronal systems in central nervous systems are more or less similar across individuals, the chance variation that occurs during development is so vast that exact matching between individuals – even identical twins – is impossible. This variation and complexity is a powerful argument against any but the most general comparison of brains to computers. “Although the brain at one scale looks like a vast electrical network, at its most microscopic scale it is not connected or arranged like any other natural or man-made network ...The brain is an example of a self-organizing system. An examination of this system during its development and of its most microscopic ramifications after development indicates that precise point-to-point wiring (like that in an electronic device) cannot occur. The variation is too great” (Edelman 1992: 24).

Emergent holism

Dissatisfaction with reductionism has led to theories of emergent holism, which try to blend the scientific findings of biology and physics. Ultimate reduction reduces everything to the motion and interaction of atomic and sub-atomic particles. However, our knowledge of particle physics remains incomplete. We know that the laws of physics operate at the macro level, but that the quantum world is required to provide answers beyond certain boundaries, as in the case of the singularity of the Big Bang. Similar boundaries may well exist in the case

of minds and consciousness, with quantum unpredictability affecting their development through the interaction of chance and chaos that underlie all the operations of particle physics. In addition to the causal effect of such micro-events on macro-processes of brains and nervous systems as they develop from conception to death, there is also a reverse top-down causation as the plasticity of the brain impacts on its neuronal structure and behaviour. New scan technologies make it possible to study the neural correlates of specific mental activities, but “no mind can be found by simply examining neurons, because in such an examination we are engaging the wrong level of analysis – although examining the neurons may tell us much about how the mind works. In this sense, the conscious mind is real, but it is an emergent reality. The mind is not identified with any one area of the brain but with its operation as a whole” (Peterson 1999: 291).

Descartes separated the mind from scientific enquiry. Edelman believes that we may be in a position to dispel Cartesian duality only when we understand the relationship between consciousness and physics. All forms of matter are the outcome of specific arrangements of particles. This means that the physical matter that underlies mind is not at all special. The actual composition and chemistry of the brain are necessary but insufficient explanations for the nature of mental properties: what is special and important is the way these elements have been arranged so as to create its “dynamic organization”. Edelman’s thesis is that mind is a special kind of *process*, depending on special arrangements of matter. Neuroscientific findings increasingly indicate that mental processes arise from the workings of enormously intricate brain systems at many different levels of organization. “Modern scientific study indicates that extraordinary processes can arise from matter; indeed, matter itself may be regarded as arising from processes of energy exchange. In modern science, matter has been reconceived in terms of processes; mind has not been reconceived as a special form of matter” (Edelman 1992: 5-6). Consciousness may ultimately be based on quantum physics, since the brain itself is made up of quantum-obedient particles, particularly at the synapses, where most activity occurs. In the language of quantum physics it “the hypothesis is that mind-brain interaction is analogous to a probability field of quantum

mechanics, which has neither mass nor energy yet can cause effective action at microsities” (Eccles 1989:189).

The problem of free will

Free will is considered essentially human, and generally regarded as the seminal difference between humans and non-humans. Together with reasoning and language, the autonomy granted by free will allows only *Homo sapiens* to participate in a reciprocal moral community of rights, duties and concerns. The development of increasingly complex legal and moral developments increased the gulf between humans and other species. Hobbes notes this move from the dangers of a natural state to the creation of a mutually protective society: “For before covenants and laws were drawn up, neither justice nor injustice, neither public good nor public evil, was natural among men any more than it was among beasts” (in Linzey & Clarke 204: 21). These new anthropocentric developments and definitions removed non-humans from legal and ethical concern.

Autonomy includes the right of self-government, personal freedom, and freedom of the will - the liberty of choice, or preference for one state over another. Tom Regan divides autonomy into Kantian and preference autonomy. Kantian autonomy is considered to exclude the entire non-human field, since only humans appear to have the cognitive skills required in such higher levels of reasoning and moral discrimination (Regan 1983:84-85). Preference autonomy is not present in inanimate life forms such as stones, clouds or rivers. Non-humans generally behave instinctually, but there are many cases where they choose, or *prefer*, one thing over another when they are presented with such a choice. They would prefer being free to being trapped, shade or sunshine depending on the weather, and their normal diet rather than exotic, unusual food. But the question is not whether non-humans have free will, but rather why we should believe that humans do.

We know that the mammalian brain structure is comparable across species, but that the quality and experience of consciousness and levels of cognition are affected through quantitative differences. Primitive drives of the limbic system

operate universally on the pleasure/pain principle across species, but the instinctual responses of humans may be tempered by reason, presenting what appears to be a spectrum of potential choices. There is no disputing that humans display an often unpredictable, infinite variety of behaviour, not seen amongst non-humans. In order to explain and understand such a wide spectrum of behaviours, we need to consider the complex interactions that operate in humans among genes, the anatomy of brain, its biochemical state, family upbringing, societal pressures and the bombardment of both external and internal stimuli that impinge on the person (Pinker 1997:53). But it is important to realize that these factors apply equally to non-humans, particularly other social primates, although deeper levels of consciousness and cognition in humans no doubt intensify the experiential effects of such interactions. Biochemical similarity may produce comparative mental states such as depression, anxiety, or obsessive-compulsive behaviours, across all mammal species – particularly primates – which may similarly respond well to the same psychotropic drugs. But apart from viral brain infections, as in rabies, non-humans do not seem prone to the severe mental illnesses that plague humans. There are no mental institutions for violent, mentally disturbed non-humans, since those that pose a danger are disposed of, as in the case of rabid animals or predators that threaten human life.

Double trouble

As discussed earlier, there is a decisive difference in the specifically human brain asymmetry, a spatially economical evolutionary adaptation that ironically may have brought other problems in its wake. Although the naturalistic fallacy warns against deriving *ought* from *is*, it is tempting to argue that the advantages of this asymmetry *should* produce superior human behaviour. On the other hand, it is conceivable that the very brain asymmetry that sparked human creativity, language and cognition has ironically created two distinctly endowed brain hemispheres that appear to wrestle for control over the emotions and behaviour of the human individual.

Although the entire brain works as an integrated whole, the evolution of cerebral asymmetry in humans has produced two differently operating

hemispheres: an analytical left brain, with the power of language, and a more holistic, artistic right brain, which is mute. The phenomenon of blindsight shows that it recognizes an object that has been subliminally flashed to the right brain. Although it cannot name the object, it can direct the left hand, which it controls, to physically select the matching object. The two hemispheres seem to be two separate brains, with different functions, perceptions, and emotions. But their functions become integrated across the entire human brain via the complex, connective fibrous bridge known as the corpus callosum. Some epileptics who experience uncontrollable seizures have the two hemispheres of their brains surgically separated in a commissurotomy. The destruction of this bridge, which enables co-operative interaction between the different skills of the two brain hemispheres, may give rise to bizarre behaviour as they compete for dominance. In what is known as “alien hand syndrome” the less dominant hand (usually the left hand, controlled by the right hemisphere) becomes unpredictable and uncontrollable, counteracting the activities of the dominant hand, such as undoing buttons as fast as they are being fastened, or closing doors as they are being opened; conflicting situations in which the left hand literally and frustratingly does not know what the right hand is doing. At worst, the alien or less dominant hand may inexplicably and unexpectedly inflict harm on others, or even on its own person (Carter 2000:69-73). Experiments show that each hemisphere in such split-brain patients operates on its own, since both factual information and emotional stimuli can no longer be passed directly from one cortical half-brain to the other, but is transmitted at an unconscious, un-thinking level (Carter 2000:67). This has a direct bearing on the structure of consciousness and self-consciousness, since the potential conflict generated in this unconscious dialogue between dominant and minor hemispheres may impact on the unity and identity of the human individual, a problem that does not appear to manifest in the functionally symmetric brains of non-humans.

This surgical dissolution of this usual “marriage of two minds” shows that the two hemispheres “might also exist in two distinct realms of consciousness: two individuals, effectively, in one skull” (Carter 2000:48). This implies that in cases where one hemisphere has been totally removed, one of two persona has

disappeared. While the disparity of the two hemispheres in whole brained individuals is masked by their apparent co-operation, unconscious conflict may be generated by the dissimilar desires of the two hemispheres. In this way we are confronted by the necessity of choosing between contrary options, a process that may well be responsible for the illusion of free will. This idea of freedom of choice is further intensified when we later reflect on specific actions and consider that a different choice would have brought a different outcome.

Free will?

The problem of free will is ancient and unresolved, and appears to hinge on solving the apparent incompatibility between the laws of causality and the exercise of human freedom of choice. Religion fails to solve the conundrum since there is a similar conflict between the free will granted to humans and its futility when set against the determinism of divine omniscience. Since we cannot assert and deny the same thing, humans either have free will or they do not. According to Thomas Aquinas “every movement both of the will and of nature proceeds from God as the Prime Mover” (in Hoy & Oaklander 1991:361). This not only makes free will a dubious gift, but shifts responsibility to the fickle hands of the puppeteer.

The basic urges, drives and desire that motivate our behaviours are reflexive and automatic responses to both external and internal stimuli. It is possible for humans to suppress some of these urges in order to satisfy some further aim. Unlike adult humans, children find it more difficult to control basic urges, not only until they learn that self-control is a valuable strategy, but also because their limbic systems are a stronger force until their prefrontal lobes achieve functional maturity – usually only in their twenties. As a result of such structural differences, it is therefore correct to say that children do not have as much free will as adults (Carter 2000:317). Damage to the frontal area of the brain inhibits vital functions that are considered to be essentially human, such as planning, choosing, mediating the emotions and creating meaning in our lives. The erratic and anti-social behaviours of Phineas Gage after his blasting accident is the oft-quoted historical example of dramatic personality change after such brain trauma, particularly since he was otherwise physically

unimpaired. Persons with such frontal lobe damage certainly “do not choose their fate – it is foisted on them by accident or illness. By any normal meaning of the word they cannot be said to possess free will. So can – or should – they be held responsible for their actions?” (Carter 2000:331).

