1 Introduction

As a species we have long wondered if there is a grand plan – or design – for our history, and for our individual part in it. We have sought answers in mythology, religion, philosophy and science, with a wide range of answers coming from these. Whatever the specifics, however, there has been a human-nature inspired tendency to come up with characterizations which suggest that there are elements of design or direction in our universe. Aspects of nature, spirits, ancestors, stars and gods, for example, have appeared to have a degree of control over events, a control that is not completely random in its manifestations or consequences concerning human fortunes. With the advent of human civilizations (city living, commerce, trade, world religions and relatively complex political administrations) ancestors, spirits and gods tended to become God, and this was a God of order and purpose, if not clear design. With the development of complicated theologies and philosophies, a grand design came to seem ever more likely, and it has been proposed that our purpose is to submit to it for the good of our souls, our good fortune, if not our fellow humans. With the philosophical notion of 'rationality' it has been argued that part of our *purpose* in being here is to discover the nature of the greater design. After all, design suggests a higher rationality and we are uniquely the 'rational' animal – *so we must have been put here to find that design and purpose.*

Yet, if we take the full implications of Darwin on board there is no grand design, purpose or higher universal moral imperative in human existence. We are animals that exist and reproduce and die, that is all, just like all plants and animals. We are nothing special. There is no evidence from nature that we are. Moreover, in Darwin's formulation *chance* is very important in the evolutionary process – as it also appears to be in human affairs. Or, if there is a grand plan, a master design, it is a very bad one indeed. We fight with each other, we kill each other, we torture each other, we ethnic cleanse, often in the name of a higher morality or rationality; we like food, drink and sex much more than reason (although we often do not admit it); we thrill at the conflicts, anxieties and double-dealing seen in mythological stories, soap operas and literature; we almost never read philosophies, and anyway they usually advocate just the opposite from each other, each claiming to be more rational and 'truth revealing' than all the others. We rarely end up in life as we – or our parents – originally planned. Our desires and fears take us ways we have not anticipated (for better and for worse). History is full of surprises, unintended consequences, good and bad luck. The enlightenment worship of reason, rationality and science has made little apparent difference, nor has the development of industrialization with its emphasis on mechanical explanations and material comforts.

Does this make an objective science of humans impossible or, indeed, a meaningless waste of time and energy? No. Human behaviour and human history are far from being completely random processes – we follow the principles of biology with its powerful urges and drives (as do all creatures), and we also follow the impulses contained in our *species-typical* human nature. Human nature is a complex mixture of unconscious and conscious drives, instincts, emotions, cognitions and learning abilities, derived largely from natural and sexual selection during human evolution; here I will argue that these mixtures can be expressed as 'species-typical desires and fears'. Desires and fears represent a surfacing of both the unconscious and conscious bioelectric activities (neural processes) during the gestation and growth of our brains. Just as brain bioelectrics can be seen to act as an interface between genetic processes and emotional-cognitive processes (including the formation of desires and fears), desires and fears act as an interface between emotional-cognitive processing and human social behaviour (the workings of these as mental processes and motivators are examined in some detail in my *Evolutionary Theory and Human Nature* [Kluwer 2001]).

Desires and fears thus act as the major motivators of human behaviour and, as a result, there is a noticeable degree of what might be called 'order-in-process' in our existence. And this (it will be argued) makes a non-teleological and/or non-ideological scientific approach to humans possible if we can discover desires and fears separate from any preconceived notions of direction, purpose, design or higher morality. Such an approach to humans, however, has not been especially popular, even among professional thinkers who believe in science and/or disclaim the existence of God. This may be because, as noted, we have a powerful *human nature* tendency to feel that there is meaning and purpose, if not direction, in our lives, and that progress is being made through the employment of 'rationality'. It may also be because non-teleological approaches not only greatly downplay the role of gods/God, but also the notion of a higher guiding morality.

