CHAPTER SIXTEEN

The Inner workings of the Brain

Summary:

Understanding the origins of human behaviour and relationship of current cultural priorities to inherited instincts. Progression of social organisation over the past thirty thousand years, exemplified by eastern Mediterranean, Africa and Tigris and Euphrates valleys. Contrast between innate, steadily evolved set of arrangements for raising children, and apparent collapse of such collaborative structures in modern society. Recent research on intelligence and linked role of experience. Possible curriculum based on a better appreciation of what it means to be human.

Towards the end of the 1980s the grip of Communism right across Russia and Eastern Europe was starting to collapse. First it was the pulling down of the Berlin Wall; then it was the internal reforms of Glasnost and Perestroika in the Soviet Union. The Communist Party, with its tactics of rule by secret police and terror, had been totally discredited by its last ditch effort to depose Gorbachev in the coup of 1990, and Yeltsin, as the first elected President of Russia, had faced down the army tanks and proceeded to dissolve the Soviet Union as a political entity.

Under the auspices of the World Trade Organisation, a highly qualified group of American and Western economists were invited by the demoralised and uncertain Russian leaders to advise on setting up a democratic, free market. With their own economic policies in total disarray, many top officials in the Russian government were eager to follow their advice blindly. With the state owning all the country’s assets, here was an unbelievable opportunity to redistribute them widely to the public so as to get a reformed, privatised economy off to a flying start. The advice the Russians received was based almost exclusively on the logic of neo-classical economics; namely that all humans were rational maximisers of their self interest, and that unrestricted markets could best co-ordinate this effort. Real Adam Smith thinking. The Russians made the transition from a collectivist economy to the practice of the
free market by the equivalent of sudden shock therapy. Paul Lawrence, a professor of organizational behaviour at the Harvard Business School, was one of those advisers, who was then subsequently able to stand back and observe the application of economic theory on an unprecedented scale. As time passed he was horrified by what he saw; by January 2001 the production of goods and services had fallen by fifty per cent, while some Russians had become phenomenally wealthy, fifty per cent of the population were impoverished as compared to only two per cent before 1989. Male mortality rates had risen at an unprecedented pace, political leadership was in chaos and the risk of a violent political backlash strong.

Lawrence, and his Harvard colleague, Nitin Nohria, then embarked on a very thorough analysis of what recent research shows to be the nature of the basic drives that appear to shape the choice humans make from day-to-day. In a remarkable book, ‘Driven’, published in 2002, they showed that the way of life of such hunter/gatherer societies as the Hadza most perfectly matched what they saw in the research as the four innate human drives that influence all our behaviour. They identified these as the drives to acquire, to bond, to learn and to defend. These are the basic instincts, developed over humanity's extensive experience out on the savannah which, Lawrence and Nohria argue, shape all our behaviour. When these four drives are reasonably balanced society thrives; whenever one drive becomes exaggerated however the balance is lost and society is thrown way off course. I can’t claim that the tiny slice of time I experienced of the Hadza way of life was pure Stone Age, for there must have been many accommodations made with contemporary societies over the thousands of years since then, but the general shape of what I saw in Tanzania in February 2003 does help to paint a picture of how human behaviours were shaped before, and during, the Great Leap Forward, and probably account for some ninety eight per cent of human kind experience – this was our ‘ancestral environment’.

Take the different attitudes of the Hadza men and women - consider men setting out on a Saturday night binge, and the women quietly enjoying each other's company, secure in the knowledge that it is they who were largely the decision-makers. In this you have people who may often look and feel very much like us. Look also at the way the villagers self organised around ever-shifting conditions. Consider the interdependence of age groups - even the youngest child felt that he or she had a role to play. Note the significantly different
organisational skills displayed by men and women, and in particular look at the way in which they communicate with non-verbal signals.

I was struck by how much more talkative the women were than the men, and how different their topics of conversation appeared to be. The women talked to express empathy with each other, and to explore the relationships of people around them; the men meanwhile were far more economic and transactional in their speech. While research shows that women use six times as many words or utterances as does a man in the course of a day, this is misleading for other research shows that men express as many ideas, but do so only silently. Most of the time a man ‘talks’ only to himself, a woman talks to other people. Which fitted exactly the Hadza lifestyle – when collecting nuts and berries there was always somebody else to talk to, but out on the savannah the hunter really was alone. It is in woman's nature to articulate her immediate thoughts. Think of Shakespeare's Rosalind in ‘As You Like It’ remarking, “Do you not know I am a woman? When I think I must speak.” Men see themselves as being the stronger, simply because they keep their thoughts to themselves. A disputable point!

Finally, for me, the biggest surprise was that, in the behaviour of the Hadza, I could see some of my own twenty-first century friends. The macho posturing of the young men, and the beguiling smiles of the young women; the love of a good laugh, the delights of humour and the willingness simply to stand on the top of a hill and enjoy the view. Add to this their inquisitiveness, possible short tempers and sense of adventure, and you have all the ingredients for a fabulous dinner party.

I only heard about the courtship rituals of the Hadza, but was not there long enough to see them in action. Evidently, at regular intervals throughout the year coinciding with the full moon, people from different villages come together for what seem pretty uninhibited parties. Only when the young have come through puberty are they allowed to participate, and the couplings are multiple. Only after several of these parties does a young couple emerge as a recognised pair. Although I know of no research that has studied such intimate relationships amongst the Hazda, this may well be related to that research undertaken recently in North America several times over the last ten years. This showed that, through kissing, a special receptor at the end of the tongue carries out an initial analysis of whether the person being kissed has chromosomes sufficiently different to your own to ensure that, upon mating, a healthy baby would be conceived. The American research shows that the more diverse the
chromosomes the more ‘attractive’ your partner appears, while the more similar the chromosomes the less attractive does a kiss seem with such a person. Similar research shows the importance of smell in the selection of an appropriate mate. That pulled me up short when I realised that, before the Hadza party in this expansive way, they make a special point of washing and cleaning themselves – was that, I wondered, so that they could be sure of giving off the right scent, and was it just possible that the excessive use of perfumes and after-shave lotions in Western countries was so mixing up our natural smelling capabilities that this was a factor leading to early and multiple divorces? There must be many a PhD waiting to be written on such a topic!