It is certainly true that humans – like all life forms - have no choice at all in their own conception and birth. Nor is there really choice about death itself, although some of our actions may hasten or delay it. But we seem to be confronted by endless choices during our lives, yet “when we look inside the brain we see that our actions follow from our perceptions and our perceptions are constructed by brain activity. In turn that activity is directed by a neuronal structure that is formed by the interplay of our genes and the environment” (Carter 2000: 331). Freedom to choose between actions, between good and evil, has been regarded as the hallmark of moral beings and has always been a crucial dividing line between humans and other animals. We *feel* as if making a choice is a rational act of free will, and generally remain oblivious of the power of underlying emotions: “Reason is, and ought only to be the slave of the passions, and can never pretend to any other office than to serve and obey them” (Hume 1969:462). We tend to overlook the extent to which human decisions are directed and shaped by unconscious factors, urging choices that increase pleasure and avoid pain. In the case of humans, making choices is conflated with free will, while it is accepted that non-humans act instinctually. Humans are blamed and punished for choices that conflict with established norms, even when such choices may harm them, whereas the inferior status of non-humans generally protects them from similar censure and punishment.

Some illusions appear to be necessary to survival, and are so programmed into our brains that, even if free will is fictional, as individuals we would continue to act as if we had free will. “The illusion of free will is deeply ingrained precisely because it prevents us from falling into a suicidally fatalistic state of mind – it is one of the brain’s most powerful aids to survival” (Carter 2000:334). At the same time, our belief in our own free will means that we attribute a similar self-determination to others. We care for those with visibly broken bones, but we punish behaviour that is caused by a comparable but invisible mechanical

breakdown of the brain. Our discontinuous and often irrational or disordered thinking makes most of us perceive any form of mental difference or disturbance in others as a personal weakness of will. Because we fail to understand that the brain, like the body, is also vulnerable to illness, it is generally believed that deviations are wilful, that the deviant individual is able to choose differently, and that failure to comply requires some form of censure or punishment. Such unreflective reactions from the dark recesses of the emotional brain continue to reinforce the belief in free will. "It seems unlikely to me that we will continue to punish people for misconduct when the crossed wires that spark their behaviour become as clear to see as a broken bone"(Carter 2000:334).

Conclusion

It seems that we are on a more naturalistic path of theory construction that allows for a closer fit between scientific discoveries and evolutionary theory, placing the mind into its rightful place in the natural world without minimizing its abilities. This approach "provides a way for understanding how consciousness and self-consciousness may be natural phenomena, even though we do not yet (and perhaps never will) fully understand their underlying causes. But if we can accept the fact that consciousness and self-consciousness are naturally occurring, in what sense can we regard them as unique to humankind?" (Petersen 1999:292).

My first chapter traced the profound role that chance has played on the structure, shape and development of the cosmos, our solar system, our particular planet and the emergence and development of biological organisms on the earth. This includes the evolutionary development of the brain, the apex being the clever, versatile and therefore unpredictable human brain that has come to dominate the environment. In the second chapter I believe that I have successfully argued that despite our differences, mammalian similarities – particularly amongst the ape fraternity to which humans belong – indicate that we need to reconsider our classifications and subsequent attitude towards non-human species. The third chapter has examined the role that history and the instinct for survival have played in our dualistic intuitions and subsequent

elevation of consciousness as a specifically human attribute. Flowing from this analysis it becomes more and more apparent that we have to appraise the emergence of minds, consciousness and self-consciousness across a landscape that is generously populated by other species that need to be included in any future theories of mind, so that decisions based on such theories may deliver a consistent theory that is of global benefit.

CHAPTER FOUR

DEMI-GODS OR SUPER-CHIMPS?

“Perhaps our conduct toward others of our own species (not to mention other species) might be improved rather than worsened by a little humility.”

Bickerton 1996:8.

This chapter will examine the consequences of accepting human beings as super-chimps, part and parcel of an evolutionary process that does not require supernatural explanations. “If humankind evolved by Darwinian natural selection, genetic chance and environmental necessity, not God, made the species” (Wilson 2001:1). To quote Mary Midgley: “Man has always had a good opinion of himself, and with reason. What, however, is essentially the ground of it? What finally (you may ask) does distinguish man from the animals?” According to her, this question is phrased incorrectly, because – “unless we take man to be a machine or an angel, it should read ‘distinguish man *among* the animals,’ and animals of this planet at that, with no extraterrestrial nonsense to give us all the drawbacks of religion and none of its benefits” (in Linzey & Clarke 2004: 47).

As discussed earlier, all life, whether organic or inorganic, is composed of the same basic chemicals and governed by the same processes, ultimately grinding down in death and decay to become reconstituted in other forms. If reincarnation is to be taken seriously, it occurs at the atomic level. “When we die, our atoms will disassemble and move off to find new uses elsewhere – as part of a leaf or other human being or drop of dew” (Bryson 2004:176). This endless morphing of conserved matter at the atomic level gives rise to our transient shapes, obscuring the interconnectedness of all forms of life. The origin and ongoing evolution of all matter, living or non-living, is explicable without inventing unnecessary and complicating entities such as *vitalism* (matter animated by spirit); empty concepts such as *finalism* or *teleology* in order to construct some kind of meaningful purpose behind the development of biological systems and processes; or *creationism* in the form of divinely inspired writings or other mythical explanations (de Duve 1995:xiv). Clearing our minds

of all myths leaves a clarity of vision in which humans take their logical and natural position in the biological hierarchy, with the acknowledgment that their intelligence is of a higher, more complex order than that of other primates. This demotion displaces humans from their privileged central position, a modern Copernican revolution that begs a new perspective of a shared world. When our picture of the world, and our place in it, is unsettled by new facts, we should be prepared to examine the concepts on which our worldview depends. "There is no doubt that any philosophical claim must be reconciled with the best available results of physical science. Nor is there any doubt that the progress of science has provided a useful antidote to much dogmatism in philosophy" (Sklar 1992:9). Science has demolished concepts such as a flat earth, a separate celestial sphere, and non-existent ether on which earlier philosophy had been based. Coming to terms with Darwin's revolutionary thesis requires an equally radical philosophical adjustment. Once we grasp the full meaning of the transience of human life as only a small part of a biological continuum, we should be prepared to examine the extent to which such new knowledge challenges our past beliefs. An authentic acceptance of a common biological heritage impacts on our moral landscape, requiring an honest appraisal of our judgements and behaviours towards both humans and other animals.

We are quite naturally drawn to giving primacy to concern for the well being of our own kin, extending outwards from there to other members of our own species. Despite such affinity, incessant and immediate information on a global scale reveals a world in which human relationships and interactions are fraught with difficulties and conflict - sparked largely by racial, sexual and religious differences. In view of such failure it seems hopeless to expect compassion for other species. This does not mean that we should abandon our search for a truly universal justice, since large issues often take their shape from paying attention to lesser ones. This underpins Gandhi's dictum that we are able to assess the ethical status of a country by the way its animals are treated.

Much has been written about the desensitising effects of cruelty to animals, which finds its most extreme expression in the development of psychopathic

behaviours against fellow humans. Both Aquinas and Kant understood this link, but since non-humans were, and still are, regarded purely as a means to human ends, the humane treatment of animals was valued only in terms of improving intra-human behaviour (Rachels 1990:209). “So one is only to have compassion on animals for the sake of practice, and they are as it were the pathological phantom on which to train one’s sympathy with men!” (Schopenhauer 1903:94). Demotion of humans to super-chimps does not devalue them in any material way. Nor should it create fear, since it does not entail a reduction of human status and value. On the contrary, “a deeply felt, all-embracing Compassion for everything that has breath” may serve to increase compassion “especially for man; because, in proportion as the intelligence develops, capacity for pain increases” (Schopenhauer 1903:244).

Ethics from Darwin

Darwin’s well-substantiated theory of evolution from a common origin made it clear that humans are closely related to other species. Darwin also believed that animals have rational and moral capacities similar to those of humans. As early as twenty years before the *Origin of Species*, Darwin wrote in his diary: “Man in his arrogance thinks himself a great work, worthy of the interposition of a deity. More humble and, I believe, true, to consider him created from animals” (in Singer 1977:212). The human lineage is only one of many that survived the evolutionary turmoil, and objective inter-species comparisons show that human abilities are not exclusive. Darwin’s message is clear, even though he himself failed to appreciate the full implications of his own theories, arguing in favour of vivisection (Rachels 1990:216) and tacitly accepting animal slaughter as part of his own diet (Singer 1975:219). Nevertheless, as a result of his revolutionary work we can no longer insist that there is a sharp divide between humans and non-humans. The widespread use of non-humans in experimental work argues for a general acceptance of shared characteristics. “Those who continue to deny that animals have mental capacities similar to those of humans are implying that this research is fundamentally misguided” (Rachels 1990:166). The use of animals as human surrogates provides sufficient reason to grant them a similar psychosomatic unity of mind and body. This means that they must be regarded as subjects of biological lives,

and, in many cases, biographical lives, both of which may be affected in the same way as those of their human counterparts. Unfortunately, despite evidence of intelligence and sentience in non-human animals, it has been customary to regard “humankind as ontologically and theologically unique and separate from other forms of life ... But if we are not cognitively unique, are we theologically unique? Are we alone the subjects of salvation or of divine interest?” (Petersen 1999:284).

