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INTRODUCTION

THE MASTER AND HIS EMISSARY

THIS BOOK TELLS A STORY ABOUT OURSELVES AND THE WORLD, AND ABOUT HOW WE got to be where we are now. While much of it is about the structure of the human brain – the place where mind meets matter – ultimately it is an attempt to understand the structure of the world that the brain has in part created.

Whatever the relationship between consciousness and the brain – unless the brain plays *no* role in bringing the world as we experience it into being, a position that must have few adherents – its structure has to be significant. It might even give us clues to understanding the structure of the world it mediates, the world we know. So, to ask a very simple question, why is the brain so clearly and profoundly divided? Why, for that matter, are the two cerebral hemispheres asymmetrical? Do they really differ in any important sense? If so, in what way?

The subject of hemisphere differences has a poor track record, discouraging to those who wish to be sure that they are not going to make fools of themselves in the long run. Views on the matter have gone through a number of phases since it was first noticed in the mid-nineteenth century that the hemispheres were not identical, and that there seemed to be a clear asymmetry of function related to language, favouring the left hemisphere. At first, it was believed that, apart from each hemisphere obviously having sensory and motor responsibility for, and control of, the opposite (or ‘contralateral’) side of the body, language was the defining difference, the main specific task of the left hemisphere. The right hemisphere was considered to be essentially ‘silent’. Then it was discovered that, after all, the right hemisphere appeared better equipped than the left hemisphere to handle visual imagery, and this was accepted as the particular contribution it made, its equivalent to language: words in the left hemisphere, pictures in the right. But that, too, proved unsatisfactory. Both hemispheres, it is now clear, can deal with either kind of material, words or images, in different ways. Subsequent attempts to decide which set of functions are segregated in which hemisphere have mainly been discarded, piece after piece of evidence suggesting that every identifiable human activity is actually served at some level by both hemispheres. There is, apparently, vast redundancy. Enthusiasm for finding the key to hemisphere differences has waned, and it is no longer respectable for a neuroscientist to hypothesise on the subject.

This is hardly surprising, given the set of beliefs about the differences between the hemispheres which has passed into the popular consciousness. These beliefs could, without much violence to the facts, be characterised as versions of the idea that the left hemisphere is somehow gritty, rational, realistic but dull, and the right hemisphere airy-fairy and impressionistic, but creative and exciting; a formulation reminiscent of Sellar and Yeatman's immortal distinction (in their parody of English history teaching, *1066 and All That*) between the Roundheads – 'Right and Repulsive' – and the Cavaliers – 'Wrong but Wromantic'. In reality, both hemispheres are crucially involved in reason, just as they are in language; both hemispheres play their part in creativity. Perhaps the most absurd of these popular misconceptions is that the left hemisphere, hard-nosed and logical, is somehow male, and the right hemisphere, dreamy and sensitive, is somehow female. If there is any evidence that could begin to associate each sex with a single cerebral hemisphere in this way, it tends to indicate, if anything, the reverse – but that is another story and one that I will not attempt to deal with in this book. Discouraged by this kind of popular travesty, neuroscience has returned to the necessary and unimpeachable business of amassing findings, and has largely given up the attempt to make sense of the findings, once amassed, in any larger context.

Nonetheless it does not seem to me likely that the ways in which the hemispheres differ are simply random, dictated by purely contingent factors such as the need for space, or the utility of dividing labour, implying that it would work just as well if the various specific brain activities were swapped around between hemispheres as room dictates. Fortunately, I am not alone in this. Despite the recognition that the idea has been hijacked by everyone from management trainers to advertising copywriters, a number of the most knowledgeable people in the field have been unable to escape the conclusion that there is something profound here that requires explanation. Joseph Hellige, for example, arguably the world's best-informed authority on the subject, writes that while both hemispheres seem to be involved in one way or another in almost everything we do, there are some 'very striking' differences in the information-processing abilities and propensities of the two hemispheres.¹ V. S. Ramachandran, another well-known and highly regarded neuroscientist, accepts that the issue of hemisphere difference has been traduced, but concludes: 'The existence of such a pop culture shouldn't cloud the main issue – the notion that the two hemispheres may indeed be specialised for different functions.'² And recently Tim Crow, one of the subtlest and most sceptical of neuroscientists researching into mind and brain, who has often remarked on the association between the development of language, functional brain asymmetry and psychosis, has gone so far as to write that 'except in the light of lateralisation nothing in human psychology/psychiatry makes any sense.'³ There is little doubt that the issues of brain asymmetry and hemisphere specialisation are significant. The question is only – of what?⁴

