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HUMAN GIVENS

The new approach to emotional health and clear thinking

Joe Griffin and Ivan Tyrrell

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Foreword

IT IS A general rule in medicine that, when there are a number of different theories purporting to explain a condition, one can be certain that all of them are wrong, though each may have certain facts right. There are over four hundred different models of psychotherapy in the West today, with the proponents of each model competing with the others and laying claim to primacy. How is it possible to have so many different models when there is general agreement about how the brain works? Can you imagine having four hundred different schools of physics or mathematics? By dint of clear thinking, Joe Griffin and Ivan Tyrrell lead us out of this muddle. They have assembled verifiable scientific information on how the brain works, including important original work of their own, and created a new organizing idea – the human givens approach – that has the potential to transform the practice of psychiatry, psychotherapy and counselling. Although my interest is in psychiatry and psychotherapy, it is obvious to me that this big idea also has great relevance to other important areas of life, such as education, social work and personal relationships. Some of the information in this book will be new and startling to many, some, at first glance, will appear familiar. But Griffin and Tyrrell's assembly of it is unique in that the bits and pieces that stick out in other therapy models now fit together, and this fit is both aesthetically pleasing and of immense practical use.

For example, they succeed in making reading about depression exciting! This common, rapidly rising condition is costing Western society enormous pain; emotional and financial. It is also a major cause of premature death through suicide. Depressed mood, loss of interest and enjoyment, fatigue, poor concentration, guilt, suicidal thoughts, and disturbed sleep and appetite, are generally agreed criteria used to diagnose depression. Often a person with depression will complain of early morning wakening, with depressed mood and tiredness worst at that time. To overcome the fatigue he or she may try to sleep longer than usual but the tiredness persists. We also know that depressed people spend a greater proportion of sleep time in the REM (rapid eye movement) state, that artificially shortening the REM

periods leads to a temporary lifting of the depression, and that antidepressants, when effective, shorten the REM sleep time.

Griffin and Tyrrell link these findings in a way that makes sense of the facts and provides the basis for rational treatment which could save millions of pounds. The story begins with Griffin's findings from his research into dreams and REM sleep and makes a convincing case for the central importance of REM sleep in depression. A trigger or **A**ctivating agent (which may be a divorce, death, unemployment and so on) sends the brain on a search for similar **P**atterns (previous negative events) setting off a train of introspection which gives rise to the **E**motion of depression with resultant **T**houghts (such as "I am useless", "nothing ever goes right for me") that the depressed person gets locked into seeing as absolute truth. The prolonged REM sleep periods are attempts to deactivate this highly arousing chain of introspection, explaining the early morning wakening (in the more severely depressed) as a mechanism to limit the exhaustion caused by the intense REM activity.

If, when depressed, we are locked into ruminating on all that has gone wrong in our lives, it makes sense that treatment should aim at reversing this deepening spiral. Griffin and Tyrrell explain how the REM state can be accessed to lift the trance of depression quickly using inborn biological mechanisms. Their insight into depression makes sense of the unfortunate, but not uncommon, occurrence that will be familiar to many psychiatrists. Often a patient with depression is admitted to hospital or seen in a clinic, and put on antidepression medicine, but found to be even more depressed a few days or weeks later. Many such patients are often encouraged, by well-meaning staff, including counsellors and therapists, to "talk about their problems". In the light of the findings presented in this book, however, talking about problems and past failures can be seen to simply grind in a guilt-ridden, worthless, useless and unlovable self-narrative as 'the truth' from the patient's locked-in perspective.

In contrast to insight and 'getting to the root' therapies, cognitive and behavioural methods have been shown to be effective for depression. We can now see that this is because they engage the cognitive or motor circuits of the brain, thus allowing the locked-in, highly aroused emotional brain to calm down, so enabling the patient to see

alternative truths, possibilities and stories for his or her predicament. In addition to pointing out the erroneous assumption that thought precedes emotion, which forms the basis of the cognitive behaviour therapy model, the APET frame, which they introduce here, provides a much broader perspective. Just as significant, perhaps, as the introduction of the Arabic numerical system with its zero digit was to mathematics, providing as it did a much wider vista than the Roman number system (I–X).

People love stories and this book is illuminated with a number of these, including those known as case histories. Case histories, stories, metaphors, pictures and jokes make things much clearer than a linear argument. Imagine describing a rose to someone who has never seen one and then asking him to identify one at a florist's. But show him even a sketch (i.e. a pattern) of a rose and from then on he will recognize one regardless of the variety. Griffin and Tyrrell explain that we 'see' the world through such patterns, and run into problems when we use the wrong pattern to make sense of our predicaments.

Perception through pattern matching is of crucial importance in the development of post traumatic stress disorder (PTSD) and phobias. In both, the **A**ctivating agent (the trauma or phobic stimulus) is of such moment that it imbues a **P**attern into the fast brain pathway (the limbic system) so that future experiences with even a fragment of that pattern evoke the terror (**E**motion) of the original encounter. Again Griffin and Tyrrell explain how this can be reversed by accessing the REM state, with resolution of symptoms often in one or two sessions.

Another fascinating topic covered, and one of the human givens, is the attention factor. 'Attention-seeking' and 'manipulative' are often used pejorative descriptions of patients and clients, but if the importance of both giving and receiving attention as a normal human need was more widely recognized, the health systems of the world would be freed of an enormous burden. The 'thick notes (or thick chart) syndrome' is no doubt familiar to many hospital doctors: a patient is passed from one specialist to another with each doctor doing a set of investigations and often surgery to remove various organs, but the patient keeps coming back again and again! If their attention needs were met effectively in other ways these particular patients would not need to fulfil them through the ritual of history, examination, investi-

gation, medication and surgery. On the flip side, if doctors and therapists were more aware of the attention factor, they would be better prepared for avoiding the trap of prolonging treatment in order to have their own attention needs met through their patients. As Griffin and Tyrrell relate, the evidence for the importance of the attention factor includes a shocking, ancient, but relatively unknown, experiment carried out by a European emperor.

And there are yet more treasures in this remarkable book including: why trance (focused attention) is a normal frequent everyday occurrence, during which suggestibility is heightened, and its role both in helping (the placebo effect, the transmission of culture and its morals) and harming (the nocebo effect, indoctrination); the conceptualization of schizophrenia as waking reality processed through the dreaming brain; why autism may be the result of the genetic absence of mammalian templates; why unbridled anger makes you stupid and shortens your life; the therapeutic usefulness of seeing addictions as attempts to meet basic human needs; and why avoiding greed and helping others is good for your health.