Evolution’s victors

Humans are the present victors on the evolutionary battlefield, a powerful position that – as in all wars – brings spoils and dominion over the vanquished. A more ingenious human brain allowed their steady global expansion during which they often hunted other animal groups to extinction. The absence of oestrus increased human fecundity, theoretically making annual procreation possible, while approximately four years is required to rear any other primate infant before the onset of a new oestrus cycle. This increased fertilization rate, together with smarter cognitive abilities and behaviours, enabled humans to expand out of proportion to their size in the scale of life forms. A general rule is that lifespan and population size decrease in tandem with an increase in species size. This explains the proliferation of micro-organisms, such as bacteria, as compared to the relatively small numbers of the largest mammals, such as elephants or whales. Humans are a dramatic exception to the rule, especially when compared to the dwindling numbers of other similarly sized primates – the chimpanzees, gorillas and orangutans. The threatened extinction of these major primate groups is directly attributable to human misbehaviour, and a clear example of the dangers inherent in the unchecked expansion of human populations.

Exploding human numbers require increased resources of all kinds, and the domestication of animals in settled agrarian communities during the Neolithic agricultural revolution heralded an equally unnatural and exponential increase in farm animals. Pressure to maximize economic benefits ultimately reached its peak in the cruel and unsavoury factory methods of modern animal farming. “In North America and Europe around 17 billion land animals were

raised and killed during 2001 to feed us. Somewhere between 50 and 100 million other animals were killed in laboratories, while another 30 million were killed in fur farms. The vast majority of these animals were forced to live and die in conditions most of us would find morally repugnant” (Matheny 2006: 13). *Global* numbers and conditions are beyond imagination.

Animals through the ages

Culture and religion continue to reinforce the perception that non-humans are second-class beings, of a different moral order to humans, a philosophy that has always justified their exploitation as a means to human ends. “It can be argued, though, that the inferior status to which animals are relegated is, like many other historical phenomena, really accidental. A different perception of animals could have prevailed had it not been defeated in some specific clashes of views” (Cavaliere 2006:55). The idea of animal rights, of harmonious co-existence, certainly is not new: it traces back to at least the early Greeks, perhaps even earlier. It is also echoed in the genesis of major world religions: a divinely created, pleasing utopian world of original harmony and tranquillity, all the more poignant and inaccessible when set against the actuality of the world and human nature. For more than two millennia various philosophers, theologians and political theorists have mulled over human obligations to animals. However meagre, such ruminations clearly indicate an enduring and fundamental unease. Early theories, however incomplete, contradictory and self-serving, indicate a moral dilemma that, like slavery, begs a similar resolution. There can be no doubt that resistance to new ideas is fuelled by a fear of change, particularly when human habits and comforts are threatened.

Some historical food for thought

As discussed previously, humans and chimpanzees are not only closely connected through their DNA, but they are also the only primates that hunt and eat other animals, and murder adult members of their own species. It is generally conceded that evolving humans probably began as opportunistic scavengers as they migrated from forest to open savannah. Exposed to the danger and example of carnivorous predators, humans gradually developed great co-operative skills in doing their own hunting. This increased not only the

volume of food available to them in the sparse savannah areas during the dry seasons, but also the percentage and concentration of protein in their diet. Fossil evidence seems to suggest that an earlier plant-based diet was replaced by increasing carnivorism. Dental fossil evidence from *australopithecines* shows “increased molar size as large, flat, grinding surfaces, or in other words, a trend towards megadonty. This would imply that the primary selective pressure in terms of diet would have been more efficient processing of hard, coarse, brittle plant foods rather than meat” (in Stanford & Bunn 2001:320). The first dental adaptations in response to increased carnivorous foraging strategies are to be found in *Homo erectus*, a lineage that either emerged from *Homo ergaster*, or was conspecific with it. The teeth of *Homo erectus* “show enormous wear, with deep scratches and chunks of enamel broken off ...Only a diet that contained plenty of meat, bone, and grit could have done this kind of damage” (Kutter 1987:536). The digestive changes in hominids that resulted from their increasing carnivorism appear to follow a similar pattern to those that occurred in the evolutionary transition between the vegetarian cave bear and carnivorous brown bears (in Stanford & Bunn 2001:322). John Speth, an archeologist from the University of Michigan, maintains that early hominids were not likely to have eaten large quantities of meat since “both modern people and early hominids are constrained in their meat consumption by the toxic, even lethal, effects of consuming too much protein. Meat is a source of both protein and calories, but only about 50 percent of one’s daily caloric intake can come from meat. Above this limit, the liver is unable to metabolise the excess amino acids and the body is unable to flush itself of the waste products of meat consumption. This can lead to liver and kidney impairment or failure, having lethal consequences” (Stanford 1999:118). However, the extinction of the mostly vegetarian ancestral lines reinforces the assumption that meat eating may have aided the survival of the carnivorous hominid lines during times of food scarcity. An increased intake of protein also appears to have played some part in the development of the human brain and the resultant increases in intelligent behaviours and skills. It has also been suggested that the dependence of later coastal nomads on fish sources, which provided greater quantities of omega oils, accelerated the development and proliferation of fully modern humans.

“The hunting, scavenging and sharing of meat were fundamental features of the lives of our ancestors. This does not mean that we are biologically driven to do any of these” (Stanford 1999:217). The naturalistic fallacy warns against deriving *is* from *ought*. Carnivory is a learned tradition, fostered by imitative behaviour, and can be unlearned like any other traditional behaviour. Cultural learning through imitation often differs amongst various groups of the same species. This is true in the case of humans, and differences in cultural transmission can also be observed amongst other primate groups. So only certain chimpanzee groups in West Africa use rocks to crack nuts, and a population of Japanese macaques on the island of Koshima have learnt to use water to separate wheat from sand (Hauser 2001:139). Vegetarian gorillas and orangutans differ from hunting primates like the chimpanzees, and Shirley Strum has even observed hunting and carnivory differences in geographically separated populations of the same baboon species at Gilgil in Kenya (Stanford 1999:29). The fact that humans developed the culture of hunting and carnivory, and that these practices may have aided their survival, does not entail that it *ought* to be continued. In any event, “to say something is a product of natural selection is not to say that it is unchangeable; ... to say that something is ‘natural’ is not to say that it is good ...” (Wright 1004:31). This is particularly so in a modern technological society that is quite capable of producing equivalent, and even improved, nutrition in quantities that could eradicate world hunger. Producing meat protein is extremely wasteful, since it requires nearly ten kilograms of vegetable protein to produce one kilogram of meat protein, simultaneously degrading vast tracts of valuable agricultural land and water resources through exploding numbers of farm animals. “Alan Durning, senior researcher at the Worldwatch Institute, believes that almost 40 percent of the world’s grain and 70 percent of American grain are fed to livestock. In the developing world, Oxfam estimates that 36.1 million acres of choice land are dedicated to producing animal feeds for European livestock” (Mason 2005:230). It is clear that world hunger could be eradicated if amoral animal farming were replaced by a more benign plant protein agriculture. Conservation efforts on this scale, and of this kind, will naturally meet with fierce resistance from consumers and producers alike, as well as all other

factions that benefit economically from animal agriculture. This despite grim and verifiable evidence of the deleterious effects of animal farming on land surfaces and water resources, its negative atmospheric impact through increased methane and carbon dioxide emissions, and finally, its multiple impacts on human health.

Domesticated bliss?

As hunter-gathering gave way to settled farming communities, suitable animals were gradually domesticated, living in close proximity with early agrarian families. It was during the closeness of such domestication that the “major killers of humanity throughout our recent history – smallpox, flu, tuberculosis, malaria, plague, measles, and cholera ... evolved from diseases of animals even though most of the microbes responsible for our own epidemic illnesses are paradoxically now almost confined to humans” (Diamond 2005:196). The dangers of hunting, of pitting oneself against dangerous prey, were gradually replaced by the easier access to more docile animals, although the excitement of the hunt seems to have been retained throughout human history. Desmond Morris suggested “that puppies were originally brought home as food, but that it soon became apparent that they made good watchdogs at night”, so it is possible that the lasting distinction made between pets and food animals may have begun at this time (in Masson 2004:6). In these new human settlements, the more egalitarian cohesion of nomadic life was steadily replaced by social stratification as some individuals gained power and wealth, with which came the attendant evils of warfare, slavery and patriarchal dominance. Paleopathological research of ancient skeletons shows decreased health amongst these early communities, since they lacked the balanced variety of food provided by the nomadic way of life (Diamond 1991:169). Populations grew rapidly in such settlements, replacing the slower reproductive rate of hunter-gather societies, which were kept in check by the rigours of nomadic lifestyle, as well as some infanticide, since more than one dependent infant threatened the mobility and therefore the survival of the group. In these agrarian settlements animal protein remained a valuable supplement for those who could access or afford it, a bias that is applicable even today, since its habitual consumption is a rarity for the greater part of humanity. Despite this, animal

protein has always been considered vital, even though it is clear that nutrition from vegetable sources is adequate and healthier.

Blood sacrifice

It is possible that the human evolutionary transition from a basically vegetarian or frugivorous lifestyle, first to scavenging, and then to hunting and killing of other animals, may also have inured humans to the sight of bloodletting. Interpretations of early art suggest that certain animals were considered as sacred and were sacrificed and eaten at solemn or mystical occasions, outside which they were regarded as taboo (Burnet 1963:95). Such ceremonies were based on primitive beliefs that the spiritual essence or characteristics of these sacred animals could be internalised through eating them. In some cultures humans were sacrificed to ensure divine favour, and cannibalism similarly ensured the transference of desired attributes from these victims, both kin and enemy. The principle of worship or appeasement through sacrifice was present in most early primitive and religious practices. Thus Abraham was willing to sacrifice his only son, Isaac: an obedience that was rewarded by the divine substitution of a nearby goat. The customary use of sacrificial animals in ceremonies in temples and other religious environments was transcended in the human Christ, a surrogate blood sacrifice symbolically repeated and revered in Christian ritual. Perhaps the ancient association between religion and carnivory ensured that both practices developed as hard-wired imperatives in the human brain, a process during which non-humans have become totally separated, debased and subjugated by humans. Although deeply ingrained customary behaviours seem impervious to change, there have always been individuals who have felt uneasy about the deliberate killing of generally docile animals that are so clearly similar to humans. But, as Alexander Pope reflected, the lure of the palate is such a passion “that ‘tis no easie task to preach to the belly, which has no ears” (in Linzey & Clarke 2004:74). Things could have been different: a chance evolutionary adaptation that made animal flesh unpalatable would certainly have protected them from human predation, arguably affecting both the environment and the flow of history.