It, therefore, raises the question: if we are largely emotional creatures, operating unconsciously a great deal of the time, and there is no predetermined direction or moral purpose in our existence, is it *worth* studying ourselves? Should we not let humans strive for moralistic perfection 'with hope' rather than impose a 'cold' scientific understanding which offers no specific utopia or human perfectibility? Unfortunately for such a view a great deal of human suffering has been caused by competing moralities designed to purify and perfect humans and human societies, each one just as ideological and dogmatic as the next. This has also been the case with 'pseudo-scientifically' discovered social utopias which, in fact, often have had even more efficient means of eliminating dissenters than moralistic endeavours have ever been able to employ.

So, in opposition to the above questions, it might be argued that: yes, we should study human nature *as it is* because, while anthropology and history tell us that a great deal of suffering has taken place, the argument here is: if we can more fully understand species-typical emotions, desires and fears – using our capacity for reason and science – we might be able to reduce (or at least evaluate) the fundamental causes of suffering and increase the number of emotionally rewarding times through reducing the circumstances in which fears are likely and by identifying and creating the conditions in which desires

are most fully met. This approach would seek to be unhindered by the baggage of trying to spiritualize humanity and be free from the moralistic compulsion to perfect and purify humans (and to re-educate – re-programme – or eliminate the impure ones). The task would be to start from 'what humans are' and work to make social life as congenial to self and other humans as possible rather than to start from 'what humans should be'. It would mean that we make assessments of changes and ideas and possibilities in terms of their compatibility with species-typical desires and fears, and with the dangers these might present to humans physically, emotionally and politically rather than in terms of dogmatic moralistic or spiritual calculations. In this vein I will also suggest that a system of justice based on an innate sense of fairness can be greatly aided by a non-teleological, non-moralistic understanding of species-typical desires and fears.

However, emphasizing emotions, desires and fears leaves most of us with a sense that we are not in control of our lives, including of our long-term destinies. It also suggests that sex and emotionally based playing might be more natural and motivating to humans than thinking or reasoning. For some it implies that existence is simply 'survival of the fittest', 'dog eat dog', 'nature red in tooth and claw'. And it seems to go against a long tradition of thinkers who have painted a very different picture of the nature of the universe and of humankind's role in it as they searched for ways of perfecting both nature and human life. For example, thinkers such as: Plato, Aristotle, Augustine, Galileo, Newton, Hegel, Comte and Marx (together with classical economists, functionalist and social-constructionist social scientists) have set out to generate a picture of a designed, or at least designable, universe, with humans as basically reasoning, purposeful creatures who can bring instincts and emotions fully under control, if not completely eliminate them, and who can, through reason, seek perfection for individuals and society through discovery of the underlying rationality/purpose of the universe.

A flavour of some of these arguments, through time and across disciplines, can show us what a non-teleological science of humans is up against. For Aristotle, with his notion of a Final Cause of ultimate perfection, the path of history was, inevitably, guided by the *necessity* of making progress to it (Aristotle, 1885; see also, Ross, 1995). He argued that, 'Nature like a good householder throws away nothing of which anything useful can be made. Nature does nothing in vain, nothing superfluous . . . Nature behaves as if it foresaw the future' (cited in Ross, p. 81). Galileo famously put forward the view that the Universe

> Cannot be understood unless one first learns to comprehend the language and to understand the alphabet in which it is composed. It is written in the language of mathematics, and its characters are triangles, circles and other geometric figures, without which it is humanly impossible to understand a single word of it (cited in Gribbin, 2002, p. 95; see also, Drake, 1994).

This is a tradition of physics which held sway for some considerable time. Rene Descartes saw the universe as being mechanical in nature and set out to discover the laws of its working. He made a clear separation between body and mind (Morris, 1991). Isaac Newton carried on with this approach and Albert Einstein reacted negatively to the randomness and uncertainty built into quantum theory, saying (also famously) that: 'God does not play dice' (Hawking, 1995; see also, Gribbin and Gribbin, 1997; Gribbin, 2002).

Among theologians and philosophers there has been a tendency to see a great predetermining/designing power (God) as the driving force in nature. St Augustine, for example, saw evolution as moving from the 'City of Man' to the 'City of God' in which the communion of saints – the *predestined* elect – would be united in peace and enjoyment of God's complete goodness. He made it clear that there was a pre-determined path for it all; it was God's Plan; no amount of 'free will' or merit could make one part of the elect unless one loved God at the expense of self and all earthly beings. An individual's capacity in this respect, however, was a predetermined gift of God and only afforded to a very small number of people (Augustine, 1950, 2012; see also, McClelland, 1996; Most, 2013).