I believe there is, literally, a world of difference between the hemispheres. Understanding quite what that is has involved a journey through many apparently unrelated areas: not just neurology and psychology, but philosophy, literature and

the arts, and even, to some extent, archaeology and anthropology, and I hope the specialists in these areas will forgive my trespasses. Every realm of academic endeavour is now subject to an explosion of information that renders those few who can still truly call themselves experts, experts on less and less. Partly for this very reason it nonetheless seems to me worthwhile to try to make links outside and across the boundaries of the disciplines, even though the price may be that one is always at best an interested outsider, at worst an interloper condemned to make mistakes that will be obvious to those who really know. Knowledge moves on, and even at any one time is far from certain. My hope is only that what I have to say may resonate with the ideas of others and possibly act as a stimulus to further reflection by those better qualified than myself.

I have come to believe that the cerebral hemispheres differ in ways that have meaning. There is a plethora of well-substantiated findings that indicate that there are consistent differences – neuropsychological, anatomical, physiological and chemical, amongst others – between the hemispheres. But when I talk of ‘meaning’, it is not just that I believe there to be a coherent pattern to these differences. That is a necessary first step. I would go further, however, and suggest that such a coherent pattern of differences helps to explain aspects of human experience, and therefore *means* something in terms of our lives, and even helps explain the trajectory of our common lives in the Western world.

My thesis is that for us as human beings there are two fundamentally opposed realities, two different modes of experience; that each is of ultimate importance in bringing about the recognisably human world; and that their difference is rooted in the bihemispheric structure of the brain. It follows that the hemispheres need to co-operate, but I believe they are in fact involved in a sort of power struggle, and that this explains many aspects of contemporary Western culture.

THE STRUCTURE OF THIS BOOK

This book is divided, like the brain it describes, into two parts.

In Part I, I will focus on the brain itself, and what it can tell us. I will look at the evolution of the brain, its divided and asymmetrical nature, the implications of the development of music and language, and what we know about what goes on in each side of the brain. What is it they do that is so different? Well, I will argue, nothing much: it is quite true that almost everything we once thought went on in one or other hemisphere alone is now known to go on in both.⁵ So where does that leave the pursuit of hemisphere differences? Right on track. The whole problem is that we are obsessed, because of what I argue is our affiliation to left-hemisphere modes of thought, with ‘what’ the brain does – after all, isn’t the brain a machine, and like any machine, the value of it lies in *what it does*? I happen to think this machine model gets us only some of the way; and like a train that drops one in the middle of the night far from one’s destination, a train of thought that gets one only some of the way is a liability. The difference, I shall argue, is not in the ‘what’, but in the ‘how’ – by which I don’t mean ‘the means by which’ (machine model again), but ‘the manner in which’, something no one ever asked of a machine. I am not

interested purely in ‘functions’ but in ways of being, something only living things can have.

Did the important semantic speech centres of the brain simply end up in the left hemisphere by accident? And if it’s so important to keep a complex function such as language all in one place, then why does language also depend on the right hemisphere? Is music really just a useless spin-off from language, or something more profound? Why do we have language anyway? For communicating? For thinking? If not, for what purpose, then? Why are we right-handed (or left-handed), rather than ambidextrous? Is the body essential to our way of being, or just a useful fuelling and locomotor system for the brain? Is emotion really just an aid to cognition, helping us to weigh our decisions correctly, or is it something a bit more fundamental than that? Why does it matter if one hemisphere tends to see things in their context, while the other as carefully removes them from it?

One of the more durable generalisations about the hemispheres has been the finding that the left hemisphere tends to deal more with pieces of information in isolation, and the right hemisphere with the entity as a whole, the so-called *Gestalt* – possibly underlying and helping to explain the apparent verbal/visual dichotomy, since words are processed serially, while pictures are taken in all at once. But even here the potential significance of this distinction has been overlooked. Anyone would think that we were simply talking about another relatively trivial difference of limited use or interest, a bit like finding that cats like to have their meat chopped up into small bits, whereas dogs like to wolf their meat in slabs. At most it is seen as helpful in making predictions about the sort of tasks that each hemisphere may preferentially carry out, a difference in ‘information processing’, but of no broader significance. But if it is true, the importance of the distinction is hard to over-estimate. And if it should turn out that one hemisphere understands metaphor, where the other does not, this is not a small matter of a quaint literary function having to find a place *somewhere* in the brain. Not a bit. It goes to the core of how we understand our world, even our selves, as I hope to be able to demonstrate.