Early concerns

The expression of concern for the *welfare* of animals has always functioned as a comforting and convenient self-deception that helps to deflect attention from the inevitable truth of our deliberate actions: that we raise animals in order to kill them so as to eat them. A great number of arguments have been developed over the millennia in order to justify the killing and consumption of animals, effectively overwhelming minority voices. For Pythagoras, who “flourished” during the fifth century B.C., the virtuous life was a good life, which certainly did not exclude self-interest, since each individual is biologically driven to increase pleasure over pain. But it also included the concept of justice for animals, not necessarily because of an inordinate love for them, but rather because it was believed that animals were vehicles used in the transmigration of souls. Since the eating of flesh of any creature that contained a fellow soul was therefore abhorrent, Pythagoras not only promoted a vegetarian lifestyle, but also encouraged the substitution of herbs and incense even in sacrificial ceremonies (Cavaliere 2006:56). One of his followers, Empedocles, likewise insisted that metempsychosis enmeshed humans and non-humans. As kin, eating animals was cannibalism, and morally reprehensible. The “foul slaughter of bulls” on sacrificial altars was to be substituted by an “offering of unmixed myrrh and of pungent frankincense, pouring libations of yellow honey on to the threshold” (Barnes 1987:198).

In contrast, Aristotle’s worldview morally sanctioned the use of animals for human purposes. Aristotle justified human slavery by arguing that certain humans were slaves by nature, an assumption that shifted animals even further down the moral hierarchy. His principle of equality excluded slaves and animals, since both were considered to lack the rational faculties required to control their own lives. Both groups conveniently became chattels, arbitrarily controlled by their intellectual superiors. Aristotle conceded that animals were able “to perceive pleasure and pain, and to impart these sensations to others” (in Linzey & Clarke 2004:6). But their inability to express their feelings in human language was critical, since it meant that their visible physical and vocal reactions to cruel treatment could be ignored. An alternative, more inclusively compassionate view did not entirely disappear. The moral stance of

Plutarch, the first century Greek essayist and biographer, is uncompromising: “You ask me why I refuse to eat flesh. I, for my part, am astonished that you can put in your mouth the corpse of a dead animal, astonished that you do not find it nasty to chew hacked flesh and swallow the juices of death-wounds” (in Coetzee 1999:38). The third century Neo-Platonic philosopher, Porphyry, similarly “advocated vegetarianism, and acutely criticized most rationalizations for animal exploitation. But it was Aristotle, not Porphyry, who, because of the obvious advantages that his view offered, as well as his later ‘adoption’ by Christianity, set the tone for the entire Western world till the beginning of the modern era” (Cavaliere 2006:58).

Augustine, in the fifth century A.D. argued that the biblical commandment against killing was intended to apply purely to humans. For if it was extended to include the irrational animals, why not also living plants, even though they have no sensation? Before his conversion to Christianity, Augustine had been a member of the Manichean sect, who believed in celibacy, metempsychosis and vegetarianism, since animal bodies were vehicles for the reincarnation of fellow souls (Larson 1977: 546). It appears that he had a problem with both celibacy and the vegetarian lifestyle. One assumes that he overcame the first challenge, but his own words clearly show his resistance to the second: “Are we then insanely to countenance the foolish error of the Manichaeans? Putting aside, then, these ravings, if, when we say, Thou shalt not kill, we do not understand this of the plants, since they have no sensation, nor of the irrational animals ... since they are dissociated from us by their want of reason, and are therefore by the just appointment of the Creator subjected to us to kill or keep alive for our own uses” (in Linzey & Clarke 2004:60). Arguably, a more reasonable division should be found in the continuum of *animal* life, put into its widest perspective as follows: “Somewhere along the scale from bacteria to humans, we have to decide where killing becomes murder, and where eating becomes cannibalism” (Diamond 1992:24).

The medieval theological view owed much to interpretations of the writings of Aristotle, simply referred to as “the Philosopher” by Thomas Aquinas, who reinforced the view that “as man, being made to the image of God, is above

other animals, these are rightly subjected to his government” (Linzey & Clarke 2004:61). Like Aristotle, Aquinas endorsed slavery. Lesser humans could rightfully be enslaved since they lacked the reason and autonomy of those humans who were endowed with an innate and superior “intellectual nature”. Such powerful voices in support of slavery remained unchallenged, which is not really surprising since “in the whole of the New Testament not one word is said against slavery, though at that time it was practically universal” (Schopenhauer 1903:204). Aquinas also maintained that the greater perfection of humans, being made in the image of God, gave them unfettered control of the natural world. There was thus a natural order of increasing perfection in which plants used the earth, animals used the plants, and man used both plants and animals. Forgetful of paradise, manipulative theology has generally selected the sanguinary post-lapsarian world to justify unrestrained animal exploitation. Human disobedience and hubris was punished by expulsion from the original state of harmony that existed in Garden of Eden. But the harshest punishment was reserved for animals when their consumption was divinely sanctioned after the Flood. For Aquinas, as for many others, this fortuitous divine *volte-face* was used as argument against “the error of those who said it is sinful for a man to kill brute animals; for by the divine providence they are intended for man’s use according to the order of nature. Hence it is not wrong for man to make use of them, either by killing or in any other way whatever” (in Linzey & Clarke 2004:10).

The Cartesian defence

The scientific curiosity and experimentation of the seventeenth century ushered in the practice of vivisection, in which live animals were dissected, often publicly, in physiological investigations. Descartes claimed that since animals were mere flesh and blood automata controlled by springs and pulleys, their apparently painful reactions could be ignored since they were acting “naturally and mechanically, like a clock which tells the time better than our judgement” (Descartes 1970:207). Although he certainly did not deny that animals were alive, Descartes maintained that it was wrong to deduce from their physical similarity with humans “that they have sensation and therefore thought, like humans ... there is no prejudice to which we are all more

accustomed from our earliest years than the belief that dumb animals think” (Descartes 1970:243). Such dangerous ground is to be avoided, since “if they thought as we do, they would have an immortal soul like us. This is unlikely, because there is no reason to believe it of some animals without believing it of all, and many of them such as oysters and sponges are too imperfect for this to be credible” (Descartes 1970:208). Such flawed reasoning from extremes intentionally disregards the obvious similarities between closer, less disparate species in the animal kingdom, a manoeuvre that deliberately creates a gulf that justifies excluding *all* non-humans from moral consideration. Our behaviour towards inorganic structures quite sensibly differs from the way we treat plants. We should logically also be less concerned about the sensitivities of plants than we should be about the sentience of non-humans. Differences in neural structure allow us to understand that there are also different degrees of consciousness and sensitivity amongst members of the animal kingdom, including humans. Like Descartes, we usually do not feel for oysters and sponges the same levels of compassion that we should feel for the pain and suffering of sentient mammals.

Descartes was a powerful voice against conflicting minority views. Unlike humans, he insisted, animals were not only devoid of soul and immortal life, but also lacked reason and language. His mechanical clockwork explanation justified cruel, gratuitous and often unnecessary practices and experimentation of all kind on live animals under the guise of science. Ultimately, of course, the belief in robotic animals was most valuable to humans, “since it absolves them from the suspicion of crime when they eat or kill animals” (Descartes 1970:245). This excerpt ironically reveals an uneasiness that persists despite all efforts to dehumanise animals to a point where their exploitation could be justified. Unfortunately the Cartesian theory sanctioned scientific experiments during which unimaginable pain and suffering was deliberately inflicted on increasing numbers of unanaesthetised animals by a great number of influential and respected members of society. A contemporary eye-witness account of such experiments shows how influential and expedient Descartes’ theory had become: “They administered beatings to dogs with perfect indifference, and made fun of those who pitied the creatures as if they felt pain.

They said the animals were clocks; that the cries they emitted when struck were only the noise of a little spring that had been touched, but that the whole body was without feeling. They nailed poor animals up on board by their four paws to vivisect them and see the circulation of the blood which was a great subject of consideration” (in Singer 1977:209). The mixture of horror and empathy is palpable in this account. The single dubious value of such public exhibitions was that they revealed and served to emphasize the unmistakable similarities between humans and animals, both in physiology and their obviously similar responses to pain. It is not surprising that modern animal experimentation is carefully hidden from the public, removing these practices from universal awareness and criticism. According to Richard Ryder, it is estimated that anything between 40 and 100 million animals are “used” annually in laboratories worldwide, mostly in duplicated or unnecessary research (in Singer 2006:97).

Contemporary reactions to vivisection varied. Voltaire’s attack was direct and ferocious. “There are barbarians who seize this dog, who so greatly surpasses man in fidelity and friendship, and nail him down to a table and dissect him alive, to show you the mesaraic veins! You discover in him *all the same organs of feeling as in yourself*. Answer me, mechanist, has Nature arranged all the springs of feeling in this animal *to the need that he might not feel?*” (in Singer 1975:210). A different response came from Kant, who acknowledged that vivisection was cruel, but that this brutality could be justified since “so far as animals are concerned, we have no direct duties. Animals are not self-conscious, and are there merely as a means to an end. That end is man” (Kant 1963:239). Kindness to animals was an indirect duty, of value only as a practice that might encourage kindness to fellow humans. But since he acknowledged that one could “judge the heart of a man by his treatment of animals”, it would be logical to regard butchers as callous and inhumane, since their profession depends on insensitivity. At that time vivisectionists and doctors in England were not allowed to “sit on a jury because they are accustomed to the sight of death and hardened” (Kant 1963:239). In retrospect the omission of butchers appears distinctly Freudian. A similar dissonance appears as Kant curiously praises Leibniz for replacing a tiny worm safely back

on its leaf after using it for observation: “He would have been sorry – a natural feeling for a humane man – to destroy such a creature for no reason” (Kant 1963:240). His sentimentality for a worm provides an extreme example of the existing universal human cognitive dissonance: a tenderness towards a selected minority of pet animals that conflicts with the apathy and silence that countenances the daily international slaughter of millions of comparable animals. Perhaps eating the worm would have supplied a suitable reason for destroying it. There certainly would have been less cruelty in that instance, and certainly less suffering. Kant’s morality lectures in 1780 evoked an openly emotional response from Jeremy Bentham, who attacked the evasive tactics and arguments that were widely used to rationalize cruelty to animals: “the question is not, Can they *reason*? Nor Can they *talk*? But Can they *suffer*?” (in Singer 1977: 213).