The authors have put in a lot of work to show how knowledge of the way the brain works (gathered from a panorama of psychology, psychiatry, sociology, anthropology and neuroscience), can be used to help the distressed humanely. This book should be essential reading for all psychiatrists, psychologists, therapists and counsellors. For the general public, this knowledge is vital if they are to protect themselves, friends and relatives from the chicanery, often unwitting, which passes for much that is called counselling and psychotherapy.

This book is a remarkable achievement that should attract the attention of any truly curious human being.

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PART ONE

New Discoveries About Human Nature

PROLOGUE

Why we need to understand healthy minds

IT TOOK millions of years for the human mind to evolve to the point where we have the knowledge to direct our own development. We have reached a watershed. Exciting discoveries about how the mind/body system works show how human nature can unfold to create effective and fulfilled individuals. What will we do with this knowledge?

Science has discovered that nature endows each healthy human conception with a wonderful array of living 'templates' – an infinitely rich treasure-house of incomplete patterns that instinctively seek completion in the environment from the moment of birth, and that continue to do so as we grow and evolve throughout our lives. These patterns are expressed as physical and emotional needs and are in a state of continuous ebb and flow. If we are fortunate, and are born into a culture and environment that provides us with the means to get those needs met, we develop well. It is precisely the way needs are met, by the impact life has on them, that determines the individual nature, character and mental health of each person. Studying these innate patterns, and charting their unfolding, is the new science of human nature, which is what this book is about.

Only by co-operating with these natural processes – the human givens – can children be educated and matured into independent, fully integrated and fulfilled adults. And, when things go wrong and people lose their way, only by working in alignment with the human givens can other people help them overcome emotional problems such as depression, anxiety, addictions, anger disorders and psychotic breakdowns.

And perhaps it is only by understanding these natural processes and overcoming the disadvantages we are also heir to – such as greed, vanity and the ease with which we can be conditioned – that we will evolve further.

CHAPTER ONE

Seeking completion

WE SHARE in common with all living organisms – including plants and the most humble, single-celled, protozoan creature – the fact that we have an 'inner nature', which we have biologically inherited, that is always seeking the right environmental stimuli to unfold properly. This truth is easily seen when we study other living things but is harder to grasp in ourselves because we are so wrapped up in the process every moment of our lives.

Every microclimate supports plants that cannot live elsewhere. The warmth and humidity of tropical South American jungles, for example, support over 8,200 orchid species, each with its own special requirements: the right soil conditions, nutriment, temperature, light and pollinating potential. The more unusual the microclimate, the more rare and exotic the plant.[1] The more common the plant, the less complex its environmental needs and the more resilient it is. Any gardener who sees that a plant is not flourishing will recognize immediately that a deficiency in the environment – too little or too much water, for example – is preventing healthy growth, or that the plant has a disease compromising its biological integrity.

At a basic level, all organisms seek nourishment to renew themselves and then give waste material back to the environment to be recycled again and again. Oxygen, the waste gas of plant life, for example, becomes an energy source for animal life.

If we look at human beings in the same way as a gardener studies plants, we can ask: what physical, psychological and social nutriment does this creature need for the successful bringing to fruition of its innate nature? We can also look for what might be preventing these inner templates from connecting to the greater world. But a person is not a plant and we need not just material but also mental, emotional and, some would say, spiritual nourishment if we are to flourish. And,

while plants 'know' how to grow, children and adults need structured guidance to optimise their own self development.

The need for meaning

An important human given, the need for meaning, is driving us to write this book. This ancient natural human desire, the quest to understand, originally grew out of primitive creatures' evolving ability to move independently. Indeed, movement is fundamental to the very existence of brains, which developed primarily to control movement, to predict the outcome of movement and remember the result of past movements. Plants, by contrast, never evolved brains since they did not need to do this. (There is a tiny marine creature called the sea squirt, which, in the earlier part of its life, swims around like a tadpole. It has a brain and a nerve cord to control its movements. But, when it matures, it attaches itself to a rock and stays in one place like a plant. Thereupon it digests its own brain and nerve cord because it no longer has a use for them.[2])

The mental faculty for controlling movement is crucial to daily life. It is involved in conceiving an idea about what to do, planning a response and then carrying it out. (Literally, when we think about getting a book down from a shelf, our brains mentally simulate the movement.) So important is it that the primary motor cortex and the premotor cortex are both located in the frontal lobes, one of the most advanced parts of the brain, which determines not only where we direct our attention but also the relationship between short-term working memory and long-term memory.

It also appears to direct consciousness itself, which is why the frontal lobes have been termed the 'executive' function of the brain.[3] Movement and meaning are inextricably linked.

The contemporary search for meaning is infinitely more sophisticated than that of our primitive ancestors like the sea squirt. It now extends multi-dimensionally to the edge of the known universe and down to the sub-atomic level – even beyond space and time. For 35,000 years, since the beginning of cave art in the cultural explosion of the Upper Palaeolithic period, the search for meaning beyond day-to-day survival was spearheaded by remarkable individuals and groups who passed their knowledge on down through the ages.

Initially, through pre-gnostic ('pre-knowing') shamanistic traditions where sticks, stones and animals were worshipped, they explored both human nature and the reality around them, and they expressed and taught their findings through a framework that today is often called 'spiritual': a fluid mix of excitatory practices, beliefs, rituals and experiences all involved in achieving and using altered states of consciousness.[4] Freed as we are from the historical and ideological framework of those times, it is clear that these 'spiritual' researchers were on an evolutionary quest, investigating how to unfold our inner nature more effectively and, in the process, unlock the secrets of outer nature. This effort eventually resulted in the evolution of gnostic ('knowing') traditions. In essence, their *spiritual* quest was a *scientific* quest to understand more of reality by refining their perceptual apparatus in order to see more clearly into the heart of nature. The gnostic teachers among them, who always stood outside the ideologies of their time, always contended that within each human being there is the potential for a far richer personality, or perception. If this inner perception is to develop, it must first be conceived of as a possibility.[5] Its basis, therefore, must rest, in part, on refined imagination.