What if one hemisphere is, apparently, attuned to whatever is new? Is that, too, just a specialised form of ‘information processing’? What role does imitation play in releasing us from determinism (a question I return to in different forms throughout the book)? I am not, of course, the first to ask such questions, and they undoubtedly admit of more than one answer, and more than one type of answer. But, while only a fool would claim to have definitive answers, I shall make some suggestions that I hope may encourage others to think differently about ourselves, our history and ultimately our relationship with the world in which we live.

Things change according to the stance we adopt towards them, the type of attention we pay to them, the disposition we hold in relation to them. This is important because the most fundamental difference between the hemispheres lies in the type of attention they give to the world. But it’s also important because of the widespread assumption in some quarters that there are two alternatives: either things exist ‘out there’ and are unaltered by the machinery we use to dig them up,

or to tear them apart (naïve realism, scientific materialism); or they are subjective phenomena which we create out of our own minds, and therefore we are free to treat them in any way we wish, since they are after all, our own creations (naïve idealism, post-modernism). These positions are not by any means as far apart as they look, and a certain lack of respect is evident in both. In fact I believe there is something that exists apart from ourselves, but that we play a vital part in bringing it into being.⁶ A central theme of this book is the importance of our disposition towards the world and one another, as being fundamental in grounding *what it is that we come to have a relationship with*, rather than the other way round. The kind of attention we pay actually alters the world: we are, literally, partners in creation. This means we have a grave *responsibility*, a word that captures the reciprocal nature of the dialogue we have with whatever it is that exists apart from ourselves. I will look at what philosophy in our time has had to say about these issues. Ultimately I believe that many of the disputes about the nature of the human world can be illuminated by an understanding that there are two fundamentally different ‘versions’ delivered to us by the two hemispheres, both of which can have a ring of authenticity about them, and both of which are hugely valuable; but that they stand in opposition to one another, and need to be kept apart from one another – hence the bihemispheric structure of the brain.

How do we understand the world, if there are different versions of it to reconcile? Is it important which models and metaphors we bring to bear on our reality? And, if it is, why has one particular model come to dominate us so badly that we hardly notice its pervasiveness? What do these models tell us about the words that relate us to the world at large – ‘know’, ‘believe’, ‘trust’, ‘want’, ‘grasp’, ‘see’ – that both describe and, if we are not careful, prescribe the relationship we have with it? This part of the book will conclude with some reflections on one particular relationship, that between the two hemispheres. It seems that they coexist together on a daily basis, but have fundamentally different sets of values, and therefore priorities, which means that over the long term they are likely to come into conflict. Although each is crucially important, and delivers valuable aspects of the human condition, and though each needs the other for different purposes, they seem destined to pull apart.

Part II of the book looks at the history of Western culture in the light of what I believe about the hemispheres. These thoughts are inevitably contingent, to some extent fragmentary and rudimental. But if the world is not independent of our observation of it, attention to it, and interaction with it, and if the mind is at least mediated by the brain, it seems a reasonable bet that the brain will have left its mark on the world that we have brought about. I hope to draw attention to those aspects of this cultural history which resonate with the findings about the brain which gave rise to it, beginning with the development of writing and currency in Ancient Greece, and the extraordinary flowering of both science and the arts, especially theatre, at that time. In brief I believe this is related to the development, through enhanced frontal lobe function, of what might be called ‘necessary distance’ from the world, which in turn demanded increased independence of the hemispheres,

allowing each hemisphere to make characteristic advances in function, and for a while to do so in harmony with its fellow. I believe that over time there has been a relentless growth of self-consciousness, leading to increasing difficulties in co-operation. The resultant instability is evidenced by alternations between more extreme positions; and, although there have been swings in the pendulum, the balance of power has shifted where it cannot afford to go – further and further towards the part-world created by the left hemisphere. The switchbacks and reverses of this progress are followed over time, looking at the main shifts that have been conventionally identified in Western culture from the Renaissance onwards, until we reach the present era.