In very many ways the Hadza are, quite simply, ‘us’. Or perhaps it would be better to describe them as being like us when we are at our most open, spontaneous, and unscheming, for other behaviours seem to have come into our daily pattern of activities that must have a more recent origin. Let's briefly look at these.

**The Origins of Social Hierarchies**

When the elder expressed his fears that it was settled agriculture that made people greedy, he was reiterating an explanation of human society first set out by Adam Smith, the Scottish economist in the 1770s. Smith described hunter/gatherer society in terms similar to what I’ve observed here, where bonds of natural fidelity bound everyone to each other. As society progressed first into a pastoral economy, then into settled farming, Smith saw humans faced with increasing social pressures. In other words human instincts had to be constrained. Later, Smith argued, came urban life and the need for civil society and the defence of property. Smith saw the fourth stage developing all around him as Scotland, in the late eighteenth century, entered the Industrial Revolution, namely the need for commercial interdependence - laissez faire economics.

In the tens of thousands of years that have elapsed since The Great Leap Forward, it seems we have started to evolve different and additional skills and behaviours because of these ever-changing circumstances. Life has become increasingly complicated. Let me review these recent social pressures. These are the things that have taken us beyond the Stone Age existence of hunter/gatherers, and are probably very slowly influencing our social instincts.
Research by two psychologists, Alan Fiske and Jordan Peterson, is of special interest at this juncture. Working in West Africa in the early 1990s, and cross-referencing his work there with what he’d done in other countries, Fiske has identified four forms of social relationships. He grades them according to complexity. The most basic of these relationships he calls Communal Sharing, which I would use as a simple description of relationships within a hunter/gatherer society. A slightly more complex relationship Fiske describes as Authority Ranking: "this basic form of human relationship is, however, subject to destabilising turmoil whenever any parties struggle to improve their ranking, since any one person's gain is another person's loss". This seems to describe exactly the elders fear about the social implications of farming, should it be introduced amongst the Hadza.

A third tier of relationships Fiske calls Equality Matching. At its simplest, this can be equated with 'you scratch my back and then I have an obligation, sooner or later, to scratch yours'. This is the kind of relationship that exists in relatively secure, permanent and complex societies, where most people know each other, and where status relationships are well established. Adam Smith would probably have seen this as a fair description of his third stage of social evolution, namely settled agriculture with a scattering of small urban centres. This was the kind of social arrangement that grew up in the Euphrates valley ten thousand years ago, and which existed in the towns and ports of pre-industrial England. These were societies where the implications of a decision made by one person could easily be appreciated by many others; people who knew each other well enough – or thought they did – that they dared not cheat on the other.

Fiske calls this fourth tier of relationships Market Pricing. I think this approximates to what Adam Smith had in mind as the skills needed in the industrial, market economy he envisaged as beginning to emerge at the end of his life in the 1790s. Lawrence and Nohria describe this as "the price negotiation that occurs in a standard, one-time commercial transaction. This kind of bargaining involves bidding and counter-bidding, often with bluffing and calling of bluff, of keeping one's rock bottom, or 'reservation price', a secret. It lends itself to exchanges between strangers who do not expect to trade repeatedly". Fiske asserts that all humans seem to have a basic understanding of how to play by the rules of this game.
He suggests that these four modes of behaviour are universal and innate among all humans. If Fiske is right this opens up a fascinating set of ideas. Innate of course means that they lie dormant within each of us and are only activated should the immediate environment, both physical and cultural, stimulate them. If it took hundreds of thousands of generations of hunter/gatherers to develop the concept of Communal Sharing, this would seem to indicate that these innate skills are the most deep-seated of all our instincts. Authority Ranking would rest on top of this, although it would be nothing like as well entrenched. Bartering (Market Pricing) which is so much part of our present culture, may be the least firmly emplaced but culturally most familiar and persuasive of any of these social arrangements. Fiske presents limited anecdotal evidence that all four forms of these social modes are manifested in maturing children starting roughly with Communal Sharing for the three year old, and proceeding by the age of eight to an understanding of bartering swapping.6

Tragedies occur when two partners to a deal play by different rules. This is seen not only across Africa and the developing countries but most certainly in England as well. Once a member of the Hadza leaves the security of their homelands and the omnipresent belief in community sharing, they are all too easily corrupted by others who see ways of exploiting their apparent naivety. Sadly, many a broken Hadza, as with the Aborigines in Australia or the Bushmen in South Africa, is to be found outside their homeland, tied by the need to get money for sufficient alcohol to temporarily escape from the tedium of the most demeaning of jobs. Likewise a young girl in England, or any other developed urban culture who, not yet knowing how to handle her developing femininity, accepts a relationship she sees as being that of reciprocal friendship only to find the man - having bought her affection for a few days - drops her and, as in a market economy, looks for the next bargain. The ultra materialistic young of Tokyo have developed a new concept of ‘contract dating’ that makes bartering most explicit. A girl needs the money for a new Gucci handbag, and quite openly sells herself for an erotic half hour to raise the necessary funds - a practice that, according to the Japanese Ministry of Education, is now followed by a quarter of Japanese high school girls, and presumably by boys as well.7

Which brings us right back to where this argument started. However strong our predispositions - our instincts - these can only flourish when interacting with an appropriate, challenging, environment. Culture is indeed as essential as Nurture.
I finished the notes for this and the previous chapter on my last morning in Istanbul. This gave me a free afternoon for a pre-arranged guide, Nazli, to give me a tour of the city that she thought would satisfy my interests. We crossed the Bosphorus on the first of the two new bridges, and climbed to the top of the high hill on the Asian shore. The views were stunning in every direction. Laid out in all its topographic splendour was the historic site of present day Istanbul on a finger of land between the Sea of Marmara and the Golden Horn. "We don't know when it was first settled," explained Nazli, "but it was already so important in 325 BC for this to become the capital of the Byzantine Empire. We know that there were nearly one hundred Greek city states stretching away up through from the Bosphorus into the Black Sea established at least three thousand years before that. The Phoenicians were here before that, as were probably the Egyptians before them. You see, we are good traders here in Turkey; we have learned over thousands of years how to drive good bargains!" She smiled. I could only agree. I remembered well the traders in the bazaars and the worldwide respect of the business community for the entrepreneurial skills of the shipping magnates of Greece.