The conflict of conclusions

The medieval-Cartesian insistence that only humans had souls meant that animals could, without fear or conscience, be treated entirely as a means to human ends. But for Alexander Pope, in the eighteenth century, their very lack of soul, and therefore of immortal life, argued for *increased* care and kindness during their brief existence: “The more entirely the inferior creation is submitted to our power, the more answerable we should seem for our mismanagement of it; and the rather, as the very condition of nature renders these creatures incapable of receiving any recompense in another life, for their ill treatment in this” (in Linzey and Clarke 2004:72). But, as Peter Singer has shown, logical conclusions to even the most enlightened arguments in most instances were obfuscated or denied as soon as they came into conflict with established customs or beliefs. “With very, very rare exceptions these writers, even the best of them, stop short at the point at which their arguments would lead them to face the choice between breaking the deeply ingrained habit of eating the flesh of other animals, or admitting that they do not live up to the conclusions of their own moral arguments” (Singer 1977:217). This nagging dichotomy is apparent in two incompatible quotations from Bentham. The first one argues for extending rights to non-humans: “The day may come when the rest of the animal creation may acquire those rights which never could have

been withhelden from them but by the hand of tyranny” (in Regan 1983:95). This clearly conflicts with his *non sequitur* that “there is very good reason why we should be suffered to eat such of them as we like to eat; we are the better for it and they are never the worse. They have none of those long-protracted anticipations of future misery which we have. The death they suffer in our hands commonly is, and always may be, a speedier, and by that means a less painful one, than that which would await them in the inevitable course of nature” (in Singer 1975:219). Even Schopenhauer, who argued consistently for the moral inclusion of non-humans, sadly failed to fully accept the logical conclusion to his own arguments. According to his philosophy, since all living beings emerge from, and return to, the basic, unknowable *noumenon* of the conserved and undifferentiated totality of energy and matter, any harm inflicted on any other living being rebounds on the perpetrator as a personal harm. “Boundless compassion for all living beings is the surest and most certain guarantee of pure moral conduct, and needs no casuistry” (Schopenhauer 1903:213). Even Christian morality was flawed, since its basic doctrine of compassion excluded animals and therefore was “not carried to the last consequences imposed by logic” (Schopenhauer 1903:222). All the more disappointing then that he failed to follow his *own* argument through to its logical conclusion. Compassion as the foundation of morality requires avoiding harm to all living creatures. He considered Western attitudes to animals “revoltingly crude” when compared to Eastern Buddhism and Hinduism, which provided a living example of the sufficiency of vegetarianism. As an atheist he could not use the convenient excuse of divine permission, and the logic of his argument crumbles in the face of appeasement: “For the rest, we may observe that compassion for sentient beings is not to carry us to the length of abstaining from flesh, like the Brahmans. This is because, by a natural law, capacity for pain keeps pace with the intelligence; consequently men, by going without animal food, *especially in the North*, would suffer more than beasts do through a quick death, which is always unforeseen; although the latter ought to be made still easier by means of *chloroform*” (my italics) (Schopenhauer 1903:228). As discussed earlier, even Darwin missed, or avoided, the logical conclusion to his revolutionary life’s work.

Traditional morality

“Traditional morality depends on the idea that human beings are in a special moral category. From a moral point of view, human life has a special, unique value, while non-human life has relatively little value. Thus the purpose of morality is conceived to be, primarily, the protection of human beings, and their rights and interests. This is commonly referred to as the idea of human dignity” (Rachels 1990:4).

It is part of human nature to resist change that undermines self-interest. Traditional morality, based on the spiritual status and dignity of humans, has always provided cogent reasons for behaviours that favour human interests. Not too long ago it was unthinkable that the idealistic activities of a mere handful of “sentimental” activists would result in the legal abolition of human slavery, which for millennia had exploited some humans by reducing them to the inferior level of non-humans. Despite this legal victory, many individuals continue to suffer because they belong to groups and categories still considered beyond the pale. But the momentum continues, including new voices urging the eradication of the economic, social and sexual slavery or exploitation of children. Beyond such specifically human issues, the frontiers have expanded to include two new areas of concern: increasing anxiety about the ecological dangers of human behaviour, together with an as yet nascent distress in support of animal rights. Tom Regan believes these two new issues erode traditional moral anthropocentrism, which sanctioned human primacy and protected human interests at all costs. “Their common task is to bury Protagoras once and for all. Humans are *not* the measure of all things” (in Linzey and Clarke 1990: x).

An anthropocentric blindfold encouraged human bias and insensitivity to other forms of sentient life. This distorted view is evident in the historical paucity of philosophical interest and writings relating to the ethical status of animals. In 1989 the bibliographical research of Charles Magel uncovered the existence of a mere 94 relevant works during the entire first 1970 years of the Christian era. This meagre total only increased by a further 240 works between 1970 and 1988. But publications have increased by several thousand since then, and

interest in animal ethics has spread to many parts of the world, with pivotal literature on the subject being translated into most of the world's major languages, including countries in the East (Singer 2006:2). Change may be slow and reluctant but, as in the case of the slave trade, it is difficult to halt the momentum of enlightened resistance to any injustice that so clearly involves the deliberate infliction of pain and cruelty.

The abolition of slavery was the catalyst that provoked denunciation of the colonialism and racism that had made it possible, followed soon after by challenges to entrenched sexism. "Once colonialism, racism and sexism had been intellectually challenged, then the next logical step in the expansion of the boundaries of the moral in-group was an attack upon speciesism ... the parallel with similar forms of irrational discrimination such as racism, sexism, and ageism" (Ryder 2006:87). It is becoming increasingly unacceptable to justify or defend cruel or unjust behaviour on the basis of non-relevant differences in biology, autonomy or intelligence, which have always been cited as reasons for the inferior status of exploited humans and non-humans. What really matters morally "is the other's distress and pain, regardless of species" (Ryder 2006:89). Moral equity on a universal scale requires a shift to the principle of moral individualism, according to which the treatment of each biological individual "depends on his or her own particular characteristics, rather than on whether he or she is a member of some preferred group – even the 'group' of human beings" (Rachels 1990 :5).

The burgeoning anti-vivisectionist and animal rights movements of the late twentieth century were stimulated by evidence from comparative studies undertaken by emerging sciences such as sociobiology and ethology. In addition to biological kinship, the unmistakable parallels in human and non-human behaviours depend on intellectual and emotional similarities, particularly amongst the primates. An increasingly holistic scientific approach also stimulated a wider awareness of global interdependency and the rising concern of burgeoning environmental and ecological movements. At this point it is important to note the greater global readiness, amongst governments and individuals, to address environmental problems and dangers without

confronting two *vital* contributing factors: the unhealthy expansion of human and farm animal populations. These two issues require an honest appraisal of human privilege and moral status within a complex global environment.

Controversial ethical questions and decisions about life and death, such as abortion and euthanasia, imperceptibly grind away at the absolute notion of the sacrosanct life of human persons. In addition, increasing awareness and knowledge of genetic and behavioural commonalities amongst primates and other higher mammals suggest that the concept of personhood is sufficiently flexible to require similar rights for similar individuals. But since many harmful prejudices continue to flourish amongst human individuals and groups, it is not surprising that arguments in support of animal rights are controversial, and often ridiculed. Then it is encouraging to remember the words of John Stuart Mill: “Every great movement must experience three stages: ridicule, discussion, adoption”.

Darwin’s lifetime saw the beginnings of agitation on behalf of laboratory animals and against the practice of vivisection. A century later this animal welfare movement was galvanized by Peter Singer’s *Animal Liberation*, which not only exposed the hidden aspects and cruelties of animal factory farming and laboratories, but also promoted the moral preferability of vegetarianism. In his *Case for Animal Rights (1983)* Tom Regan agreed that vegetarianism would be the logical moral outcome of extending rights to non-humans, but argued that Singer’s defence was inadequate because it was based purely on the *welfare* of animals. According to him, systems based on injustice can never be *reformed*, but require to be *abolished*, as in the case of the slave trade, where concern about the welfare of slaves would have been equally inadequate. He further argued that, although Singer quite correctly objected to the vast mass of unjustified and unnecessary animal experimentation, his preference utilitarianism might sanction some experiments that allowed the sacrifice of animals for the general greater good. “But Regan would have none of this utilitarian calculating. Instead, he said, we must acknowledge that, like humans, animals have *rights* that should not be violated under any

circumstances whatever, not even if we think there is a great good to be achieved. While Singer was a reformer, Regan was an abolitionist” (Rachels 1990:217-218).

Who should have rights?

Of course it can be argued that the concept of moral rights is an assumption; a human construct devoid of meaning. This is part of the ongoing debate over moral versus legal rights. Jeremy Bentham insisted that rights depend on the law; that there are therefore “no natural rights - no rights of man, anterior or superior to those created by the law. The assertion of such rights, absurd in logic, is pernicious in morals” (in Regan 1983:268). John Mill believed that individual rights depend on a combination of law and morality: “When we call anything a person’s right, we mean that he has a valid claim upon society to protect him in the possession of it, either by the force of law or by that of education or opinion” (in Regan 1983:269).