The particular relevance to us at this point in history is this. Both hemispheres clearly play crucial roles in the experience of each human individual, and I believe both have contributed importantly to our culture. Each needs the other. Nonetheless the relationship between the hemispheres does not appear to be symmetrical, in that the left hemisphere is ultimately dependent on, one might almost say parasitic on, the right, though it seems to have no awareness of this fact. Indeed it is filled with an alarming self-confidence. The ensuing struggle is as uneven as the asymmetrical brain from which it takes its origin. My hope is that awareness of the situation may enable us to change course before it is too late.

The Conclusion, therefore, is devoted to the world we now inhabit. Here I suggest that it is as if the left hemisphere, which creates a sort of self-reflexive virtual world, has blocked off the available exits, the ways out of the hall of mirrors, into a reality which the right hemisphere could enable us to understand. In the past, this tendency was counterbalanced by forces from outside the enclosed system of the self-conscious mind; apart from the history incarnated in our culture, and the natural world itself, from both of which we are increasingly alienated, these were principally the embodied nature of our existence, the arts and religion. In our time each of these has been subverted and the routes of escape from the virtual world have been closed off. An increasingly mechanistic, fragmented, decontextualised world, marked by unwarranted optimism mixed with paranoia and a feeling of emptiness, has come about, reflecting, I believe, the unopposed action of a dysfunctional left hemisphere. I will have some concluding thoughts about what, if anything, we can do – or need *not* to do – about it.

Because I am involved in redressing a balance, I may at times seem to be sceptical of the tools of analytical discourse. I hope, however, it will be obvious from what I say that I hold absolutely no brief for those who wish to abandon reason or traduce language. The exact opposite is the case. Both are seriously under threat in our age, though I believe from diametrically opposed factions. The attempt by some post-modern theoreticians to annex the careful anti-Cartesian scepticism of Heidegger to an anarchic disregard for language and meaning is an inversion of everything that he held important. To say that language holds truth concealed is not to say that language simply serves to conceal truth (though it certainly can do), or, much worse, that there is no such thing as truth (though it may be far from simple). But equally we should not be blind to the fact that language is also

translated and disregarded by many of those who never question language at all, and truth too easily claimed by those who see the subject as unproblematic. It behoves us to be sceptical. Equally this book has nothing to offer those who would undermine reason, which, along with imagination, is the most precious thing we owe to the working together of the two hemispheres. My quarrel is only with an excessive and misplaced rationalism which has never been subjected to the judgment of reason, and is in conflict with it. I hope it will not be necessary for me to emphasise, too, that I am in no sense opposed to science, which, like its sister arts, is the offspring of both hemispheres – only to a narrow materialism, which is not intrinsic to science at all. Science is neither more nor less than patient and detailed attention to the world, and is integral to our understanding of it and of ourselves.

WHY IS THE STRUCTURE OF THE BRAIN IMPORTANT?

It might seem reductive to link the highest achievements of the human mind, in philosophy and the arts, to the structure of the brain. I believe it is not. For one thing, even if it were possible for mind to be ‘reduced,’ as we say, to matter, this would necessarily and equally compel us to sophisticate our idea of what matter is, and is capable of becoming, namely something as extraordinary as mind. But leaving that aside, the way we experience the world, and even what there is of the world to experience, is dependent on how the brain functions: we cannot escape the fact, nor do we need to try. At the most basic, some things that we know to be potential objects of experience – sounds at particularly high or low frequencies, for example – are not available to us, though they may be to bats and bears; and that’s simply because our brains do not deal with them. We know, too, that when parts of the brain are lost, a chunk of available experience goes with them. But this is not to hold that all that exists is in the brain – in fact, it demonstrates that that cannot be the case; nor is it to say that mental experience is *just* what we can observe or describe at the brain level.

OK, but if my purpose is to understand the world better, why do I not just deal with mind, and forget about the brain? And in particular why should we be concerned with the brain’s structure? That may be of academic interest to scientists, but as long as it carries on working, does it really matter? After all, my pancreas is doing fine, without my being able to remember much about its structure.