By the time we get to Thomas Aquinas (1224–1274) the state, or at least political society, was 'the milieu for mental and moral development' (Aquinas, 1966; Black, 1984, p. 65). But nevertheless any policies developed were to be based on 'natural laws' provided by God: 'Thomas's God is a rational God. Like Aristotle's nature, God does nothing without a purpose' (McClelland, 1996, p. 112). All that was left was for humans (secular and theological) to find these laws and abide by them. In this tradition John Locke (1975 [1690], 1980 [1662]) firmly believed that God had provided the basis for a just commonwealth and it was up to humans to use their God-given reason to discover how it could be implemented and administered. For Locke: 'Like the rest of creation, God had set humankind a purpose, a telos, and it was not limited to this world' (Spellman, 1997, p. 120).

Early western anthropology set out to discover a 'natural order of existence', or at least the principles of such an existence, by observing a multitude of hunting and gathering societies. They came back from observing bands of conflicting, bickering individuals – usually with very little social stability, or even solidarity (Marwick, 1965; Harris, 1968; Douglas, 1970; Colson, 1974; Ambrose, 1975; Kuper, 1983; Jarvie, 1984; Woodburn, 1991) – and saw within them 'well-structured, synchronic social *systems*' full of rational, naturally cooperating actors' (Cf., Kroeber, 1917; Radcliffe-Brown, 1952; Gluckman. 1963; Boas, 1965 [1938]; Durkheim, 1965 [1912]; Levi-Strauss, 1966). Using 'science' ('social physics' – Saint-Simon), early sociologists had the very same aim with regard to discovering the laws of social evolution and of social *structure* to be able to establish principles for how societies should be organized to provide *social solidarity*, and thus social harmony and justice, and for guiding individual moral choices in daily life. There was an implication that societies evolved through distinct intellectual and 'structural' stages (Ward, 1897, 1906; Parsons, 1937, 1966; Spencer, 1967 [1874, 1896]; Marx and Engels, 2011 [1939]; see also, modernization theorists).

There are some very powerful thinkers here, and their intentions to improve to perfection humans and human social life can be hard to argue with. Yet their abiding faith in reason and teleology has had a long history of being questioned and even sometimes ridiculed. For example, the Sophists, the author of Ecclesiastes, Machiavelli, Hobbes, Voltaire, Hume, Swift, Darwin, Nietzsche and Freud considered humans somewhat less than rational creatures, often not in control of their own destinies and bounced about by Fate, Fortune, events, sex, emotions, desires and fears. This view of human nature is also frequently the stuff of stories and myths, ranging from the work

of ancient Greek playwrights to numerous modern authors. 'Fortune lifts and Fortune fells the lucky and the unlucky every day. No prophet on earth can tell a man his fate' (*Antigone*, Sophocles – Fagles trans., 1984, p. 119). Jocasta rails to Oedipus against prophesy: 'What should a man fear? It's all chance, chance rules our lives. Not a man on earth can see a day ahead . . . Better to live at random, best we can' (*Oedipus the King,* Sophocles – Fagles trans., 1984, p. 215).

Oedipus, of course, fought against this view in his desperate attempt to discover 'the truth' but his efforts only led to the mental demons of guilt and shame that accompany patricide and incest. In the process Sophocles raised the possibility that we might have *unconscious* desires to kill our fathers and sleep with our mothers. Jocasta tries to calm Oedipus well before he knows the truth: 'Many a man before you, in his dreams, has shared his mother's bed' (p. 215). The importance of both fantasy and delusion in human existence is noted in *Oedipus*: in the words of the chorus 'does there exist, is there a man on earth who seizes more joy than just a dream, a vision? And the vision no sooner dawns than dies blazing into oblivion' (Fagles, 1984, trans., p. 233).