Disputes about legal versus moral rights aside, discrimination and prejudice across differences in race, religion and gender cause empathic recoil in reasonable people. The fact that most of us react instinctively to assaults that demean other lives, particularly when pain is deliberately inflicted, suggests that we do feel “that moral rights are something, not nothing” (Regan1991:50). Common values encourage co-operative rather than competitive behaviours amongst members of the same group. This idealistically suggests that the evolution of common global values may similarly promote the co-operation and future survival of the human species itself. Unfortunately we are overwhelmed by current global conflict that continues to be fuelled by differences in race, gender, nationality and religion. These differences are used to dehumanise and sanction cruel and unjust treatment of other groups or individuals. To dehumanise means to make non-human, to treat as we treat animals. Child soldiers are taught to see their opponents as animals, a psychological brainwashing that makes it possible for them to commit the most heinous atrocities even against members of their own communities. The holocaust was made possible by reducing other humans to the level of animals, treating them with the same disregard and mechanical extermination.

A cardinal rule of human rights is that we are legally forbidden to treat human beings as we treat non-humans. But since humans are only one of many co-existing evolutionary outcomes, it seems irrational to grant them a superior status whilst denying even the most basic and humane treatment to other primate members. Of course, once primates are accorded acceptable rights, it becomes increasingly difficult to exclude other mammals, and to know finally where the line should be drawn. Although the human race has a grim history of inhumanity towards members of its own species, confraternity on the whole ensures better treatment than that meted out to non-humans. It will only be possible to establish the principle of *equal* consideration of *equal* interests, both human and non-human, once we separate “human” from “rights”. This does not necessarily imply equal treatment, but it will forbid existing practices that deny other sentient beings the most basic rights granted to every member of the human species. “And being human, or humanoid, these voices go on, the great apes should then be accorded human rights, or humanoid rights. What rights in particular? At least those rights that we accord mentally defective specimens of the species *Homo sapiens*: the right to life, the right not to be subjected to pain or harm, the right to equal protection before the law” (Coetzee 1999:26).

What the argument against speciesism does not imply

We accept that there are notable differences between humans and non-humans, particularly in their cognitive awareness and experience of subjective qualities. The argument for animal rights does not imply equal rights for humans and non-humans. There are rights that logically cannot apply beyond human societies, such as the right to vote, the right to education, freedom of speech and freedom of religion. Non-humans are unable to exercise these particular rights, but the same restrictions apply to many humans, notably comatose or seriously mentally impaired individuals. It is similarly “equally meaningless to give such rights to two-year-old humans. That doesn’t mean that we should give less weight to the interests that two-year-old humans do have, like the interests in being fed, in being warm and comfortable, and in being loved” (Singer 2006:5). According to human rights, even those who are

unable to understand or exercise their specific rights should not be subjected to any forms of cruelty, nor should they be exterminated. A system of rights based on giving equal consideration to obviously equal interests would extend the same basic protection to those non-humans who have qualities sufficiently similar to humans.

It is also true that “normal mature humans often have different interests from nonhuman animals ...something that harms normal adult humans may cause much less harm, or even no harm at all, to some nonhuman animals” (Singer 2006:5). We recognise that human interests often extend beyond satisfying basic requirements. Curiosity and creativity can bring great satisfaction to human individuals, in the process often enriching the world through art and music. Many humans have been willing to face extreme deprivation in order to achieve their goals, from the exploration of dangerous environments to such extremes as principled hunger strikes or becoming a suicide bomber. Since non-humans do not have interests of this nature, we may agree that the reasonable confinement of animals, although it differs from their original freedom before domestication, generally does not cause them undue distress, as long as they are supplied with sufficient food and water. A different order of intelligence, curiosity and ability means that humans are generally affected to a much greater extent by confinement and lack of stimulation. But the psychological well being of non-humans, particularly other primates, has similarly been shown to be severely affected by confinement in laboratories, some zoos, and in the cruel practices of factory farming.

There is some resistance to animal experimentation, particularly repetitive, unnecessary and cruel practices such as the Lethal Dose or LD 50 tests, which are stopped only when half the experimental animals have died from poisoning, often in agony. Another example, amongst many, is the Draize test, in which noxious chemicals are put into the eyes of rabbits, in order to check their potential, often minor, hazard to humans. Since rabbits are unable to blink, the pain inflicted is unimaginable. Even if all animal experimentation were banned, we may face future dilemmas in deciding whether to use adult humans or non-humans in certain experiments that may be considered

essential. Although the levels of pain or actual discomfort may be the same in both cases, “there is *some* reason, compatible with the principle of equal consideration of interests, for preferring to use nonhuman animals rather than normal adult humans” (Singer 2006:5). Because they are able to imagine and anticipate future states, any situation or action that threatens pain or death may be more terrifying to humans. Although such anticipatory awareness is considered to be absent in non-humans, we should remember that some human categories are equally impaired, including human infants and embryos, the comatose, and the severely mentally retarded. Although we can reassure and prepare most humans by explaining impending procedures, non-humans are suddenly thrust into fearful situations. This means that levels of terror suffered by humans through their anticipatory dread may well be equalled by non-human terror during procedures that they cannot be expected to understand, even in cases where they are actually being helped (Singer 2006:5).

Can speciesism be defended?

A vital question is whether it is truly possible to defend speciesism, which grants moral preference to only one species, simply *because* they are members of *Homo sapiens*? It is quite natural for humans to apply the strongest moral worth to their own offspring, moving outwards from there to kin, to neighbours and finally to other members of the human species. But to be truly consistent, speciesism requires that *each* human individual must be accorded the same moral status. Accordingly, it excludes the prejudicial use of arbitrary criteria such as race, sex or age as a means of devaluing the moral worth of any member of the homogeneous human species. But in turn the human species is but one part of a taxonomic tapestry in which it is closely interwoven with other mammals, particularly other primates. Speciesism, which depends entirely on belonging to the human group, therefore selectively functions on this wider biological stage in the same way as racism operates within human society. Since reasonable people reject the use of *race* as a human boundary, it is difficult to continue to justify the equally arbitrary use of *species* as a moral basis for our behaviour towards non-humans. Considering our anthropocentric history, it is not surprising that the treatment of non-humans has never truly

been considered to be a philosophical problem. The theologically inspired status and moral privilege granted to humans by virtue of belonging to the human group has historically never been seriously questioned. Human interest has been well served by speciesism, which has successfully resisted all challenges as it jealously guarded human entitlement to much more than the herbs of the earth.

Amongst humans, the principle of equality dictates that differences such as race, gender and religion should be considered irrelevant in the application of basic human rights. “Individuals are to be treated in the same way, unless there is a difference between them that *justifies* a difference in treatment” (Rachels 1990: 197) (my italics). It is clear that all individuals are not equal in all respects, physically or intellectually, and some of these differences may well be of a kind that may require differences in treatment. Relevant criteria for admission to certain educational levels or institutions, for instance, would necessarily exclude non-humans as well as those humans who do not satisfy the particular requirements. Different medical treatments are similarly dependent on the relevance of the symptoms exhibited by each individual (Rachels 1990:176). But there are no differences whatsoever that could justify inflicting deliberate or unnecessary harm on any individual, human or non-human, unless of a temporary nature in order to ensure improvement in health or quality of life. Even in such cases it is necessary to use methods that diminish painful physical or psychological effects that may result from particular interventions. There certainly is not a single individual difference that could ever justify torture, human or non-human.

The argument from special human qualities

“The continuing failure of philosophers to produce a plausible theory of the moral importance of species membership indicates, with increasing probability, that there is no such plausible theory” (Singer 2006:4). But if we are unable to defend speciesism, “is there something else that happens to coincide with the special boundary, on the basis of which we can justify the inferior consideration we give to nonhuman animals?” (Singer 2006:4).

Over the centuries, the greater moral worth of humans was based on the belief that humans had been created in the image of God, placing them just below the angels and giving them a dignity denied to all other animals. In addition to their spiritual and moral *gravitas*, human attributes such as language, reason, self-awareness and autonomy have historically been used to legitimise the menial status and exploitation of lesser species. It is difficult to justify why rights should depend on these abilities, instead of more basic ones, such as the capacity to experience and respond to pleasure and pain. The answer seems obvious: the universality of sentience – the experience of pleasure and pain - would require a radical expansion of the moral community to include many non-humans. A closer examination of some of the arguments that are used to exclude non-humans reveals several inconsistencies and dilemmas.

Language as a criterion for rights

There can be no doubt that the versatility and scope of human language, as well as the feedback loop that it creates in developing rational thought, has granted humans a higher level of intellectual ability than non-humans. However, despite differences in linguistic evolution, all methods of communication play an important role in the survival, social cohesion and welfare of all human and non-human groups.

In the absence of language, animals have been denied thought, and therefore consciousness. According to Descartes' language test, only individuals "who are able to express their thoughts by using a language, either words or their equivalent" are conscious. This definition excluded non-humans. Since animals were mechanical constructs, their vocalizations were meaningless, even when they suggested reactions to pain and pleasure similar to those of humans. La Mettrie, the eighteenth century philosopher and physician, objected to this robotic view of animals. He suggested that if we explain the behaviour of animals mechanistically, it would be simpler and more parsimonious to apply the same principle to human behaviour (Regan 1983:10). The language test also fails to explain what consciousness is, or how it operates. If consciousness depends the ability to use language, it would mean that children are not

conscious before they learn to speak. However, if they are not conscious before they speak, it means that during this period they are unable to process any sensory inputs, such as sound, light or touch. But “instruction in language use requires *conscious reception* on the part of the learner. Unless we assume that, *before* learning a language a child can be aware of something, we shall be at a loss to explain how the child can learn it” (Regan 1983:15). It is patently false that children lack consciousness before they acquire language. Accordingly, “(I) f a young child can be conscious independently of learning a language, we cannot reasonably deny the same of animals, despite the latter’s inability to say what they are aware of” (Regan 1983:16). The further argument that human children have the *potential* to acquire language does not explain how, or when, the necessary consciousness actually arises in them so that they are able to acquire language. This circular language argument relies on the assumption “that there is an essential connection between, on the one hand, being able to use a language, including having the potential to do so, and, on the other, being conscious. Whether there is such a connection, however, is precisely the question at issue” (Regan 1983:17). Of course if children are not conscious before learning a language, it means logically that they temporarily have no moral status and may be treated in the same way as any other non-conscious individuals.