However one conceives the relationship of mind and brain – and especially if one believes them to be identical – the structure of the brain is likely to tell us something we otherwise could not so easily see. We can inspect the brain only ‘from the outside’ (even when we are probing its innermost reaches), it is true: but we can inspect the mind only ‘from within’ (even when we seem to objectify it). Seeing the *brain’s* structure is just easier. And since structure and function are closely related, that will tell us something about the nature of our mental experience, our experience of the world. Hence I believe it does matter. But I should emphasise that, although I begin by looking at brain structure in relation to the neuropsychological functions that we know are associated with each hemisphere, my aim is purely to illuminate aspects of our experience.

Freud anticipated that making connections between experience and the structure of the brain would be possible once neuroscience became sufficiently evolved. A neurologist first and foremost, he believed that the mental entities that he described, and whose conflicts shaped our world – the id, the ego and the superego – would one day be more precisely identified with structures within the brain.⁷ In other words he believed that the brain not merely mediated our experience, but *shaped* it too.

When we look at our embodied selves, we look back into the past. But that past is no more dead than we are. The past is something we perform every living day, here and now. That other founding father of psychoanalysis, Jung, was acutely aware of this, and surmised that much of our mental life, like our bodies, has ancient origins:

Just as the human body represents a whole museum of organs, with a long evolutionary history behind them, so we should expect the mind to be organized in a similar way . . . We receive along with our body a highly differentiated brain which brings with it its entire history, and when it becomes creative it creates out of this history – out of the history of mankind . . . that age-old natural history which has been transmitted in living form since the remotest times, namely the history of the brain structure.⁸

The brain has evolved, like the body in which it sits, and is in the process of evolving. But the evolution of the brain is different from the evolution of the body. In the brain, unlike in most other human organs, later developments do not so much replace earlier ones as add to, and build on top of, them.⁹ Thus the cortex, the outer shell that mediates most so-called higher functions of the brain, and certainly those of which we are conscious, arose out of the underlying subcortical structures which are concerned with biological regulation at an unconscious level; and the frontal lobes, the most recently evolved part of the neocortex, which occupy a much bigger part of the brain in humans than in our animal relatives, and which grow forwards from and ‘on top of’ the rest of the cortex, mediate most of the sophisticated activities that mark us out as human – planning, decision making, perspective taking, self-control, and so on. In other words, the structure of the brain reflects its history: as an evolving dynamic system, in which one part evolves out of, and in response to, another.

I think we would accept that the conflicts that Freud helped identify – between will and desire, between intention and action, and broader disjunctions between whole ways of conceiving the world in which we live – are the proper concern, not just of psychiatrists and psychologists, but of philosophers, and of artists of all kinds, and of each one of us in daily life. Similarly, understanding the way in which the brain’s structure influences the mind is of relevance not just to neuroscientists, or psychiatrists, or philosophers, but to everyone who has a mind or a brain. If it turns out that there is after all coherence to the way in which the correlates of our experience are grouped and organised in the brain, and we can see

these 'functions' forming intelligible wholes, corresponding to areas of experience, and see how they relate to one another at the brain level, this casts some light on the structure and experience of our mental world. In this sense the brain is – in fact it has to be – a metaphor of the world.

THE IMPORTANCE OF BEING TWO

Although the brain is extraordinarily densely interconnected within itself – it has been estimated that there are more connections within the human brain than there are particles in the known universe – it is none the less true, as might be imagined, that the closest and densest interconnections are formed within localities, between immediately adjacent structures. Thus the brain can be seen as something like a huge country: as a nested structure, of villages and towns, then districts, gathered into counties, regions and even partly autonomous states or lands – a conglomeration of nuclei and ganglia at one level, organisational foci and broader functional regions within specific gyri or sulci (the folds of the cortex) at another, these then forming lobes, and those lobes ultimately forming part of one or other cerebral hemisphere. If it is true that consciousness arises from, or at any rate is mediated by, the sheer density and complexity of neuronal interconnections within the brain, this structure has some important consequences for the nature of that consciousness. The brain should not be thought of as an indiscriminate mass of neurones: the structure of that mass matters. In particular it has to be relevant that at the highest level of organisation the brain, whether mediator or originator of consciousness, is divided in two.