A person needs preparation (in other words, appropriate environmental input) in order to attain more intelligent perception. And an essential part of the preparation involves a calming down or diminishing of aspects of personality, which hinder, or even destroy, the possibilities of refined perception. These include traits such as vanity, greed, self-obsession, etc. People driven by obsessions, for example, are unable to stand back and see beyond them. Likewise, people who are ruled by emotions cannot make progress, because strong emotions overwhelm finer perceptions, just as raucous shouting drowns out a gentle whisper.[6]

History shows that 'spiritual' knowledge, wherever it has appeared publicly, is quickly polluted by the greed in the world; the teachings of wiser people inevitably degenerate into dogma-driven cults, fossilize and become self-perpetuating power structures. Wars are fought, people are indoctrinated and ignorance is entrenched, causing terrible havoc around the world.[7] (Cult formation is not limited to extreme religious groups. It can be found in political parties, within academia, the arts, scientific laboratories, and business – in fact in any situation where

people meet regularly, emotions are raised and charismatic personalities exert influence for their own ends.[8])

But the essential pattern of this ancient knowledge about human development is perfectly echoed by, and in tune with, the findings of modern science about not only the physical universe but human development at all levels. Neurobiology, psychology and sociology all show that there are inner patterns of perception that seek to connect with the greater world and, when they do, allow for greater refinement and progress as human beings. And it is clear that, when these developmental processes are blocked, we cannot move on.

For example, we cannot be mentally healthy if we are isolated. In her article, "What it feels like to be a child with no friends", Celia Brayfield wrote in the *Sunday Times*[9] about the effect of being brought up by a reclusive mother: "Friend was a word I didn't know when I went to primary school. We didn't do friends in our family. An old, dark leylandii hedge ended our garden and behind it we lived in complete isolation. My mother was content but I was suffocating with loneliness. When I got to school nobody wanted to play with me and quite a lot of children wanted to beat me up."

Little Celia drifted unhappily around, thinking, "I want to be your friend but I don't know how," and "… wondering why the other children were being so horrible. When people pick on you, you feel you must deserve it. I didn't know the rules and I certainly didn't know any of the songs or rhymes or skipping games a girl needs if she's going to be a social success in the playground.

"With no friends, I was also an easy victim for the bullies," she said. "On top of the normal day-to-day punching and kicking, the ringleader once threw me face first down a flight of stairs."

The article was inspired by a report that had just been published on social skills teaching in British primary schools. The report estimated that one primary school child in five has problems related to lack of social skills and poor mental health. It also highlighted the considerable body of research showing that, when small children have emotional difficulties, they can't learn anything.[10] Celia Brayfield wrote, "I was acting that out wonderfully [at school]. Although my mother made sure that I knew my letters and numbers before I started school, I lost them instantly and was soon lagging behind the rest of my class.

The teachers thought I might never learn to read.

"I was saved by a teacher who took me aside in the playground and asked why I wasn't playing with my friends. Miss Potter was few people's favourite, a strict lady with fierce red lipstick, but her heart was surely in the right place. When I answered that I hadn't got any friends, she gave me a lecture on basic social skills. It began, 'To have a friend you must be a friend,' and, although I couldn't have been more than six, I've never forgotten it. Take the initiative, talk to people, smile, be nice and kind, do as you would be done by. It was probably the most useful thing I ever learnt in school.

"I went right out and did what Miss Potter had recommended and very soon had excellent friends."

Despite a successful career, missing the natural window of opportunity to learn essential social skills in the vital first years still left a shadow over her life. "I'm still not sure I'm doing life right," she says. "Often, I feel I'm lurching through relationships like young Frankenstein's monster trying to tap dance. I hear myself talking and my conversation sounds as appropriate as Eliza Doolittle on her outing to Ascot. I envy the dazzling creatures who draw a vast circle of friends around them like moths to a flame and I know I'll never be one of them. But I get by and I hate to think how my life would have worked out if Miss Potter hadn't intervened in it."

This example of what happens when just one need is not adequately met perfectly illustrates the principle behind the human givens approach. Here we see that, if the need to build rapport with others is not supported in the important first few years of life, it affects development and our lives as adults. Without meaningful connections to family, friends or colleagues, it's not easy to move our lives forward. In such circumstances anyone, however intelligent, can become emotionally overwrought, begin to worry excessively and become stuck in the cycle of depression, unless such a lack is resolved.

With this modern needs-focused view of human nature, the old questions about the meaning of life can be put into sharper focus and we can develop a contemporary understanding about them. Just as one human given is that we are social creatures and need connection to a group of people who accept us, so too is it a given that we need meaning. But, just as its roots are in movement, meaning cannot be a

static thing. It must, as in ancient times, be a 'stretching' process that continues to reveal new meanings by refining our perceptions and thus increasing our knowledge. There is always more to learn and understand. It is this stretching process, as our brains continually resculpt through new learning, that makes us such an adaptable species.[11]

We can all feel a sense of flow, meaning and purpose when we challenge ourselves in some way: advancing a project, or developing a sport, skill, craft or art. As we stretch ourselves, something within us is seeking to fulfil an inner need through finding its completion in the environment[12] – a process that might be termed spiritual. Obviously, the challenges people face will vary from person to person. It might be, for a businessman, the process of developing a new business or, for a musician, mastering difficult new music, and, as such, the process will be a spiritual one, because it serves to refine perceptions. And yet an activity that is initially stretching will soon become mechanical if, for instance, the business isn't developed once it is up and running or if the mastered music is simply repeated. To be stretched further, we need to seek new challenges. The brain always needs new challenges to keep it stretched, otherwise neurons (brain cells) start to atrophy. A busy brain is a healthy brain.

Mountaineers, for example, can spend years preparing to do something that to others might seem inherently pointless: to climb the sheer face of a huge mountain, at the top of which the rarefied air is difficult to breathe. Why would they want to do something as uncomfortable and dangerous as that? Well, for them, it is an intensely meaningful experience. They have more bliss in their hearts as a consequence of doing it. That is what draws them to climbing. Life *always* seems more significant when we stretch ourselves, in whatever way, because we are then more connected to reality. Many human drives, such as those for goal seeking, for physical agility, for endurance, for visual accuracy, for teamwork and for status, would find fulfilment in mountaineering, but this would satisfy climbers only for a limited duration. If mountaineering becomes too routine, and the climbers are no longer stretched, it ceases to be a spiritual activity for them because they no longer have to make a conscious effort to achieve mastery of it.