Autonomy as a basis for rights

Another suggested requirement for membership of the moral circle is autonomy, which belongs to “individuals with desires, beliefs, and the ability to act in pursuit of their goals” (Regan 1983:116). Although autonomy is generally restricted to humans, many animals do in fact display a variety of behaviours that clearly demonstrate that they want, desire or prefer certain things. They can therefore be said theoretically in some way either to prefer, or to object to, a variety of things or situations that impact either positively or negatively on their welfare. They may prefer one food to another, or shade to full sunlight, and seek to satisfy such preferences. In the same way they may, through struggle reactions, physically manifest objection to forced restrictions, painful stimuli and even to being killed. Since many animals have this kind of autonomy, their welfare in terms of their preferences may be affected positively

or negatively, in the shape of benefits or harms. Like humans, non-humans have a biological life, and many of them also have some kind of biographical life, together with a psycho-biological identity that continues through the length of their lives, despite the fact that they may not experience this on the same cognitive level as humans. Their comparative complexity means that, like humans, they have similar biological, social and psychological needs or interests that need to be considered in order to ensure and sustain their welfare.

Human potential as a basis for rights

It is argued that rationality, autonomy and language are capacities that separate humans from other animals, but the undeveloped condition and utter helplessness of human infants clearly indicate that these capacities are also absent in their case. Despite their lack of rationality, autonomy and language, it is then argued that the *potential* of human infants to develop these capacities, although not realized for many years, grants them rights that are denied to non-humans who do not have such potential. The argument linking the *potential* acquisition of human language in a-lingual human infants to consciousness was discussed earlier. It was clearly shown to be inadequate, since the circularity of the Cartesian language test implies that consciousness is absent before they acquire language, yet consciousness must be present in order to acquire language. When human infants or children are being abused we certainly do not stop to consider whether they have the *potential* to develop rationality, autonomy, or language. On the contrary, we instinctively respond to the pain and suffering inflicted on them. Furthermore, if rights depend on the potential to develop specific abilities, we are then entitled to ask why such rights apply to severely retarded humans, who lack the potential *ever* to acquire rationality or autonomy, while refusing them to sentient, communicative non-humans who display greater rationality and social interaction than many impaired humans.

The dilemma increases when we consider that newborn humans, who demonstrably lack rationality and autonomy, are on a developmental continuum with unborn humans from the moment of conception, since it may

logically be claimed that the fertilized egg holds the same future potential as the newborn infant. So if it is wrong to kill newborn humans, abortion at any stage before birth is equally wrong since it ignores the rights of the embryo, which carries the same potential as the neonate for the emergence of rationality and autonomy at some future time.

Argument from personhood

Rights have generally been considered to apply to “persons”, a category regarded as synonymous with human animals, belonging to the genus *Homo sapiens*. This definition dextrously excludes other primates and mammals, removing from them the protection theoretically afforded to humans. From its origins in the work of Locke, the concept of “person” remains an ongoing debate, since non-humans as persons in their own right will upset the generally accepted view that only humans qualify for this title. Is there personhood beyond *Homo sapiens*? David DeGrazia suggests that “personhood is associated with a cluster of properties without being precisely definable in terms of any specific subset: autonomy, rationality, self-awareness, linguistic competence, sociability, the capacity for intentional action, and moral agency” (DeGrazia 2006:42). Although some humans, including human children, lack some of these properties, we do not regard them as non-persons. Since some non-humans are more advanced than impaired humans, it seems irrational to label them as non-persons. In light of the individual development and extended abilities of some higher mammals, it is possible, at the very least, to argue that “normal, post-infancy great apes and dolphins *are borderline persons*” (DeGrazia 2006:46). Once again we are faced with the dilemma that arises in the case of those members of the human species who, through birth or accident, are bereft of many of the abilities believed to be essential to persons, such as language, reason, memory and even self-awareness. “So – at best- these criteria do not mark the greater moral significance of *human* beings as such, but rather that of most humans and some non-humans over some humans and most non-humans” (Singer 2006:4).

The argument from reciprocity

The combination of reason and language makes it possible for human interactions that lie beyond the capacity of non-humans. One of these is reciprocal behaviour, a theoretical social contract that restrains individuals in human society from initiating harmful acts against one another, in exchange for not themselves being harmed. The success of such abstract agreements requires that participating individuals possess the necessary rational abilities to understand their implicit and mutual roles. It is argued that non-humans are excluded from reciprocal agreements because they lack the required sophistication of both language and reason. Accordingly, humans have no direct duties towards non-humans, including not harming them, or killing them, both of which are prohibited amongst rational, autonomous human signatories to the hypothetical contract. But human children, as well as other human individuals who are mentally or emotionally impaired, are similarly incompetent. Their inability to participate in the contractual state does not mean that we have no direct duties towards them, that we may harm or even kill such individuals. Being human, however impaired, gives them a protection that is denied to sensitive, alert and communicative non-humans. It is also means that future, as yet unborn, generations are excluded from participation in reciprocal negotiations. This implies that we have no duties towards them; that we may ignore the impact that our activities and behaviours have on the ecological future of the planet that such future individuals may, or may not, inherit.

Human rights based on the principle of generosity

Some critics of animal rights accede that human infants and the severely retarded possess neither rationality nor autonomy, which means that they therefore do not qualify for rights. But it is argued that these individuals are protected through fellow humans who generously include them within the moral circle. Generous actions and their recipients depend on personal choice. "There is no moral failing present here, and certainly no logical fallacy. People are at liberty to choose to limit their generosity anyway they wish. It's just that, human nature being what it is, most of us extend our generosity to our conspecifics, fewer of us to other animals" (Regan 1991:54). But this

“generosity argument” is dangerous since its freedom of bestowal is unpredictable and may manifest in prejudicial choices. We may, for instance, feel more generously disposed to children of our own racial group; we may consider allowing children from other groups to be used in biomedical experiments, as indeed other primate groups are. There is also always the danger that the selective generosity of the majority, or the most powerful group, may sanction atrocities and persecutions against those who are seen to be undeserving of such generosity. Fortunately most humans certainly feel that the routine use of children from other groups in biomedical activities “is wrong, is unfair and is unjust”; that the treatment of children should not depend on human whim. To ensure consistency, the rights of all vulnerable humans and non-humans should be independent of subjective and selective human generosity (Regan 1991:54).

It is clear that rights based on selective human abilities create moral dilemmas concerning those human individuals who lack them, as well as many non-humans who display different levels of these abilities. Autonomy, rationality, dignity, language and even immortal souls have been defined as qualities possessed only by humans, creating definite either-or categories that qualify humans for rights by separating them from other animals. Attenuated abilities, and in some cases their total absence, should disqualify unborn humans, human infants, the comatose, the seriously mentally impaired, as well as senile elderly persons. It is inappropriate to protect them while excluding many non-humans of comparable or superior intelligence. We should err on the side of caution, remembering that the burden of proof rightly falls on those who deny the moral inclusion of non-humans by virtue of a postulated *absence* of relevant human qualities. Those who hold this view should support their claims by furnishing valid proofs that adequately counter increasing scientific evidence for the *presence* of such comparative qualities, or degrees of proficiency, in non-humans.

What kind of moral view should replace the old system

Although we know that humans are different, it is time to discard anthropocentric ethics in favour of legally buttressed, overarching norms that minimally preserve and guard the basic rights of all similar individuals. A fundamental tenet of this universal justice would be as follows: “If we think it is wrong to treat a human in a certain way, because the human has certain characteristics, *and a particular non-human also has those characteristics*, then consistency requires that we also object to treating the non-human in that way” (Rachels 1990:175).

Harms

Harming individuals erodes their welfare. “Not all harms harm equally, and not all harms harm in the same way. Two types of harm can be distinguished – inflictions and deprivations” (Regan 1983:94). Harm that is directly and deliberately *inflicted* on humans and non-humans may cause acute or chronic physical and psychological pain and suffering, severely affecting the quality of life of any individual. Some of the harms that are deliberately inflicted on non-humans range from routine practices such as the branding and castrating of livestock, the debeaking of laying hens, and lifetimes spent indoors on unnatural slatted or wire-mesh floors in the dark confines of crates. The terrors of transport are followed by the final harm, the killing that ends the life of the biological individual. Some harms may not be painful, since they arise when individuals are *deprived* of certain benefits that are necessary for their welfare. Although non-humans may not be cognitively aware of such deprivations, they experience the frustration of confinement and crowding. They may also be denied the normality of outdoor life and sunlight, of normal social hierarchical interactions, and even certain nutrients. This happens in intensive farming practices in the case of veal calves that are not only fed an unnatural liquid diet in the solitary, dark confinement of their crates, but are also deprived of iron in order to make them anaemic, producing the pale flesh desired by connoisseurs. (These veal calves, together with ducks and geese that are forced to enlarge their livers and thus produce greater quantities of *foie gras*, are two instances in which disease is deliberately inflicted on non-humans to satisfy human taste.)

It can be argued that since animals treated in these ways are unaware of a different life, they are not really being harmed. That individuals may know no better is no excuse for causing physical or psychological harm. They remain victims of such harm, whether aware or unaware. Children who are denied an education on the basis of race, religion or gender, may be equally unaware that their welfare is being diminished, but they are victims nonetheless. Not all harms cause physical pain or suffering. Animals in factory farms, zoos and laboratories are cognitively unaware of their pitiful, often crowded, conditions, but they are subjects who *experience* these conditions, and in addition some of them also experience actual pain and suffering. Since these are the only conditions they know, they are unaware that they are being harmed. Even some vague remembrance of previously experienced kinder conditions are of no value since, like human infants, they are cognitively unable to make comparative judgements. But their ignorance of alternative states does not negate their experience of present harmful conditions, nor does it ameliorate the moral culpability of those who deliberately and knowingly impose such harms on either human or non-human individuals.