Shakespeare (1977) was concerned with the arbitrary outcomes of much of human life. Lear bemoans: 'Let copulation thrive; for Gloucester's bastard son was kinder to his father than my daughters Got 'tween the lawful sheets.' (p. 908). And when his fool has been hanged he laments: 'No, no, no life! Why should a dog, a horse, a rat have life, And thou no breath at all?' (p. 915). And the doomed Cordelia – the non-schemer, the loyal daughter – acknowledges to her father, the king, as the end was near, 'We are not the first, Who, with best meaning, have incurr'd the worst' (p. 912). The novelist George Eliot put 'difficult choices before her characters, showing their human frailty and the sometimes disastrous consequences of dubious actions undertaken out of mixed and confused motives' (Ashton, 1996, p. 381). These elements were common in the novels of the great Russian writers: Turgenev, Tolstoy and Dostoevsky.

In the Bible book of *Ecclesiastes* (King James) the preacher asks: 'What profit hath man of all his labour wherein he taketh under the sun? *One* Generation passeth away and *another* generation cometh: and the earth abideth for ever' (chap. 1, verses 3–4). And as far as meaningful labour is concerned, what is the point? 'Then I looked on the works that my hands had wrought, and on the labour that I had laboured to do: and, behold, all was vanity and vexation of the spirit, and *there was* no profit under the sun' (chap. 2, verse 11). Moreover, it is not an especially good idea to seek wisdom, 'For in much wisdom *is* much grief: and he that increaseth knowledge increaseth sorrow' (chap. 1, verse 18). The Confucian master Xun Qing, argued in the third century BC that '"Fate" is not determined by Heaven but by chance' (*Treatise on Heaven*, in O'Grady, 2012, epigraph, chap. 15). A key doctrine of Buddhism emphasizes the relativity of human life. Impermanence is a major theme in Buddhism (and to a lesser extent Hinduism); 'all human striving is no more than a vanishing hand clutching at clouds' (Watts, 1962, p. 7). While the 'afterlife' might be different, the *Qur'an* points out: 'Know ye (all), that the life of this world is but play and amusement, pomp and mutual boasting and multiplying (in rivalry) among yourselves, riches and children' (chap. 57: sec 3:20).

Voltaire is renowned for (among other things) being scathing of the then current philosophical/rationalist notion that 'all was for the best in the best of possible worlds'

(See, *Candide* – 1759). His contemporary David Hume pointed out that, 'Necessity is regular and certain. Human conduct is irregular and uncertain. The one, therefore, proceeds not from the other' (Hume, 1958, p. 403). Hume's view of thoughts and experiences as they made up consciousness was that they were 'fluctuating, uncertain, fleeting ... in a perpetual flux ... succeed[ing] each other with an inconceivable rapidity' (Hume, 1958, p. 252; see also, Hume, 1963; Morris, 1991; Dollimore, 1998; Eagleman, 2011). Hume and the polemical writer Swift also noted some of the dangers and injustices that can be created in the seeking of rational answers to what are largely emotional and political issues. Nietzsche summed up the world: 'That which we now call the world is the result of a host of errors and fantasies which have gradually arisen in the course of the total evolution of organic nature' (Nietzsche, 1886: Section One, 16). In the whole of his work he (Nietzsche, 2010) generally held that reason and passion could not be separated; and it was not just the congenial passions that would necessarily predominate. For him the 'Will to Power' was the driving force of all human actions. The will to power was a combination of a multitude of instinctual forces that consciously and unconsciously, purposefully and subliminally, allowed humans to survive and proliferate. There was no grand plan behind it all.

And according to a number of philosophers with a political focus, the will to power clearly operated in human social life, and a 'natural order' was not assumed. Hobbes, for example, argued that the natural state of humans was a war of every man against every other. He considered that humans were naturally egotistical, competitive, aggressive and power-seeking (Hobbes, 1968; Morris, 1991). Before Hobbes, Machiavelli had warned us of the dangers of unconstrained humans when natural human emotions are given a free reign and means of providing order are absent. They both strongly suggested that issues of order were political rather than moral or ethical in nature. Machiavelli attributed about half of human affairs to 'Fortune', against which even the wisest and strongest (and most ruthless) of princes would have to work very hard to have any influence at all (Machiavelli, 1950). As 20th century British Prime Minister Harold Macmillan famously answered, when asked by a reporter what he thought would be his major problems over the coming period: 'events, dear boy, events'.