If we feel lonely, anxious, greedy, depressed or angry, there are

clearly aspects of ourselves that are not being stretched. Parts of our nature have not developed properly, preventing the refinement and unfolding of other aspects of ourselves. We cannot develop more refined perceptions without fulfilling more basic human needs and appetites first and in a balanced way – just as alcoholics cannot develop and stretch their capacity for human relationships because of their drunken behaviour.

Pursuing this thinking, we can see that what a large part of this world mistakes for spirituality is nothing more than brainwashing by ideological organizations – from the extreme activities of fundamentalists like the Taliban in parts of Asia today, so reminiscent of the Christian Inquisition in medieval Europe, to the evangelical cults and happy-clappy new age religions that thrive in Western countries by gathering people together in groups to sing and emote. They sincerely believe that the feelings they generate in their practices are related to spirituality, whereas, however enjoyable they may be, they are manifestations of the 'herd instinct', which we share with rats, sheep and wildebeest. Whilst herding does indeed fulfil an inner need (safety in numbers), it is at a very primitive level.

From our point of view, spiritual activity is not simply the mouthing of ritualistic words and phrases and performance of formulaic movements, but the linking of the inner to the outer, the developing, stretching and refinement of human nature to fulfil a higher level of potential. To stop our search for meaning – our spiritual activity – at the level of the herd instinct and attention seeking, which is what seems to happen in many organized religions, is clearly not aiming very high. Perhaps now, with the new science of human nature, we can move beyond brainwashing and mindless repetition of old dogmas to realize that the continuing scientific quest for knowledge and meaning is one expression of contemporary spirituality and perhaps our most important undertaking. (Whether people choose to use or misuse the knowledge that is thus acquired is another issue.)

Nature gives each of us the potential to develop, but we have to be continually challenged to find proper fulfilment. There is a continuum. Getting our basic needs met is at one end, and the unadulterated search for truth, the most profound and difficult form of stretching for us, is at the other. So we can view the ongoing stretching of our

capacities (as our inner templates try to find a match to relate to in the environment) as a developmental process. If this is what the spiritual quest is really about – connecting the inner to the outer – we can see it on a natural continuum, a scale built into the way matter and life has evolved.

The postmodernist fallacy

This idea is, of course, the opposite of the ubiquitous, some would say anarchic, postmodernist views that originated in modern art and design, took root and spread through all aspects of our culture like a virulent infection, and are still rampant today. Postmodernists believe that there are no absolute truths and therefore, because everybody's point of view can be deconstructed, all opinions are of equal value. They promote this with totalitarian ruthlessness, imposing institutionalized political correctness on the rest of us.[13] This may often seem harmless, as when someone can lie in bed all day claiming that this is a work of art simply because they say it is, and financially profit from their 'work'. Such behaviour gives people something silly to talk about. But some postmodernists do much more than exploit the gullible. They go so far as to say that all thought is equally relevant (that there are no boundaries, no rules, no hierarchies, no objective reality and all facts are just 'social constructs'); furthermore, all species are of equal value, and a human being is no more important than an ant. This 'deconstructionalism', as it is termed, is a pseudo-scientific quest for negation.

But the postmodern concept is made redundant because we, *and nature*, can measure. The scaling question to ask is, to what degree does a plant or creature connect up its innate genetic templates to the environment and how complex are those templates, in terms of refinement of its perceptions? Clearly, a bat has access to an echo-sound location template that we do not possess. But, in overall complexity, its templates must be scaled lower than ours. In humans, for example, moral behaviour results from the ability to perceive and act on our shared interdependence and respect for other people's needs. To return to herding for a moment, we can see the herding instinct in a cloud of midges, birds, cows, and other animals; and we can see it, in human beings, in any large gathering such as in football stadiums or churches. While getting together and singing from the same hymn sheet is clearly

a low-grade activity, it is at a higher level than the swarming of midges because a human grouping contains more possibilities for learning, development and change.

There cannot *but* be measurable differences between human beings: some can run faster than others; some are less mathematically ignorant; some have more mechanical aptitude; some have more musical aptitude, etc. Clearly, different templates are differently refined in different people. It is the degree to which a species evolves more refined templates that determines how advanced it is. And, just as there are more highly evolved – adaptable – species, so will there be more highly evolved, adaptable, individual members of a species.

The growing knowledge that there is such a natural scale for gauging not only the development of a species but how individual members are flourishing will, it is to be hoped, consign destructive post-modernist beliefs to curious footnotes of history.

The science of human nature

The ultimate aim of education (the word comes from the Latin *educare*, meaning to draw forth, bring out, develop from a latent condition) is to unfold and refine what is within. In real education (as opposed to conditioning people or training them to pass exams), the way we know that a young person or pupil is progressing is by observing how well he or she is learning to discern subtle distinctions in the meaning of observable phenomena as their perceptions become more refined. The process of successfully matching up inner patterns to the outer world is not experienced as a vague subjective feeling that could just as easily be generated by drugs. It is revealed objectively, in the ability of a person to perceive more of the richness of the patterns by which the world operates and therefore be more effectively engaged in it. This is why it is often said that a truly spiritual person is not a hermit sitting on a mountain contemplating his navel, but someone involved in the world, working, serving others and opposing tyranny of all kinds.

Such an understanding removes the so-called conflict between science and spirituality – which is, in fact, only a conflict between fundamentalism in science and fundamentalism in religion. If spirituality is the search for meaning, the ultimate stretching of human potential, this must be the science of human nature and its unfolding.

Science and spirituality are therefore compatible, something the wisdom traditions down the millennia have always maintained. Once we realize that spirituality is about getting needs met, the complexity of relationships and connecting up patterns of understanding about how the world operates, we can see that it cannot be separated from the search for knowledge. Moreover, when a real understanding is present, it enables the possessor to be more effective in the world.