"Look the other way, to the East, across Anatolia," said Nazli, reclaiming my attention. "This is the way all conquerors have come. It was the way the Turks moved across Anatolia and in 1453 destroyed the second Roman Empire of Constantine. They rolled on, as you know, to the very gates of Vienna. If you could see three hundred miles to the east you would come to the extraordinary ruins of Chatal Huyek, the really enormous city of eight thousand years ago that was excavated in the 1960s. It's almost as old as Jericho. Anatolia has been described by archaeologists as the homeland of the city."

And almost as ancient, I thought, as Ur of the Chaldees outside modern Baghdad, which could be as old as ten thousand years and where the earliest cuneiform writing has been found. Three hundred miles to the north east of that again are the Zagros Mountains of Iran where I had first seen nomads on their annual migration thirty years before. That was also where I saw genuine cross-generational learning for the first time – four-year-olds being instructed in how to look after the chickens; six-year-olds taking responsibility for the goats; eight and nine-year-olds for the sheep, and twelve-year-olds for the cattle. Here, in front of me, across the Eastern Mediterranean and in the valleys of the Tigris and the Euphrates, was
the crucible in which the human race had evolved alternative social structures for increasingly complex societies. Here were the first experiments in equality matching and market pricing, while in the assumed location of the Garden of Eden in southern Iraq was the place where Jews, Christians and Moslems believed all life began.

In a week I was seeing in my mind's eye evidence for the accumulating range of behaviours that make our species the complex, ever-adapting, learning species that we are. A species empowered by our evolutionary experience, but constrained by it as well. We have more in common with the Hadza than we might realise. Every time we feel the urge to get away from it all we are probably experiencing that tension between being nomadic and settling down to accumulate our wealth – we, as city dwellers taking our holidays on the beaches of the Mediterranean or in some country cottage, are out there both with the nomads of Africa and the early city dwellers of Anatolia. Thus, faced with all the choice of a modern sophisticated culture we are in the ‘buyer beware’ culture of the bazaars. Just to further confuse us, all these impulses act within us simultaneously.

As I waited for my luggage at Heathrow a Turkish businessman got highly excited as he took a message on his mobile phone. He was especially happy and his smile invited my question. "Yes," he said, "the Turkish Parliament has just voted against accepting the enormous bribe from the Americans to let them use our bases for the war with Iraq. I know I'm a businessman but money isn't the only thing that matters. I am so proud of my country because I can now tell my children that money really isn't the bottom line. Maybe today Turkey has started to grow up, and maybe this is the beginning of us turning our backs on a culture that has been based on bribery. I am very happy."

… and its Possible Collapse?

The next morning, refreshed from my travels and back at home in Bath, I read a highly disturbing news item in that day's Independent newspaper. It read, "Half of the five-year-olds starting school lack the speaking and listening skills needed to cope in the classroom. Almost two thirds of teachers complained that few children were now able to recite nursery rhymes or songs. More than half believed that only a tiny minority of pupils were capable of listening and responding to instructions." Alan Wells, the director of the government-funded
Basics Skills Agency who conducted the study, described poor communication within families as "the daily grunt" and being partly to blame. He accused parents of buying children expensive games and computers that seem to have replaced shared activities between them and their offspring. There is an ethos (among parents) which says, “Don't worry, schools will do it all for you, and speaking and listening don't have any connection with later attainment.”

Three other news items that week caught my over excited attention. "A growing number of primary school children are becoming so obese and unfit they can't even take part in PE classes… waistlines of eleven to sixteen-year-olds have grown by an average of two inches in the last twenty years"9 "More than a third of seven-year-olds are seriously stressed out by compulsory national tests. One in ten seven-year-olds were so worried by SATs that they were reduced to tears and could not sleep", reported The Guardian10 and "Children who can't live without TV… the children in our study couldn't imagine life without it. Just like a light bulb, the television is always on. It tends to be put on first thing in the morning when the household wakes up and it is often on last thing at night" reported The Guardian, while a recent enquiry by the LEA in Birmingham showed that eighty per cent of three-year-olds had a television in their bedrooms.

I thought about the mental journey I had just undertaken. My conclusion was painful. Today's children in England seem to be growing up in a world so devoid of meaning and emotional security that children further back along the evolutionary chain, in the bazaars, as it were, of Istanbul, Isfahan or Marrakesh, are better off than they are. The children of the nomads are more connected to the reality of how life works, while the children of the Hadza can be more sure of their community's support and love for them than can vast numbers of children in the western world. My visit to the Hadza made me realise yet again that we are fast losing our grip as far as bringing up our children to thrive in the twenty-first century.

Yet still the British Government, and other governments in the developed world, with the encouragement of the World Bank and other multi-national organizations, see this breakdown in the natural order of things as a problem with an institutional solution. In the British Government's latest proposals for reforming secondary education they undertake that, by 2006, additional funds will be available to all the country's secondary schools to enable them to provide breakfast clubs, after-school clubs, summer schools, and homework clubs.
'Homework'. Have we lost the significance of that word, 'home'? Is it not here that today's young people are experiencing the root of the educational problem? Many don't have functional homes. Considerable numbers of children have lost contact with one of their parents before the age of ten. And what politicians so often miss is that many young parents are finding that it's almost impossible to be the good parent they want to be, because the whole of society has become dominated by the imperative for everyone to be economically productive.