Even with a strong emphasis on reason and rationality within the evolving social sciences not all thinkers were convinced that human social life was amenable to following exact laws and structures. For the sociologist Max Weber, traditions, beliefs, emotions, charisma, status, economic positions and power politics, in a variety of contingent interrelationships, all played a part in explaining particular human social outcomes (Weber, 1978, 1981). And in sociology's sister discipline, economics, where rational, calculating man was the underpinning of the classical model, predictions of the business cycle were so often contradictory and proven wrong that the economist Ezra Solomon (1984) wryly observed 'the only function of economic forecasting is to make astrology look respectable' (see also, Galbraith, 1975). In social policy, Christopher Jencks (1975) concluded from a major statistical analysis of the effects of home and schooling on economic success in modern America (measured over two generations) that 'luck' accounted for about 50 per cent of predictability. By luck he did not mean a supernatural force. Rather, he argued that the variables accounting for success were so

many, and so different for each individual, and *not following* any historical or clumping patterns, that particular mixes could not be easily identified, classified into useful categories or be seen to repeat themselves in a predictable manner.

Indeed, even at the heart of the scientific search for cast-iron laws and predictability in nature, uncertainty and a lack of complete predictability came to have an important role. In modern physics, for example, the development of quantum electrodynamics (QED) postulates that the position and direction of an electron is 'subject entirely to chance, selected at random from the options open to it' (Gribbin and Gribbin, 1997, p. 39). In Heisenberg's words, 'we *cannot* know, *as a matter of principle*, the present in all its details' (Hawking, 1995; Gribbin and Gribbin, 1997; Gribbin, 2002, p. 520). And, 'Heisenberg's uncertainty principle is a fundamental, inescapable property of the world' (Hawking, 1995, p. 61). 'Nothing is certain in the quantum world . . . Quantum processes obey the same rules of chance as dice at a crap table in Las Vegas' (Gribbin and Gribbin, 1997, p. 39). Despite this QED is arguably 'the most successful scientific theory yet developed' (Gribbin, 2002, p. 526; see also, Hawking, 1995; Gribbin and Gribbin, 1997).

Nevertheless, the above scientists would not argue that the universe is a chaotic mess, unliveable in and not understandable by science. Just the opposite – they spend their lives searching for 'order in process' within it. While a number of the above thinkers, who were suspicious of rationality, design and purpose, suggested that human consciousness is often at war within itself (such 'wars' not being products of clear-cut factions struggling for supremacy, but more like bar-room brawls in which it is hard to tell what the issues are, who is on what side and what might be a satisfactory outcome), a disordered, conflict-prone picture of human nature and randomness in human life does not preclude the possibility of a science of human behaviour. Writers such as Hobbes, Machiavelli, Voltaire, Hume and Max Weber, for example, did not believe so. The task is to incorporate randomness, chance and conflict into the science. I suggest that we can undertake this through an understanding of species-typical emotions, desires and fears as being *evolutionarily derived* motivations of human behaviour (without *inventing* meaning and purpose for humans and then using these as primary *motivations* for human behaviour).

In search of a science of humans

A significant move in this direction was made when Charles Darwin provided a scientific paradigm free from a grand design, predictable direction and purpose in nature, including in human existence. Darwin's approach placed the causative processes – natural and sexual selection – prior to the outcome, with the outcome given no retrospective causal power whatsoever, and random chance being a significant factor. Publication of *The Origin of Species* in 1859, thus, presented a blow to any notion of a Grand Design or Final Cause in nature, reducing God's involvement – if not eliminating it altogether. Following the *Origin's* argument that organic life was largely a product of mindless forces unconnected to their outcome, he set in motion an approach to human

consciousness (human nature) which did not presume the evolution of a unique higher rationality. In *The Descent of Man and Selection in Relation to Sex* (1874/1879) he emphasized the continuity of animal and human characteristics – including mental ones – and the significance of sexual selection in human evolution, implying that *sexual choice*, not man the big-brained/tool-using rationalist, might be the key to human evolution (see also, Ridley, 1993; Miller, 2000; Jones, 2002). In *The Expression of the Emotions in Man and Animals* (1872) Darwin considered emotional expressions in humans as representing modified inherited *animal* tendencies – and not always that much modified. He observed, for example, that, 'A young female chimpanzee, in a violent passion, presented a curious semblance to a child in the same state' (Darwin, 1872, pp. 139–140).