Deprivations do not always cause suffering, as in the case of children who have been deprived of education. But although there is no direct pain or suffering involved, they are being subjected to harm in terms of their developmental welfare and future possibilities. Likewise, even where physical suffering is not evident, serious psychological harm may be done through solitary or close confinement. Like humans, many non-humans are social animals. Both require some satisfaction of their psychological and social needs such as companionship, security and liberty, if the welfare needs and interests of each individual are to be fulfilled. There are, however, cases of harmful deprivations that may cause or involve pain or suffering. Confinement may not only deprive individuals of normal or usual physical or social behaviours, but diminished activity, inappropriate flooring and unsuitable diets may cause chronic pain and illness. The frantic reactions of caged wild animals, such as wolves or large cats, are purely extreme examples of the less visible impact of unnatural restraint on more docile, intensively raised farm animals (Regan 1983:99).

Death and killing

“It is sometimes said that so long as animals are put to death painlessly, so long as they do not suffer as they die, we should have no moral objection...” (Regan 1983:100). According to this reasoning, experimentation on animals is justified as long as they are anaesthetized and, if necessary, killed before they regain consciousness. There are no comparable *caveats* in animal slaughter. Concern about the welfare of animals is an evasive tactic that ignores the final harm of depriving them of life, no matter how pleasantly or organically they may have been raised. “And an untimely death is a deprivation of a quite fundamental and irreversible kind ...once dead, always dead (Regan 1983:100). Like slaughter animals, there are many humans that are also unable to express a preference for remaining alive, particularly human babies and foetuses, very young infants, the mentally enfeebled, comatose, and senile humans. This does not mean that we may exterminate them.

In addition to being biologically alive, humans also subjectively experience a meaningful biographical life. Death ends the ultimate value of each individual life with its unique physical, psychological and emotional experiences and interactions with the world and other individuals. Most humans have biographical lives, but many are excluded either for developmental reasons - as in the case of embryos, foetuses and very young infants - or by virtue of impairment of some kind, as in the case of the mentally damaged or the irreversibly senile. Many animals appear to have biographical lives, but there are certainly many cases where we feel relatively confident that such biographical lives do not exist, as in the case of Cartesian oysters and sponges. A reasonable moral line against killing would suggest erring on the side of caution where there is any suspicion of the existence of a biographical life. Accordingly it can be argued that the life of any severely damaged human, who will never develop a biographical life, should not be of greater value than that of an intelligent, emotional animal such as a chimpanzee.

Considerations of cruelty, welfare and rights

It is right, and commendable, to repudiate cruelty, to abhor the infliction of both active and passive pain and all forms of unnecessary distress on all sentient beings. It is equally right and commendable to require the welfare of all existing sentient beings, both on an individual and universal basis. Most of us find this natural in our close human relationships, and are sometimes capable of experiencing feelings of anguish and compassion for the suffering of fellow humans often as far removed from us as the other side of the globe. Many humans are equally concerned about the pain, suffering and general welfare of pets, who are correctly accorded the right to shelter, food, and health interventions to promote quality of life. Yet our denial of the obvious affinity and logical connection between pets and farm livestock sanctions the endless production and daily destruction of billions of animals for human consumption. This cognitive dissonance is culturally transmitted and, like human racism, retards the development of a truly universal moral justice.

Legislation and moral value

As a human invention, legislation has naturally favoured human beings. Concern about animal welfare began to emerge in the first quarter of the nineteenth century in Britain and America, but comparative concerns or laws still do not exist in many other countries. There is little or no global protection of animals against human exploitation and abuse. Even where enlightened laws have appeared, there is considerable reluctance to prosecute and punish beyond cases of extreme cruelty (Regan 1991:43).

Change is slow, but we are seeing some legislative adjustments to curtail blatant cruelty and the most noxious exploitation of certain non-humans. There is increasing pressure against the indiscriminate use of animals in laboratory research, and several countries are gradually excluding the use of the great apes in research laboratories and circuses. But these tardy advances are overwhelmed by threats to the very survival of the great apes as indiscriminate logging practices and agricultural expansion continue to destroy their natural habitats. In addition, their populations continue to decline as a result of a flourishing bushmeat trade, which appears to be a cultural choice,

since the price paid for such meat is often twice that of beef and pork (Peterson 2003:149). This trade “draws out of Central Africa’s Congo basin forests an estimated and astonishing 5 million metric tons of animal meat per year. That amount is absolutely unsustainable ... A generally accepted estimate holds that around 1 percent of the total bushmeat trade involves the meat of the great apes: chimpanzees, bonobos, and gorillas” and “a recent survey based on responses from professional fieldworkers tells us that chimpanzees are hunted in 50 percent of their protected areas, bonobos in 88 percent, and gorillas in 56 percent” (Peterson 2003:151).

The latter half of the twentieth century saw an explosion of factory farming in order to increase profit at any cost. Farm animals were crowded into cages or crates in airless sheds. The most torturous were veal crates for calves, battery cages for laying hens and stall and tether cages to confine pregnant pigs. In response to powerful animal activist campaigns, the European Union has agreed on a legally binding protocol, which recognizes animals as sentient beings, thereby waiving the euphemism that classifies them as “agricultural products”. The European Union also agreed that from 2007 onwards it would begin to outlaw the inhumane use of crates, cages and stalls. There are laws on the horizon that will prohibit the force-feeding of geese; the culling of wildlife is carefully reconsidered, and gradually a new awareness seems to be seeping into the fringes of some human thinking.

How to live ethically without humans being seen as special

Moral behaviour is believed to arise from divine laws, without which an ethical life is generally considered to be impossible. Most humans have been so indoctrinated by culture and religion that they unquestioningly accept the tenets of human spirituality, superiority and entitlement. But the philosophical impact of Darwin’s evolutionary insight has never been fully acknowledged. We need to come to terms with the fact that humans emerged accidentally from an evolutionary process that is blind and without purpose. Darwinism clearly undermines traditional morality. It destroys the elevated position that humans have created for themselves and reduces them to their natural place amongst the animals. Although evolutionary theory is generally ignored or resisted,

there have been several attempts to amalgamate the scientific facts on which it is based with traditional creationism. The recent, more sophisticated theory of Intelligent Design is yet another creationist attempt to avoid the implications of evolution. Its intention is to preserve humans as the deliberate culmination of a divine evolutionary process, thereby retaining the human foundations on which traditional morality is based. Since the naturalistic fallacy maintains that matters of value cannot be based on matters of fact, that we cannot derive *ought* from *is*, it has been suggested that we cannot base ethics on the facts of evolution and that therefore Darwinism has no implications for ethics. But the truth is that we cannot accept Darwinism without rejecting traditional morality and replacing it with something even better.

Removing the old moral anchor is unsettling, since it requires the reform, and in some instances, the abolition of conflicting aspects of culture, religion and morality. Darwinism undermines human dignity in one sense, as “the moral effluvium of a discredited metaphysics” (Rachels 1990:5). This does not mean that the concept of dignity is meaningless, only that it should apply beyond human boundaries. It needs to be replaced by a less discriminatory moral individualism that does not depend, like racism and sexism, on being a member of any special group. Because discriminatory practices have always existed does not entail that they cannot be challenged. Similarly, the *fact* that some of our cultural and religious structures and behaviours have a long and accepted history is neither necessary nor sufficient reason that they *ought* to be accepted, or that they should be impervious to change.

Premises and conclusions

I have expanded on some aspects of evolutionary theory, on the operations of cosmic and biological chance, and the unpredictability and extraordinary variety of emerging biological life from the same origin. The undeniable kinship of mammals is so obvious, particularly amongst primates, that the historical human attitude to non-humans is difficult to defend or sustain. Since the premises of traditional morality, which directed human behaviour, were restricted to the sanctity and dignity of human life, we should not be surprised

that they yielded the anthropocentric conclusions that justified the exploitation of other life forms and resources. The ecological environment has been severely affected by the requirements and conflict of expanding human and wild animal populations. Of greater concern is the deliberate and heedless increase of farm animals. Vast herds damage useful agricultural land and require enormous volumes of valuable grain to produce a fraction of its weight in food. Such high density populations pollute the soil, water sources and the atmosphere, adding immeasurably to global warming. Evolutionary insights require an honest reappraisal of our beliefs and behaviours so that we may frame arguments in which premises are based on scientific truth, ensuring impartial, valid conclusions. Open minds are required to confront the assumptions that grant moral rights to humans whilst denying them to sentient non-humans. "Thinking through, critically and carefully, what most people take for granted is, I believe, the chief task of philosophy, and it is this task that makes philosophy a worthwhile activity" (Singer 2002: 88).

The evolutionary advantage of the creative human brain holds the potential for another Great Leap Forward, one that exercises greater vision and control in creating a sustainable and equitable environment within which individuals and species could flourish. It requires objective and critical reasoning that is capable of evaluating and adjusting the accepted political, cultural and ethical thinking of a species that is just one of many threads in an evolutionary tapestry. Enlightenment is a powerful force. It has shaken religion and superstition and continues to act as societal leaven through the revelations of science. It has undermined the divine right of kings, and increasingly challenges the divine right of humans, reducing them to their biological position within the evolutionary hierarchy. "Though some who criticize the concern about the moral status of animals evidently do not realize this, to be 'for' animals is not to be 'against' humans" (Regan 1983:156). Human lives can only benefit from a more inclusive worldview and system of international justice that considers the welfare of all sentient individuals and the sustainability of a shared environment.

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