This account of contemporary childhood leaves many ideas unresolved. Intentionally so. I for one don't believe that the human race can go on like this. No one person, no one organisation, alone can stop this decline. Acting as thoughtful, intelligent people it is we - acting in our hundreds and thousands who have more power than any government. You will understand why I once said at a conference, "It's almost as if the children of today are blowing an evolutionary whistle and saying: Hey, we were born for something better than this." The Hadza have something that the children of England are fast losing; they have the love and affection of their parents and a community that understands interdependence. And they spell the word love T-I-M-E.
Inquisitive Scientists look at Learning

In the numerous presentations I make, I remind people that learning is a matter of constructing new concepts by consciously using an original insight to extend or modify an earlier idea. "We never learn anything new absolutely from scratch", I say reiterating Howard Gardner of Harvard, "We are constantly resculpturing ideas that we already have.” However we’re not necessarily very good at doing this. The brain of an unschooled five year old is full of theories of cause and effect that the young child has formed for itself – theories which help the child survive on a day-to-day basis, as Gardner set out in his book ‘The Unschooled Mind’ in 1991. Some of these theories are naïve - in other words they make sense to a five-year-old, but become increasingly inadequate as the child's experience of reality deepens. To a five-year-old it is intuitively correct to believe that lead is heavier than feathers, while an older student with an appreciation of both weight and volume should have upgraded the naïve explanation that satisfied a five-year-old to recognise that a tonne of lead weighs exactly the same as a tonne of feathers. Learning that does not use new insight to correct earlier, imprecise explanations is useless. Yet we all fall into such traps, time and time again; old, unchallenged assumptions get us into great difficulty, because they are so deeply engrained within our minds.

In October 2002 for example, shortly before my first visit to Tanzania, I had been lecturing a group of a hundred deputy heads, all of whose schools had recently jumped through the various hoops set up by government to prove that they were of sufficient quality to become flagship Specialist Schools. They were a good, attentive audience and asked a number of insightful questions. However, later that evening, having already gone on to another conference, one of my colleagues told me that she heard one of the deputies both acknowledging the importance of what I had said, but going on to claim that I must have been wrong “because I remember being told long ago that the brain was simply a blank slate.” My colleague challenged him; “Yes,” he replied, “I suppose if I had thought it through properly I would have sensed that that was what John meant, but he never actually denied that the brain was a blank slate!”

As the quantity of information on almost everything continues to grow at a frightening pace so, almost in desperation, we cling to pictures, metaphors, similes, parables and stories to help us make sense of ideas that are outside our immediate experience but which we surmise
might be significant. In the ancestral environment, right through to the eighteenth century, sense making proceeded at an unhurried pace. New ideas were assimilated and processed as and when they came up. There was plenty of time for reflection. Our generation is faced with a very different situation - we feel that there is so much to be taken notice of that we simply run out of time for reflection. Consequently our minds get filled up with unprocessed material. Conferences of academics exemplify this phenomenon almost better than anything else. The first lecture may, at least in the United States, be at 7.30am and the last one twelve hours later - all interspersed with trade fairs, receptions and dinners. My briefcase becomes ever fuller of papers, and my mind aches with unprocessed ideas. By allowing ourselves to be treated in this way we deny the truth of what we are purporting to teach. The brain is not simply a blank slate, and a conference not just a tool with which to write even more on that slate in progressively finer writing.

In an important article on the psychological foundations of culture,\textsuperscript{13} published in 1992 by the two evolutionary psychologists, John Tooby and Lada Cosmides, we’re challenged to reconsider, from the perspective of the evolutionary nature of the brain, what we actually mean by ‘learning’. For nearly a century, the authors argued, social scientists have believed that ‘sense’ is made by the individual out of the multiplicity of stimulants received by the brain "because the social world inserts organisation in the psychology of the developing individual."	extsuperscript{14} Simply put, this assumed that without the external input of how to structure ideas so as to create useful knowledge, the individual just did not know what to do with ‘all this stuff’. Evolutionary psychology replaces this external view of learning with the belief that what we call learning turns out to be ‘a diverse set of (internal to the individual) processes caused by a series of incredible, intricate, functionally organised cognitive adaptations, implemented in neurological machinery’. In effect, Evolutionary Psychology in 1992 was forestalling what the neurobiologist Gerald Edelman was to tell me in San Diego three years later; namely that the brain is full of innate predispositions ‘to make sense’ of its external environment in ways which, over eons of time (and mainly in the Pleistocene period), have been evolved as good strategies by our ancestors so that we can meaningfully join ideas together. Learning is essentially about making connections for yourself.

In ‘The Blank Slate; the modern denial of human nature’; published in 2002, Steven Pinker extended this argument when he said that the mind had to be built out of specialised parts if it were ever to solve specialised problems, "Only an angel could be a general problem-solver;
we mortals have to make fallible guesses from fragmentary information. Each of our mental modules solves problem by leaps of faith about how well the world works, by making assumptions that are indispensable, but also indefensible - the only defence being that the assumptions worked well enough in the world of our ancestors."\(^{15}\) Our brains, it seems, are adapted to that long-vanished way of life of the hunter / gatherer, not the brand new agricultural and industrial civilisations. They're not wired to cope with anonymous crowds, schooling, written language, police, courts, armies, modern medicine, formal social institutions, high technology, and other new-comers to the human experience."\(^{16}\) Our brains are, as Howard Gardner argued in 1983, equipped with multiple forms of intelligence, each one of which helps us, as it did our countless ancestors, to look at different aspects of a situation.

Steven Pinker has to be one of the most prolific and fascinating writers of recent times; four mighty tomes have come from his keyboard in less than ten years; ‘The Language Instinct’ (1994), ‘How the Mind Works’ (1997), ‘Words and Rules’ (1999) and ‘The Blank Slate’. They amount to nearly two thousand pages of closely argued ideas, describe with a candour that force the reader, time and again, to go back and challenge long-held beliefs about how we once thought things worked. The sheer volume of his scholarship is daunting. He writes, he says disarmingly, for all those who are "curious about the mind" and with the hope "that scholars and general readers might profit from a birds eye view of the mind, and how it enters into human affairs."\(^{17}\) Pinker is essentially a synthesiser, who is able to draw on a vast range of ideas. "There is little difference (from a birds eye view) between a specialist and a thoughtful person,” he writes, “because nowadays we specialists have to be the lay person in most of our disciplines, let alone in neighbouring ones."\(^{18}\)

Pinker asks why it is important to sort out all these ideas and indicates that "the refusal to acknowledge human nature is the equivalent to the Victorian's embarrassment about sex, only worse; it distorts our science and scholarships, our public discourse, and our duty to our day-to-day lives."\(^{19}\) Pinker carefully disentangles the moral and political issues that have confused and obscured scientific findings, and rationally examines who and what we are. "When it comes to explaining human thought and behaviour, the possibility that heredity played any role at all still has the power to shock. To acknowledge human nature, many think, is to endorse racism, sexism, war, greed, genocide, nihilism, reactionary politics and neglect of children and the disadvantaged. The new scientific challenge to the denial of
human nature leaves us with a challenge. If we are not to abandon values such as peace and equality, or our commitment to science and truth, then we must pry these values away from claims about our psychological make-up that are vulnerable to being proven false."20