His argument was that physical capacities could take on new functions as evolution proceeded, and that this was very significant in the evolution of human emotions. For instance, faint smiles in humans are muscular facial reactions of recognition and non-threat, derived from the facial expressions of apes when signalling submission. And an automatic, or semi-automatic, smile remains in humans a means of saying 'hello, I will not harm you, I do not come to challenge you; we can have a peaceful chat'. In apes, 'laughter' is a common spontaneous result of social playing, including being tickled; tickling generates 'pleasure' at least as far back as dogs. In the case of laughter, a particular behaviour generates a physical reaction that provides pleasure and a sense of fun/happiness. And in apes and humans the pleasure is related to a social relationship – which can be seen from the fact that neither an ape nor a human can get pleasure or laughter from self-tickling however much they realize that tickling causes laughter and that laughter is pleasurable. In his search for a link between phylogenetically inherited physical tendencies and the development of human emotional responses, he was able to come to similar conclusions concerning the evolution of emotional expressions of such things as fear, terror, rage, grief, anxiety, joy and anger – these being set in motion by inherited animal reactions such as trembling, the grinding of teeth, changes in blood flow, perspiration and averting eyes. The significance is that it is the inherited physical reaction that generates the emotional feeling, rather than an abstract meaning given to a particular action or relationship generating the feeling.

> Most of our emotions are so closely connected with their expressions, that they hardly exist if the body remains passive – the nature of the expression depending in chief part on the nature of the actions which have been habitually performed under this particular state of mind (Darwin, 1872, p. 234).

The link with 'habitual performance' and mind brings us to another level. Darwin speculated that actions of the body were linked to 'nerve force' – perhaps akin to the actions of neurotransmitters in today's physiology – which, at the same time, was linked to habitual behaviour – habit having a very similar feel to the current notion of the establishing of neural networks.

To establish the connection between behavioural expressions and the evolution of mind in humans he spent considerable time considering blushing, because: 'Blushing is the most peculiar and the most human of all expressions' (p. 310). Why? Because, although blushing is a result of very physical activity – the relaxation of muscular coats

of small arteries by which capillaries in the face become filled with blood – it requires mind for its expression; 'this theory rests on mental attention having some power to influence the capillary circulation' (p. 336). Yet it is unconscious mind. We cannot cause blushing by any physical means (as tickling can cause a laugh), or by willing it, and we cannot suppress it by physical or mental means (attempting to only makes it worse) – but in certain mind states it is inevitable (and seemingly universal). What may have been a physical response to fear, anxiety and agitation came, in humans, to have personal and social meaning. We can see distress in others when they blush, and feel that we must be giving away our anxiety/distress/shame in the same way. So, when the human face became 'the chief seat of beauty and of ugliness, and throughout the world is the most ornamented' part of the human body (p. 356), humans became extremely conscious of the potential effects of the appearance of their faces. This awareness can cause involuntary blushing when attention seems extensively focused on self's face.

This we can assume was even more the case when human faces and facial expressions began to represent not only the sexual desirability of a person, but also their character, intentions, trustworthiness and value as a friend or long-term mate. Blushing, then, depends on 'a sensitive regard for the opinion, more practically for the depreciation of others, primarily in relation to our personal appearance, especially of our faces; and secondarily, through the force of association and habit, in relation to the opinion of others on our conduct' (p. 334). So when we feel under scrutiny we often blush and: 'We thus see that close attention [of our own minds] certainly affects various parts and organs which are not properly under the control of the will' (p. 340). It is not a big step from here for a human, especially when in the presence of others, to be able to imagine a 'moral' failing and blush because of the linkages between blushing and mind that have been established.