Approximately 37,000 years ago,[14] human beings became more than intelligent animals just instinctively reacting to promptings from the natural world all around. A great leap forward in human evolution occurred, sometimes called "the brain's big bang": we discovered how to access the dreaming brain, our own reality generator, so we could consciously daydream and use our imaginations, drawing on memories of the past, to visualize possible futures. The most talented individuals and groups who took this step and developed their imaginations quickly learned how to plan more successful hunting trips, solve problems, develop more specialized new tools, empathize and ask abstract questions (complex language, with a past and future tense, cannot develop without imagination), make music and entertain, decorate and clothe themselves, and educate children more efficiently. Some remarkable individuals seem to have elected to teach others, including children (as we know, from preserved footprints), how to access their imaginations by taking them deep into mountain tunnels and caves, sometimes two or three miles underground. Here, far away from the constant noisy distractions of the natural world, they taught them to use their brains in a novel way, to conjure up new thoughts and images. In such quiet subterranean centres, what we can only term 'psychological research' took place, and cave art began. Here were schools[15] for developing outward focused imagination and speeding our ability to learn, directly connect with and understand, in greater depth, the natural world and a sense of invisible powers beyond it. People studied and thought about animal behaviour in new ways until eventually it was possible to domesticate, use and breed many formerly wild creatures. Fellow man also became infinitely more interesting to our ancestors, as, once possessed of imagination, they could not help but be aware that their lives were precarious and difficult, and began to realize that individual survival would be much better assured within social groupings. They could imagine how they

might change their situation and stretch themselves in non-selfish ways for the long-term benefit of all.

About 10,000 years ago, in many regions of the world, we changed from being hunter-gatherers to farmers. Early farmers needed the ability to observe seasonal changes closely over long periods. They had to analyze information, perceive what was needed for a crop to develop its potential as food or medicine, learn how to plan long term and to find solutions to problems that arose, such as how to irrigate dry land and organize the manpower to harvest crops. They also needed a certain philosophical attitude towards the unpredictability of weather, blight and so on, and had to take account of the fact that skills were unevenly distributed in the tribe. Without access to imagination, none of these capacities could have come into being, and the development of farming, and the civilizations that arose as a result of it, would never have taken place.

Adapting to now

We nomadic hunters, farmers, villagers and small-town dwellers have reached the twenty-first century where most of us now live in urban conglomerations of great complexity. The wonderful boon of imagination we were given 35,000 years ago, as well as creating what is great in our culture, has also created an environment that seems out of control. We have the means to magnify our greeds and have made a world that whirls around us so fast, and in such disturbing ways, that we can no longer trust our culture to reliably provide the psychological nourishment for us to develop fully as human beings. When things go wrong and there are power cuts, transport system failures, wars, financial market crashes etc. – individuals feel helpless. The speed of change, and the carelessness with which governments instigate change, explains much of the massive increase in many forms of mental illness. The latest statistics show that half of all people in our culture will suffer from mental illness at some point in their lives and up to 20 per cent of the population is mentally ill at any one time. A fifth of all children are said to be seriously emotionally disturbed. The pressure is building rapidly.

To make another leap forward in our evolution, one every bit as significant as the great leap forward of 35,000 years ago, we urgently need to understand the inner processes that must be properly nourished

for psychologically healthy human beings to mature, and nurture our children accordingly. That will involve a huge shift in perceptions for much of our species. Without such a shift, however, we can see that we are heading towards massive and unsustainable levels of mental illness, leading, perhaps, to our destruction. But human development grows out of necessity, and the pressure this puts on us generates fertile seeds of hope, waiting, hiding in strange places, for the right conditions to bring on the next phase in what will, we hope, be our continuing story.

CHAPTER TWO

Where does human nature come from?

IT IS A TRUISM that we come, as all matter must, from the stars. The basic elements, vast energies and great distances of deepest space that we measure with our sophisticated instruments and try to understand with our science and struggle to grasp in our imaginations, are where our consciousness originally came from. These fundamental physical elements and material processes in the universe may be our evolutionary parent, but to understand human nature we need first to pick up the story closer to home.

The unfolding growth of any living thing – plant or animal – can seem to the unsophisticated mind as if it is powered by some magical unearthly force. It is certainly an infinitely complex process. But we know that it relies on information transcribed from the genes, passed down through the ages. Genes provide the factual basis for the existence of any living thing. They are hereditary blueprints encapsulated in deoxyribonucleic acid (DNA), the chemical composition of which was discovered in 1953 by Watson and Crick.

But how do the genes insert their programmes, particularly for instinctive behaviour, into the brain? The answer, it seems, is that it happens in what is known as the rapid eye movement (REM) state of brain activity and, if you wish to understand how your mind works, there is perhaps no better place to start than by looking at the REM state,* an enormously important human given.

Curiously, it was also in 1953 that the REM state discovery was first

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* In the early days of sleep research, various terms were employed to designate this active stage of sleep. Michel Jouvet, for example, called it paradoxical sleep; other researchers called it dream sleep. But the term REM sleep, although unsatisfactory in that it is only descriptive of one physical phenomenon associated with the state, is now widely used throughout the scientific community to designate it. So we use this term in this book.

published, by the American researchers Aserinsky and Kleitman.[1] They noticed that, for about three-quarters of our sleep, the brain was in a state of comparative rest. This state became known as slow wave sleep, the most recuperative part of any 24-hour period for any mammal, when the body is at its most efficient in fighting off infection and when tissue damage is repaired. But Aserinsky and Kleitman also observed that, for nearly a quarter of all sleep periods, the sleeping person exhibited darting, rapid eye movements behind the closed eyelids. They then soon established that the brain was highly active at this time, using as much energy as when awake. But it was several years before the connection between this state and programming instincts was made.

As we illustrate in this book, many mysteries of human psychology and mental health have been solved through studying the implications of the information that scientists painstakingly gathered as a result of Aserinsky and Kleitman's discovery. We now know, for example, why we evolved to dream; what dreaming is doing for us each night; why depressed people wake up exhausted (and how they get depressed in the first place); how the brain can become traumatized; how the brain learns; why we are so easy to condition, brainwash and manipulate; what psychosis is; how and why exchanging attention is so important; what hypnosis is – and much more.

The risk and the prize

To begin our exploration, we must ask some fundamental questions about the role of sleep. Why *do* mammals sleep? Day and night, in forests and fields, desert and tundra, caves and houses, creatures find the safest places in which to curl up and fall asleep. And, whilst asleep, why do they spend the majority of the time in slow wave sleep – the state in which the body and brain recuperate from the previous day's wear and tear – and some of the time in the REM state, completely paralysed, cut off from sensory contact with the world and all its dangers? What possible evolutionary advantage could there be for creatures to be so vulnerable for so much of the day – literally paralysed and at risk from hungry predators?