"Humans behave flexibly", argues Pinker, "because they are programmed; their minds are packed with combinatorial software that can generate an unlimited set of thoughts and behaviours."21 Which is a straightforward explanation of why behaviours change so easily – it sets continually changing variables in conflict. “People are", Pinker affirms, "qualitatively the same, but they differ quantitatively.” In strictly biological terms, therefore, I may be more similar to a Maasai warrior in Tanzania than I am to one of our neighbouring Somerset farmers a couple of miles up the Langridge valley from where I live. Samuel Johnson famously made the point in 1721, but without the evolutionary psychologist’s technical knowledge, when he wrote; "We are all prompted by the same motives, all deceived by the same vanities, all animated by hope, ordered by danger, entangled by desire and suffused by pleasure."22 The abundant evidence that we share a human nature does not mean that the differences among individuals, races or sexes, are also in our nature. Confucius was pretty spot on when he wrote; "Men's natures are alike; it is their habits that carries them far apart."23

It is when Pinker and other evolutionary psychologists turn their attention to how children learn that they show just how essential it is that policy-makers should recognise the true realities of human nature for "the most obvious area in which we confront native way of thinking is in the schoolhouse.”24 Any theory of education has to be based on the most carefully thought through theory of human nature. In the twentieth century, as Pinker argues, the dominant theory of human behaviour was undoubtedly that of the blank slate, as set out by John Locke three hundred years before. "Children come to school empty and have knowledge deposited in them, to be reproduced later in tests (the Savings and Loan model)… Children don't have to go to school to learn to walk, talk, recognise objects, or remember the personalites of their friends, even though these tasks are much harder than reading, adding, or remembering dates in history. They do have to go to school to learn written language, arithmetic and science, because these bodies of knowledge and skills were invented too recently for our species-wide knack for them to have evolved.”25 In other words it’s essential that a quality education should balance thinking with doing. It was the argument I’d made at the Wingspread conference when I said that the present system of education was effectively
'inside out' in its lack of acknowledging the significance of a child’s informal learning experiences.

Our generation is fortunate. We are getting closer to helping men like my grandfather and great-grandfather understand the relationship of nature to nurture. In a book fascinatingly entitled ‘The Scientist in the Crib’, written by three neurobiologists who had recently had their own babies - Gopnik, Meltzofl and Kuhl – they observed; "For human beings nurture is our nature. The capacity for culture is part of our biology."26 It was early in 2003 that the science writer and journalist, Matt Ridley, captured the sense of this new understanding in a title with just three words: ‘Nature via Nurture’.27 In replacing ‘versus’ with ‘via’, he gave a whole new twist to our understanding of humanity and, to me, a new respect for the way in which the subtlety of language can be applied to such good effect. Nature via nurture is the most succinct way yet of describing evolutionary psychology.

"Genes are designed to take their cues from nature.” Ridley writes: “To appreciate what has happened you will have to abandon cherished notions and open your mind, you have to enter a world where your genes are not puppet masters pulling the strings of your behaviour, but are puppets at the mercy of your behaviour; a world where instinct is not the opposite of learning, where environmental influences are sometimes less reversible than genetic ones, and where nature is designed for nurture. The human brain is built for nurture.”28

Experience is what counts. This, of all recent books, is the one I believe would most repay close study by all those interested in just how we humans become the people we are. Ridley argues that the brain is grown, rather than assembled. This is an important distinction. The genes of animals with smaller brains simply stop the growing action at a certain point, while animals with larger brains, like us, have genes that stop the same growing action at a later point. This applies to both the brain and other parts of the body. “A chimp has a different head from a human being not because it has a different blueprint of a head, but because it grows the jaws for longer and the cranium for less time than does the human being. The difference is all in the timing”.29 The significance of timing is enormous. It's an issue taken up by Clive Bromhall in his book ‘The Eternal Child’30 published just a few month's after Ridley. Bromhall argues that the achievement of the human species is that we have survived simply because we have learnt to slow down some aspects of our development. By doing this it has enabled us to retain into adult life many of the features normally associated with youth
- energy, imagination, risk-taking and playfulness. In other words – we can have old heads on young shoulders essentially because the environment can slow down the impact of one set of genes (in this case those of the body) while other genes are, as it were, turned up (in this case those of the brain); it’s a controversial, if intriguing, explanation.

Bromhall goes on to say; "The startling new truth that has emerged from the human genome - that animals evolve by adjusting the thermostats on the front of genes, enabling them to grow different parts of their bodies for longer - has profound implications for the nature/nurture debate. Imagine the possibilities in a system of this kind. You can turn up the expression of one gene, the product of which turns up the expression of another, which suppresses the expression of the third, and so on. And right in the middle of this little network, you can throw the effect of experience. Something external - education, food, a fight or unrequited love - can influence any one of the thermostats. Suddenly nurture can start to express itself through nature."31
Am I just thick…?

The question of intelligence fascinates all of us "Am I just thick?" asked the eleven-year-old girl a day after I’d spoken to her and one hundred and fifty other eleven to thirteen-year-olds at the Yokohama International School in Japan, "or is it that I'm only bright at the things that really interest me?" Her friends grinned; "She's very good at annoying the boys", said one of them. "Does my brain get better through use though?" asked a third and, quick as a light "What sort of use?" asked a fourth. "It's not fair if I'm not helped to use my brain properly, because that means I'll never do as well as those who understand themselves better!"

Ridley's findings on the nature of intelligence, drawn largely from studies on twins, converged nicely with the work of David Perkins, the co-director of Project Zero at Harvard, explored in his fascinating book ‘Outsmarting IQ; the emerging science of learnable intelligence’. 32 I tried to explain the distinction Gardner makes about different kinds of intelligence to those inquisitive eleven to thirteen-year-old girls. It seems, from this research, I explained, that about half of what we normally describe as being ‘intelligence behaviour’ has its origins in genetic factors. Quite simply some people are born with a Rolls Royce of a brain, and others with a clapped out old Cadillac. The face of the girl who first asked the question fell; "That's me!" she said, obviously tempted to walk away.