At this point consciousness, unconsciousness and concept formation are linked to a phylogenetic capacity for blood to flow to the face in certain mental states. And there is feedback with regard to these mind states.

> If, then, there exists, as cannot be doubted, an intimate sympathy between the capillary circulation in that part of the brain on which our mental processes depend, and in the skin of the face, it is not surprising that the moral causes which induce intense blushing should likewise induce, independently of their own disturbing influences, much confusion of the mind (pp. 323–324).

These 'confused' mind states come to be related to a powerful tendency to feel anxious from too much attention directed at self from others, especially teasing, questioning or deprecating attention, being part of a package of fear, embarrassment, shame and shyness which emerged during the evolution of the human mind. It is a mind derived from human phylogenetic history in which shyness and embarrassment evolved from what was already there. It is a mind evolving in a context of ever-changing – sometimes congenial, sometimes threatening – social worlds.

Darwin may have somewhat underestimated the possible reproductive advantages of shyness given the nature of human sexual evolution (see Chapter 3), but his comment about shyness and design is clear and to the point. 'Those who believe in design, will find it difficult to account for shyness being the most frequent and efficient of all the causes of

blushing, as it makes the blusher to suffer and the beholder uncomfortable, without being of the least service to either of them' (p. 335).

Building upon this approach to emotions, William James – considered to be among the founders of modern psychology (1890) – put forward the hypothetical example of how we came to fear bears (1884). A fear of bears, according to James, does not cause us to run from bears; but rather a bio-electric tendency, phylogenetically inherited, to automatically run from big, dangerous creatures emotionally teaches us, through the physical changes generated from the running away from bears, to be afraid of bears specifically. Physical bodily action, thus, teaches us emotional feelings and understanding. James was criticized in that it was suggested his 'system' was too slow to explain the relatively rapid reactions of humans in the face of danger. However, this was based on the notion that James was arguing for visceral feedback as the 'teacher' of emotions when, in fact, he was also arguing for somatic feedback (as in the case of running from a bear), which is fast enough (LeDoux, 1998; see also, Damasiò, 2000).

Current evidence from neuroscience suggests that danger stimuli go to different sections of the brain via two or more pathways. Some stimuli – with minimal information – travel very fast to emotional and quick reaction centres, and others, with more information, to the cortex where slower, but more elaborate, analysis can take place (LeDoux, 1998; Brown, 2003; see also, Kahneman, 2011). The evolution of these mechanisms supports the approach taken by Darwin and James, although it suggests that, while running, other information is being stored to later be used in analysis. Whatever the details, it cannot be denied that this perspective does make considerable sense from an evolutionary point of view. It is based on the principle that 'The cost of treating a stick as a snake is less, in the long run, than the cost of treating a snake as a stick' (LeDoux, 1998, p. 165; see also, Hamilton, 2012), but that eventually it is useful to be able to know the difference, and to be able to assess the different dangers each might generate (in different circumstances).

Any evolving human that had to wait on the evolution of a relatively complex fear of bears (originally it would have been of something like lions, cheetahs, baboons or some big ape) would not have left very many copies of their genetic blueprint behind. But, if the act of running like hell with the image of a bear in one's head activated a 'charging-up' of an image of a bear as dangerous, with additional stimuli concerning bears and bear country being stored at the same time, a considered fear of bears would have become established. As humans became more self-aware, and capable of thinking and consciously remembering, a fear of bears might result in staying out of bear country – after all very few humans can outrun an angry bear. With increased emotional-cognitive capacities, however, a fear of bears could lead to using bear country when bears were away, or when it was a specific advantage, but being extremely vigilant about the presence of bears, and becoming very alert to signs of bears. (Who knows, the brave people who did this might then take the bear as a totem animal.)

In this approach, the interrelationship between body and mind is so intricate that it is not useful to consider them as separate entities. Reactions, emotion and reason evolved together, generating motivational packages (ones that are to a significant extent unconscious) that exist because they gave survival and reproductive success during the