It was the French scientist Michel Jouvet who discovered that REM sleep was accompanied by muscle paralysis – specifically, the inhibi-

tion of antigravity muscles.[2] (The internationally agreed system for recording sleep phases now includes recording the signals coming from the muscles, as well as eye movements and brain waves.) And he was also the first to suggest that REM sleep may have evolved to permit more freedom in the expression of instinctive behaviours, pointing out that REM sleep, homeothermia (being warm-blooded) and the flexibility of instinctive behaviour are linked because being warm-blooded allowed the higher vertebrates more freedom of behaviour and was inevitably accompanied, as mammals continued to evolve, by increased complexity in brain development.[3] In other words, once mammals and birds could keep a constant internal temperature, instead of their behaviour being governed, as in cold-blooded creatures, by simple set responses to changes in the environment, they became far more mobile with more options available to them.

There was a downside to achieving this increased mobility, however, and that was that the fivefold increase in the energy they needed to expend to achieve it had to be matched by a fivefold increase in energy intake.[4] It made no evolutionary sense for the increase in flexibility to be expended purely in increased time spent searching for food. Animals could save some energy by sleeping when they weren't hungry or when no food sources were available (and perhaps this is when slow wave sleep developed) but this alone wouldn't help generate the required extra energy.

What was also needed was a more highly developed and intelligent brain that would enable mammals to inhibit instinctive drives when they weren't required and to stimulate those actions that were likely to be more productive. This meant evolving a 'thinking cap', a higher cortex capable of suppressing, at least temporarily, some of the less vital instinctive responses whilst still able to direct behaviour to reach goals which the organism wants to achieve – the very role undertaken by the expanded neocortex in mammals. As the researcher Paul Maclean observed, "A remarkable feature of the neocortex is that it evolved primarily in relation to systems receiving and processing information from the external world, namely the exteroceptive, visual, auditory and somatic systems. It was as though the neocortex was designed to serve as a more objective intelligence in coping with the external environment."[5] For the instinctive brain to be able to respond

to this new intelligent input, a new type of programming had to be developed. A type of programming that would make instinctive responses much more flexible and capable of being modified in their expression by this ongoing stream of information being processed by the cortex. The REM state, as we shall see, developed for this purpose.

The recognition of the importance of REM sleep as a programming state grew out of a crucial set of findings about when REM sleep occurs, gathered from information collected in sleep laboratories around the world. It soon became clear to scientists that REM sleep occurs most frequently when we are very young and less often when we get older. Also, it starts long before we are born. At between twenty-seven and forty weeks, human foetuses spend up to eighty per cent of their time in REM sleep. When they are born, sixty-seven per cent of sleep time is REM sleep, a proportion that gradually reduces to twenty-five per cent by middle childhood. As healthy adults we spend about a quarter of our sleep in the REM state, until we reach old age, when the amount lessens. This clearly supports the idea that REM sleep is a programming state.

So too does the fascinating finding of William Dement and his colleagues in America. They noted that the amount of REM sleep an animal has depends upon how mature it is at birth.[6] Those species whose young are born capable of living almost fully independently, in terms of both mental and physical functions, have very little REM sleep at birth. Those which are highly immature when born, however, show high levels of REM sleep. A baby guinea pig, for example, is born fully developed – a perfect miniature of its parents. At birth it needs to spend just fifteen per cent of its sleep in the REM state. By contrast, the newborn rat is totally immature. It is born blind, naked and immobile, and spends ninety-five per cent of its sleep time in the REM state. But it doesn't stay immature for long and, within a month, REM sleep accounts for under a third of its sleep time.

The conclusion that Dement and his colleagues reached is that REM sleep is most important for the very young and clearly has something to do with the developing brain. Maybe, they thought, it provides stimulation for the developing cerebrum in an environment (the womb) where not a lot that is new and stimulating occurs. But meanwhile, back in France, Professor Michel Jouvet was suggesting a more

plausible reason for the variations in length of REM sleep, one that fitted with the findings of Dement and his colleagues but improved upon their conclusions.

Jouvet suggested that REM sleep is concerned with programming the central nervous system to carry out instinctive behaviours.[7] He showed experimentally that REM sleep is controlled by a primitive part of the brain and that, when a particular area of the midbrain is removed (the part which controls the inhibition of the antigravity muscles), cats seem to act out their dreams, which take the form of instinctive behaviours such as chasing or attacking (invisible aggressors), mating, drinking or grooming motions and fear reactions.[8]

Other scientists' research findings supported his conclusions. It was observed, for example, that human babies also act out what appear to be sophisticated expressions of emotion during REM sleep – showing apparent perplexity, disdain, scepticism and amusement, etc. – and that they don't do this while awake.[9] Moreover, some of these emotions, scepticism and disdain for example, don't come into use until later in life. Another researcher noted that young babies smile in REM sleep, yet they don't do so when awake till they are several weeks old.[10] And yet another suggested that, because newborns can breathe, suckle and swallow as soon as they are born, none of which behaviours is required in the womb, they may learn this instinctive ability during REM sleep. (Observation of foetal lambs has shown breathing movements of the chest wall in REM sleep, regardless of the lack of air to breathe.[11]) Furthermore, babies born prematurely are seen to spend as much time in the REM state as they would have if they had remained in the womb for the normal forty-week term.

All this adds up to compelling evidence that the REM state serves to programme instinctive behaviours which the young of the species will need as they go through life. This endogenous source of stimulation sculpts the development of the brain. After an animal is born, the stimuli it encounters as it grows continually prompt the unfolding of more layers of this instinctive knowledge. Ever more complex neuronal connections are created in each stage of its life. When, as we reach sexual maturity, we set out to find a mate, fall in 'love' and produce children of our own, we are acting out the instincts laid down from our genes whilst asleep in the REM state many years before.

Now we come to another important question. If we just had straightforward, set, instinctive responses to everything we ever encountered in life we would be nothing more than mechanical robots. So, how exactly do these instinctive templates laid down in REM sleep make mammals more adaptable, flexible and intelligent?

Why the brain is a metaphorical pattern-matching organ

Clearly, animals we share the world with have instinctive responses that are the same throughout a species. Horses, for example, have their own way of communicating with one another, which has been studied in depth by many people. Monty Roberts, the original 'horse whisperer', is quite clear that this language is an ancient pattern of behaviour that *all* horses share. "The language of horses is universal. It has not even so much as an accent. So, if I go to Japan or Australia or Canada or Germany, wherever, it is exactly the same."[12] But we also know that horses and all other mammals have greater flexibility to adapt to changes in the environment than cold-blooded creatures, such as fish and reptiles, do.