"Hold on", I said, "That's only half the story. A quarter of what we mean by intelligence relates to being intelligent in a particular kind of environment. You girls", and here I picked my words carefully, "are very comfortable in this environment. You know your way around very well. You're feeding your brains with a lot of stimulation. That helps your brain to grow quickly. Someone born with a great deal of genetic inheritance living in a non-stimulating environment will not grow her brain as well as any one of you can, even if you don't start with the same advantage. It’s stimulation that matters so much. Then there is a third component; about a quarter of what we mean by intelligence actually relates to how well you think about things. David Perkins calls this reflective intelligence. It's all about asking good questions. It's the way you five girls started to ask me questions this morning more than a day after I had talked to you about this. It's about using your theoretical and your practical knowledge. It's about finding your way around. It’s about being inquisitive. Our brains grow through asking good questions.”
Perkins once told me a story that makes this point well. He and his new wife had just moved into a tiny apartment at the top of a long, twisting staircase. They had very little furniture but decided to spend most of their limited funds on a big, comfortable sofa. They got it to the bottom of the winding stairs and it got jammed there - right at the very bottom. They tried again and again, and it remained stuck. They were beside themselves with frustration. Then a couple of great big burly removal men walked by on their way home at the end of the day, they saw the problem and offered to come in. They looked at the stairs, looked at the sofa, smiled and picked it up and walked backwards. They then turned the sofa upside down and approached the staircase from the other side. That enabled them to pass it up through the first part of the staircase. For the next level they turned the sofa on its end and thereby reached the second level. At that point they turned the sofa the right way up and got it up to the top of the staircase. In other words they thought about the problem in a very different way.

"That, David told me", I said to the girls, "is what reflective intelligence is all about. Seeing things from a broader perspective than just listening to a lecture. That is what each of you can do if you learn to think of issues imaginatively. The person who can do this gets far further than someone with all the genetic bonus points." Those girls were fascinated. Who knows where that conversation which took place in a park in the middle of Yokohama would take them in years to come? "What do you know about William Wordsworth?" I asked them. It seemed they knew quite a lot, and more than just about the daffodils. "He’s one of the most famous English poets" said the first girl. "Correct", I said, "But he almost failed when he went to Cambridge University, and got only the lowest class of degree." There were smiles all around. This was the kind of open-ended discussion that youngsters of that age really enjoy. "Weren't you just going off for some coffee?" the first girl asked. I nodded. "We'll all come with you", she said, looking at her friends. Pausing slightly at such a Pied Piper-like situation, I made a weak excuse of having some work to do. I'm sure they would have talked for ages about a topic we normally think is essentially a matter for graduate or post-graduate dissertation.

If I'd been giving a lecture rather than just chatting to those girls I might have gone on to quote Ridley again; "The surprise hidden in the average figures (about intelligence) is that the influence of genes increases and the influence of the shared environment gradually disappears with age. The older you grow, the less your family background predicts your IQ and the better your genes predict it. By adulthood, intelligence is like personality: mostly inherited,
partly influenced by factors unique to the individual, and very little affected by the family you grow up in." 33 What this seems to reflect is that much of the intellectual experience of a child is generated by others. An adult, by contrast, generates his own intellectual challenges. The environment is not some inflexible and unreal thing: it is actually identified by the observer, and given an identity by that person’s perception of what it is. “Having a certain set of genes predisposes a person to experience a situation in a certain kind of way. Having sporty genes makes you want to practice sport; having intellectual genes makes you seek out intellectual activities. The genes are the agents of nurture.” 34

Ridley makes a further, and very important, point when he says that, “Genes are likely to be affecting appetite more than attitude. They do not make you intelligent; they make you more likely to enjoy learning.” It is not so much when stimulus and rewards come together that learning occurs, but when the individual notes a discrepancy between what they observe, and what they expect to observe. It is then that the individual has to rethink an assumption in the light of changing experience; that is when learning occurs. “The environment acts as a multiplier of small genetic differences, pushing sporty children towards the sports that reward them, and pushing bright children towards the book that rewards them.” 35

Those young teenagers in Japan were like teenagers everywhere; inquisitive, excited, moody, confused, and full of short-term enthusiasms. Later that morning in Yokohama I spoke to Neil Richards, the head of the International School, and responsible for promoting the International Baccalaureate in Japan. “It seems to me,” said Neil, “that the topics which you are bringing up should be absolutely at the core of the school curriculum. These are issues that not only help youngsters understand themselves better (which means they are fascinated by them) but it would also give them the framework to join so much of what they have to study together. It seems that schools should work to show how themes such as the Origin of Man, the Functioning of the Brain, and the whole issue of purpose, values and spirituality should be constantly recurring themes within the curriculum. Schools with such a focus would appear to be more relevant to youngsters lives, as well as to the context within which they live them – what a difference this would make to the approach to learning!”

In a study on adolescence made in 2000, the Chicago psychoanalyst Mihaly Csikszentmihaly wrote; "Teenagers are maddeningly self-centred, yet capable of impressive feats of altruism; their unpredictability, their shifting from black and white and from hot and cold, is what
adolescence is all about. Whether these adolescents will grow up to be confident and productive adults is to be found in how they experience opportunities on a day-to-day basis.\textsuperscript{36} Worryingly, the opportunities for such intergenerational experience seem to be in decline everywhere. It is said that American small towns were far more community conscious before the invention of air conditioning than subsequently, for with no air conditioning everyone used to sit on their front porches on rocking chairs, fanning themselves in the cool of a summer's evening and talking to their neighbours. Air conditioning was wonderful, so wonderful that everyone moved indoors and kept the windows tightly shut, and didn't talk to anyone. So self-contained did each home then become that they never even noticed the strangers on the streets. Nowadays a sense of collective insecurity permeates entire communities as people move from air-conditioned car to air-conditioned home, and everybody fears a stranger. Children are, by far and away, the biggest losers in such communities, for parents effectively keep them shut in.