This flexibility gives great advantages. Birds, for instance, which also exhibit REM sleep for short periods, instinctively set about building nests. But the diversity of shape, size, composition and location of nests built by birds, even of the same species, shows how great the variation can be in the execution of this seemingly simple piece of instinctive behaviour.[13] In effect, birds are programmed with an instinct to look for 'twig-like' things with which to build the nest and 'soft' materials with which to line it. This flexibility allows them to use straw, wire, plastic, etc., as well as twigs, to build a nest, and feathers, paper, foam, moss, scraps of cloth, etc., to line it. Similarly, many parent and baby mammals use the uniqueness of their voices to identify where the other is when they are out of sight. Humans might not be able to tell the sounds of baby animals apart but the parents clearly can. The instinct to respond to another's voice pattern is flexible enough to include the whole range of voice patterns that may be found within a species, from among which the individual can select the right voice as being 'like' the kind it is programmed to look for.

The more unspecified the parameters of genetically anticipated stimuli (and responses as well), the greater will be the flexibility in the

animal's behaviour, and the greater the environmental learning component of the instinctive behaviour can be. In other words, the more patterns to match to that a creature has, the greater its metaphorical ability and the more flexibly it can operate and evolve. An example from studies of tool making by chimpanzees illustrates this. When they discover that their fingers are not long enough to get into the nests of the tasty (to them) ants and termites, chimpanzees will select a twig, strip it of leaves and push the thin end of the twig deep into the nest. They then wait patiently for the food to walk out along the twig, whereupon they gently pick it off and eat it.[14]

The more complex the life form, the more varied and rich are the instinctive patterns, or templates, laid down in it. Human beings are the most flexible of all mammals; therefore, our instinctive programming has the largest capacity for environmental input. By the time they are born, babies are already primed to look for human faces and build rapport. They can copy actions, sticking out their own tongues when an adult does likewise – yet how do they even know where their tongue is and how to move it to copy another's actions? As leading child development specialists say in *How Babies Think*, "[As babies] we know, quite directly, that we are like other people and they are like us."[15] This can only be as a result of instinctive programming.

To achieve this intelligence, instinctive programmes need to be sufficiently flexible to allow for a wide range of environmental variation. No baby can know in advance the exact shape or colour of its mother's face, nor the language that she speaks. Babies, like all mammals, need to know how to act in whatever environment they find themselves. This, it seems, is why instinctive *but incomplete* patterns of behaviour are programmed into the developing young of a species. The more incomplete or unspecified the 'programme' is, the greater the flexibility in a creature's behaviour, and the greater the opportunity to learn from the environment.

So we have partially answered why it is we need to sleep and go into the REM state. It has to do with the risky enterprise of evolving warm-bloodedness. That was the prize. For mobile life forms to become more flexible in their relationship with other creatures and inanimate matter – the plant kingdom and ever-changing weather and food supplies – they needed to develop the ability to exercise more choices.

And the metaphorical abilities we evolved – to look for something important for our survival that is 'like' something we have been programmed to recognize (e.g., in the case of a baby, a nipple or the teat of a bottle or even, for a time, a finger tip) allow us to do that. It is these same metaphorical abilities that we use to learn language, build rapport, use imagination, question and analyze our own emotional responses and so on. And they are all programmed into us during REM sleep as metaphorical patterns. Since the patterns are never exact, they have to be held in an incomplete metaphorical form.

So, the brain is essentially a metaphorical pattern-matching organ, constantly seeking environmental stimuli to match up to the instinctive and learned responses amassed since conception. Not only does this give us the ability to recognize something we need (such as a nipple or teat) but it is the means by which we recognize something when we come across it again (we see a chair and can identify it by pattern matching, at the speed of light, to our knowledge of what chairs tend to look like). We use pattern-matching and metaphor to communicate with others ("it's like this" or "it's like that") and to build on our understandings about the world (inventors often devise new ways of doing things by enlarging on or adapting the way something is achieved in nature). Our brains are constantly pattern matching, relating what is new to what we already know.

Metaphorical communication is an intrinsic part of the way all human beings understand and communicate experience. This is particularly important for therapists and teachers to understand because, just as we have the potential to identify appropriate metaphors, we may also make inappropriate metaphorical matches between two patterns. In fact, error is inevitable on some occasions because the capacity for analogy or metaphor *derives biologically from the programming of instinctive behaviour*. Instinctive templates for behaviour can only specify patterns to be identified in an approximate way. Many people have seen films of the ethologist Konrad Lorenz being followed around everywhere by a family of young goslings. Goslings are preprogrammed to attach themselves to the first large moving object they encounter after hatching because, normally, this would be their mother. Now, if that large moving object happens to be Konrad Lorenz's wellington boots and they attach to him and not the mother goose,

clearly the wrong metaphorical patterns have been identified. The birds bonded with Lorenz: they followed him persistently; they became distressed when he left them and ran to him for support when they felt frightened.[16] Clearly this was a situation where the matching of an instinctive template to its environmental counterpart had gone awry. Human beings have a far more sophisticated, creative capacity for identifying metaphor than do animals, but it stems directly from the metaphorical processes found throughout the animal kingdom. We have the ability to think analogically, that is, to think holistically, and to recognize how a pattern metaphorically matches another pattern. But we also have the ability to think logically, to break problems down and analyse them. Our conscious mind's preferred mode of operation is logical thought while that of our unconscious mind is analogical or 'association of ideas', as it is sometimes called. Unconscious thinking, therefore, represents by far the largest part of brain activity because everything of which we are not immediately conscious is, by definition, unconscious.

A great many mental problems are caused by these thinking processes going awry. When someone who has been sexually abused in a past relationship, for example, finds that they cannot bring themselves to have sex with a present partner whom they love, they are making a false analogical connection between the old abusive relationship and the new healthy one. It is a form of learned helplessness that the logical conscious mind seems powerless to overcome. Another example of false analogy matching is when a person is highly aroused early in their sexual life and makes associations between that arousal and particular objects, activities or situations. They then continue to be sexually 'turned on' by such connections (fetishism) which can seem inexplicably perverse to others. From this perspective, the goslings following Lorenz's wellington boots are 'perverts'.

When people unconsciously match present events to patterns established in the past that are inappropriate to the current situation, they need help to unhook themselves from those patterns. Such faulty conditioned responses get in the way of a normal response, preventing them from being fully in the present. (There are well-established techniques for doing this, which we explain in Chapter 12.) By contrast, the type of counselling that encourages the emotional re-experience of

past problematic situations has the undesired effect of enhancing the mismatch – engraining the inappropriate patterns deeper – and thereby raising the emotional pitch, harming the patient and keeping them longer in therapy, or rather, as we prefer to call it, 'pseudotherapy'. (Of course some counsellors who encourage patients to review their pasts emotionally also quickly progress to encouraging their patients to take a more empowering view of their history, reframing it so as not to see themselves as victims. This can be highly beneficial.

Without sleep, we warm-blooded creatures die

We know that REM sleep remains essential throughout life. The dramatic results from the first known experiments on sleep deprivation, conducted over a hundred years ago, found that it took between seven and ten days for puppies to die if they had no sleep. Why they died was unknown to the researchers at the time. Postmortem examinations showed no obvious changes in brain tissue or other vital organs.[17]

One of the great veterans of sleep research was Allan Rechtschaffen who, with enormous ingenuity, devised experiments with rats that enabled scientists to study the effects of 'net' sleep deprivation on test animals without other variables getting in the way. His control animals slept normally but in every other way were treated the same as those deprived of sleep. He found that there was no doubt sleep deprivation alone was responsible for the death of the test animals.[18]

Rechtschaffen and his colleagues searched and searched for explanations. At first they suspected a drop in body temperature might be the cause because all the test rats showed a decline in body temperature. But, when the experimental rats were kept warm with heaters, they still died. Breakdown in bodily tissues caused by accelerated metabolism or systemic infections was also ruled out in a series of elaborate experiments.[19]

Even though Rechtschaffen's studies failed to find out the direct cause of death in his sleep-deprived rats, they did provide us with new information. One consistent observation was that the test rats ate increased amounts of food while, at the same time, losing weight. These changes suggested that sleep-deprived animals have an increased metabolic rate, as though they have an increased need of energy. In fact, near death, the sleep-deprived animals showed an energy expenditure two to three times above normal. This could be caused only by

excessive heat loss or by a dramatic change in the set point of the brain thermostat.

Rechtschaffen thought hard about this and went on to devise more ingenious experiments which showed that, indeed, the set point of the brain mechanism that keeps internal heat at a constant level was increased by sleep deprivation. Rats who had been deprived of sleep for two weeks preferred to remain in a 'heat corridor' where the ambient temperature was 50°C (122°F). The control rats found that unbearably hot and fled as fast as their legs could carry them to the part of the corridor where the ambient temperature was 30°C (86°F). Clearly, if the test rats preferred to be in a much hotter environment, their internal thermostats had been altered. Sleep deprivation disrupted the activity of the brain cells responsible for temperature regulation.

In further experiments, Rechtschaffen found that rats prevented from having REM sleep were unable to keep their body temperature stable. It became clear to him that REM sleep deprivation did not cause a change in the brain thermostat but did cause the disruption in heat conservation. The link between the evolution of warm-bloodedness and the REM state in the brain could not be more clear.

Interestingly, when sleep-deprived animals were near death and then allowed to sleep, all of these changes could be reversed. Most remarkable was that the animals showed large amounts of REM sleep rebound. They had to catch up on what they had missed. On the first day that they were allowed to sleep without interruption, overall length of REM sleep was five to ten times greater than normal. Rechtschaffen's conclusion was that "the need for paradoxical (REM) sleep may exceed the need for other sleep stages".

Other eminent researchers, building on even more recent work, go much further. "REM, it seems, is some sort of supersleep," said J. Allan Hobson.[20] He gives three reasons to support this. The first is that, "although it normally occupies only about 20 per cent of the total time we sleep each night, it takes only six weeks of deprivation of REM sleep alone to kill rats, compared with four weeks for complete sleep deprivation. Based on its relative duration of only 20 per cent of sleep time, we would predict that five times as long a deprivation period would be required if both states were equally life-enhancing." On these terms, one minute of REM sleep is worth five minutes of non-REM sleep.

The second reason he gives to support the idea of REM supersleep is one that will please catnappers around the world. Short naps are surprisingly beneficial "if they occur at times in the day when REM sleep probability is high. Daytime naps are different from night sleep in that we may fall directly into a REM period and stay there for the duration of the nap. Since the time of peak REM probability is greatest in the late morning, the tendency of naps to be composed of REM sleep is highest then and falls thereafter till the onset of night sleep (about twelve hours later)." The implication is that a little bit of sleep, at the right time of day, may be more useful than the same amount later on.

The third reason is that "following the deprivation of even small amounts of REM sleep, there is a prompt and complete repayment. The subject who has been denied REM sleep launches into extended REM periods as soon as he is allowed to sleep normally. In recent drug studies, when REM sleep was prevented, the payback seemed to be made with interest. More REM sleep was paid back than was lost."

He then goes on to propose "a link between brain-mind states and genetics" which makes sense, given the evidence that our instincts are laid down from our genes in the REM state.

We would go further and suggest, from these findings, that, since babies show REM from about 10 weeks, it is the primary state of consciousness. As the sense organs start to receive inputs from the environment, the brain pattern matches to the instinctive templates programmed in during the REM state. Every time a new pattern-match is made it is preceded by a spark of consciousness, an alertness about what might be, followed by that 'ah ha!' moment as the pattern is recognized. After a baby's birth, this happens at an ever-accelerating rate, as templates for breathing, swallowing, seeing and connecting with human faces, responding to human touch, drawing milk from a mother's breasts, etc., are matched up to reality. As children grow and come across situations and things that they don't instinctively know how to deal with, the more conscious they become.

Waking consciousness is clearly a modification of the REM state. When the outside universe first gives feedback to the brain that it can pattern match up to, it is the templates programmed in during the REM state that generate a model of reality in us from which we

operate. As we experience more, adding more memories, the reality we generate becomes ever more complex. Just as waking reality is a modification of the REM state, derived from input through our senses from the outside world, so our dream reality – when information from the outside world is cut off – also depends on the REM state, as we shall see.

But why, once we are programmed in early life with all of the instinctive behaviour patterns we require, do we need to continue to go into the REM state every night of our lives and, in a state of body paralysis, dream our dreams? To penetrate the secrets of nature requires great concentration and application. In the next chapter we will look at how the result of such effort, piecing together the implications of existing scientific knowledge about the REM state, and building upon it, has yielded the answer. This answer is having many surprising consequences and has enabled the development of key insights, not only into dreaming but also into how we learn, depression, post traumatic stress disorder (PTSD), psychosis and autism, as well as giving us a richer understanding of consciousness itself. And all of these insights have huge practical applications.