In his book ‘\textit{Bowling Alone}\textsuperscript{37}, Robert Putnam has studied this phenomenon more closely than others. He is largely responsible for introducing the concept of social capital: the sum of all the little things that, on a day-to-day basis, make life more pleasant, reassuring and, in a word, ‘comfortable’. As such he is a frequent visitor to those politicians, including Prime Ministers such as Tony Blair and Bertie Ahern in Ireland, who are concerned that the collapse of community is impeding governments’ ability to provide social support for all. It is an expression that Putnam attributes to L.J. Hanifan,\textsuperscript{38} who was at that time in the 1920s the State Supervisor for Rural Schools in Western Virginia. Hanifan put it very nicely, more than eighty years ago; social capital is "those tangible substances that count for most in the daily lives of people: namely goodwill, fellowship, sympathy, and social intercourse amongst the individuals and families who make up the social unit; the individual is helpless socially if left to himself. If he comes into contact with his neighbour, and they with other neighbours, there will be an accumulation of social capital, which may immediately satisfy his social needs which bears a social potentiality sufficient to the substantial improvement in living conditions in the whole community."

It is the absence of this generalised reciprocity’ which often makes life for today’s young people now so difficult. The adult world just seems too busy to think beyond its immediate needs in a way our ancestors did: "I don't need that patch of ground behind my garage, so why don't your kids use it to make some money growing tomatoes, or whatever, and in
exchange you could do my tax returns for me every year." It's about creating such little
niches of opportunity for things that never show up on either the national or individual's
balance sheet. These are the opportunities that youngsters desperately need. I had it from old
McFadgen, who taught me to carve, and from Mr Roast, who taught me how to rebuild a
Tudor house. ‘Children need communities, Communities need children’, I entitled an article
published some years ago in an American journal.\footnote{39} It's a simple statement, but it's full of
meaning. The energy of youth is, within an integrated community, a marvellous correction to
the rationality of adulthood. Social capital takes a long time – many generations – to build up,
but it can be destroyed extremely quickly.

\textbf{The Industrial Legacy – Learned Helplessness}

It was a winter's afternoon in what used to be called the Black Country, that part of the West
Midlands where owners of coalmines, canals, blast furnaces, steel rolling mills once became
fabulously rich, and where hundreds of thousands of working people laboured until the day
they died. Heavy industry ‘limped on’ right up to the 1970s but, when competition from
overseas markets became too intense, the smokestacks fell, the fires went out, and working
men and women found themselves equipped with only redundant skills and the legacy of an
education system which for seven or eight generations had inculcated an attitude, of what I
was told that evening by a local headteacher was ‘learned helplessness’. That woman’s
analysis was perceptive. Industrial management had, for generations, denied ordinary
working people any sense of responsibility for their own actions. Parents had not thought it
worth encouraging their children to do anything other than accept the way things were.
Primary schools were the first point of contact where the experience of institutional learning
first hit a collapsing society. The schools faced an uphill struggle with insufficient resources,
and it had been like this for generations. As inadequately prepared youngsters went into
secondary schools, so the secondary teachers blamed the primary schools for what they could
never have achieved. Local education officers, under pressure from central government,
responded by becoming ever more prescriptive. “With ever more instructions to perform in a
prescribed standard way, our teachers are now becoming subject to ‘learned helplessness’.
So, you are quite right John to remind us that all quality learning, is in effect, ‘messy’; only
simple memorisation tasks are linear, most learning of any substance is a matter of joining
many different ideas together in many different formats. Unless government honours this reality we will continue to lose heart as we push children against the grain of their brains.”

As it happened I had to fly to Bratislava in Slovakia that evening, to address a gathering of independent policy centres funded by the financier, George Soros, to develop curriculums in ex-Communist countries that would help young people to think things out for themselves. “That is very difficult for us in Poland,” said one, “for under Communism we were never expected to encourage children to think for themselves. In fact, we teachers weren’t allowed to do so. Most of us still live in a culture of ‘learned helplessness.’”

"That is only a mild description of the problem I would encounter in my area” said a young, Omar Sherrif looking intellectual from one of the former Russian autonomous republics. “What you are recommending would have me branded, even now, as a dangerous revolutionary, if not a traitor! Our people have been taught to wait for orders, and then to do things in a regulated way. The idea that learning is messy and individual simply undermines the confidence of bureaucrats.” Therein lies the heart of the problem. Writers, politicians and bureaucrats find it easy to exhort people to move away from an old top-down, hierarchical set of structures that they attribute to the industrial age. What they are reluctant to accept, however, is that the more open world we seem to be moving into is a world where individuals have to be given the space to work things out for themselves. However much such commentators may seek to deny this, administrators just don’t like trusting other people to work things out for themselves; in a sense it’s easy to understand – learned helplessness gives administrators a job to do, which they would quickly lose if people can work things out for themselves. It really is as simple as that.

It's not easy to describe how the brain functions. Sometimes I describe its scale in terms of the numbers of its neurons or synapses, or in terms of its plasticity as well as its neural pruning. I describe innate predispositions as if they are D.I.Y. books waiting to be pulled off the shelf. I describe the wonder of the innumerable connections - both formal and random - that it makes, and I tell of its ability to think laterally as well as the ease with which it falls back into outdated assumptions. It doesn't work like a linear computer, and it creates itself through use. I describe such learning as being self-organised, spontaneous, and endlessly flexible, defying any clear description of purpose. All this can easily confuse my audiences,
who may find the words attractive enough to give me a good ovation, but then find that I have left them with no easy alternative model on which to develop their ideas.

I get impatient with statisticians and their claim that, eventually, they will find a way of measuring everything and correlating every possible variant. I annoyed a professor at that meeting in Bratislava; he came from the University of Vilnius in Lithuania, and his faith in numbers was as great as my disbelief. But he granted me one point. So far statisticians have made little progress in relating the formal to the informal experiences of learning. "Just to say that Bulgarian students get better results in physics tests than the Danes is to totally miss the point, if the average Bulgarian is so disenchanted with the subject that he destroys all his books immediately the exam is over, while the Dane is sufficiently interested in the subject that he spends his own money in years to come buying journals, and eventually decides to become a physicist. I agree with you that learning is messy, but how do you quantify that?"
Flying back from Vienna the following morning I was too tired to read, but not tired enough to sleep. As I sipped a glass of excellent Hungarian wine I knew that an image was forming in my mind - an image that, to me at any rate, said almost everything that needed to be said about human learning. It was rooted in my own experience of the past four years, a time in which I was constantly trying to balance my time between the affairs of the Initiative, and that of renovating our house – a continuous reminder of the need for balance between thinking and doing. There is not a corner of the house that I don't know, nor any space that does not hold a separate emotion, nor a building task that doesn’t remind me of either packing for an overseas trip, an incident that I was trying to describe for this book, a set of negotiations for a training programme, or the weekly struggle to reserve enough time for the family to be together. Only I know where I botched a job, left off an undercoat, or put in too much plaster. I know in which places I was feeling good about things, and where I was frustrated. As the heating system comes on early in the morning I sense the hot water coursing through the pipes, restricted or unrestricted by the thermostatic valves, each of which is individually responding to the ambient temperature. In Autumn I think of the places on the roof in which leaves can gather and block a down pipe, and in Winter I know where to look for frozen pipes. There is an old expression; "We design our houses, and our houses then shape our behaviours". That has to be very true, both literally and metaphorically for our brains ‘process’ our thoughts through the sum of all our previous experiences.

This house has become an outward manifestation of how my mind works. I know the moods of the different rooms, and I know how differently the house reacts to a summer's day, or a winter's night. So, when I first started to write this book, I moved out of my study with its insistent telephone, fax and computer screen to a table in front of one of the enormous windows in our bedroom, a window facing due south that catches lots of sunshine. Here I could write easily, with the inspirations of the view, the sense of history, and the constantly shifting mood of the sky. Here my mind could race, and the words flowed. Then, months later, I knew I had to take a much more systematic approach and underpin my free writing with a careful selection of significant facts and the construction of a disciplined framework if I were to hold my audience's attention. Broad skies had to be replaced by an inner sanctum, a place I could trust but which had few regular distractions. A different corner of my mind. So I retreated to the panelled dining room in the semi-basement, a room with an enormous table.
and adjacent to the comfortable smells of baking and brewing coffee coming from the
kitchen, but far away from the executive function of the study, with its daily load of addictive
trivia. To my wife's distress I've colonised this space for months now to the exclusion of all
else. Clusters of books, piled ten or twelve high relating to different ideas almost over topple
the table. Papers, newspaper cuttings, copies of emails, of letters and technical reports have
proliferated onto side tables and so too has a crop of blue, yellow and pink post-it notes
sprouted from all kinds of inexplicable places. A draft of one chapter hides comments on
another, and carefully annotated emails remind me of revisions still to make. Trivia gets
mixed up with all this - letters from friends, biscuit paper wrappers, dried up pens, old
newspapers, photos and empty coffee cups.

I'm sure you’ve picked up on the analogy. My opening stream of consciousness took place in
that part of my brain much influenced by external factors - by the sky and the clouds, the
constant movement of people, and the sound of children in the school next door. This is the
generalised, big picture, synthesising aspects of my brain. But my brain needed another
perspective. I knew I had to build other kinds of connections much deeper within my
consciousness. Connections at a more systematic, more abstract level, disciplined and
uncluttered by the inspiration of the broad view. I needed to let my mind float away and hear
the voices from long ago of John Milton and William Lovett, Robert Morant, R.A. Butler and
Robert Ascham, not just the very public statements they made, but some of their more private
recollections which can tell us so much about why they held the particular views, (such as
Florence Nightingale’s comment of the young Robert Morant when she interviewed him for
the post in Siam, that he would have a great future providing “he does not always strain at his
tether in doing over much work.”). I had to scan endless tables of statistics, and follow the
arguments of scientists working in disciplines never alluded to when I was a student at
university. That was when I retreated into the dining room.

My youngest son, Tom, a young man not renowned for any sense of tidiness or order, looked
in the other day and for a moment stood, apparently incredulous at the chaos that surrounded
me. For indeed it must have seemed vastly messy to anybody other than myself. Yet to me it
represents an ordered confusion of innumerable interconnecting possibilities; ideas in one
paper, lead to a cross reference to another, to an experience encountered on a particular trip,
and the emergence of a valid generalisation. I think in pictorial terms of connections that I
can scarcely describe in words.
As long as no one tries to tidy all this up, I feel safe. The significance of this muddle lies in the position of each pile, and its relation to the others. Weeks ago even I began to despair of its creeping nature, and foolishly I tried to tidy it up. It was the worst thing I could have done, for instantly I lost a mass of possibilities. For days I could not find what I was looking for, and even more important, the connections I was trying to make were lost. The room with the beautiful view, the study with its executive function, and the apparent messiness of the dining room are all external manifestations of the very structure of my brain. I guess that many of you will already be envisaging your own thought processes in the same way. The glory of our mental powers is that their strength lies in just that self-designed messiness, the hidden connections which Vaclav Havel defined as the essence of education.

To complete my analogy, of course the greater part of my life is lived outside the house and its specialised functions. Conferences are important to me for all the people I meet, and the perceptive questions I am asked and struggle hard (and not always successfully) to answer. It’s richer because, as a family, we enjoy each other’s interests and share good and bad times together. When I’m too tired to string together another sentence I retreat to the workshop and find a different kind of challenge in shaping a piece of wood, and great anticipation in the aroma of brewing coffee! When I awake in the morning I need a jog along the canal to freshen me up for another day at the writing table. These are not luxuries, for it is when I am most relaxed that more often than not, I get the inspiration for the next piece of writing, or find a phrase that better describes what was the previous evening a dull, colourless sentence. Our brains, yours and mine, exist in the world at large and certainly not just within our heads.

How we grow our minds when young conditions the range of faculties we create in our brain to deal with ever changing circumstances. Everything, it seems to me, that is emerging from research on the brain would suggest that we are a species with virtually unlimited intellectual potential if, that is, we appreciate the nature of the brain. We have been enormously empowered by our Stone Age ancestors, but with that empowerment also comes a number of constraints. We can get it all dreadfully wrong if education is driven simply by the needs of short-term expediency. Unless we are careful we could use all our newfound understandings to create battery hens, rather than free range chickens. That’s what makes a proper consideration of these issues so urgent.