The great physiologist, Sir Charles Sherrington, observed a hundred years ago that one of the basic principles of sensorimotor control is what he called 'opponent processors'.¹⁰ What this means can be thought of in terms of a simple everyday experience. If you want to carry out a delicate procedure with your right hand that involves a very finely calibrated movement to the left, it is made possible by using the counterbalancing, steadying force of the left hand holding it at the same time and pushing slightly to the right. I agree with Marcel Kinsbourne that the brain is, in one sense, a system of opponent processors. In other words, it contains mutually opposed elements whose contrary influence make possible finely calibrated responses to complex situations. Kinsbourne points to three such oppositional pairings within the brain that are likely to be of significance. These could be loosely described as 'up/down' (the inhibiting effects of the cortex on the more basic automatic responses of the subcortical regions), 'front/back' (the inhibiting effects of the frontal lobes on the posterior cortex) and 'right/left' (the influence of the two hemispheres on one another).¹¹

I am concerned mainly with exploring just one of these pairs of oppositions: that between the two cerebral hemispheres. I will at times deal with the other oppositions – 'up/down' and 'front/back' – as they undoubtedly impinge on this, more especially since the hemispheres differ in the relationship each has with the underlying subcortical structures, and even with the frontal lobes: they are in this, as in so many other respects, asymmetrical. But it is the primary duality of the

hemispheres that forms the focus of the book. It is this, I believe, that underlies a conflict that is playing itself out around us, and has, in my view, recently taken a turn which should cause us concern. By seeing more clearly what is happening we may be in a better position to do something about it.

We are nearly ready to begin our examination of the brain. Before doing so, however, I need to enter a couple of caveats, without which I risk being misunderstood.

DIFFERENCES ARE NOT ABSOLUTE, BUT EVEN SMALL DIFFERENCES GET TO BE AMPLIFIED

When I say the ‘left hemisphere does this’, or ‘the right hemisphere does that’, it should be understood that in any one human brain at any one time both hemispheres will be actively involved. Unless one hemisphere has been surgically removed, or otherwise destroyed, signs of activity will be found in both. Both hemispheres are involved in almost all mental processes, and certainly in all mental states: information is constantly conveyed between the hemispheres, and may be transmitted in either direction several times a second. What activity shows up on a scan is a function of where the threshold is set: if the threshold were set low enough, one would see activity just about everywhere in the brain all the time. But, *at the level of experience*, the world we know is synthesised from the work of the two cerebral hemispheres, each hemisphere having its own way of understanding the world – its own ‘take’ on it. This synthesis is unlikely to be symmetrical, and the world we actually experience, phenomenologically, at any point in time is determined by which hemisphere’s version of the world ultimately comes to predominate. Though I would resist the simplistic idea of a ‘(left or right) hemisphere personality’ overall, there is evidence I will look at later that, certainly for some kinds of activities, we consistently prefer one hemisphere over the other in ways that may differ between individuals, though over whole populations they tend to cohere.

For two reasons, even small differences in potential between the hemispheres at quite a low level may lead to what are large shifts at a higher level.

For one thing, as Ornstein has suggested, at the level of moment-to-moment activity the hemispheres may operate a ‘winner takes all’ system – that is, if one hemisphere is 85 per cent as efficient at a task as the other, we will not tend to divide the work between them in a ratio of 0.85:1.00, but consistently use whichever is better to do the whole job.¹² On those occasions where the ‘wrong’ hemisphere does get in first, however, and starts to take control, at least for not very demanding tasks, it will most probably continue to trump the other hemisphere, even if the other hemisphere would have been a better choice at the outset – possibly because the time costs of sharing or transferring control are greater than the costs of continuing with the current arrangement.¹³ I will consider the working relationship of the hemispheres in detail in the last chapter of Part I.

The other is that, though such winner-takes-all effects may still be individually small, a vast accumulation of many small effects could lead ultimately to a large

bias overall, especially since repeated preference for one hemisphere helps to entrench still further an advantage that may start out by being relatively marginal. To the extent that a process goes on usefully in one hemisphere, it reinforces the sending of information preferentially to that hemisphere in the future. ‘Small initial differences between the hemispheres could compound during development, ultimately producing a wide range of functional asymmetries, via a “snowball” mechanism.’¹⁴ The hemispheres are thus involved in differentiating themselves.

Equally this lack of absolutism affects the way we need to understand the data. A finding can be perfectly valid, and even of the greatest significance overall, and yet admit of contrary findings. The average temperatures in Iceland and Indonesia are clearly very different, which goes a long way to explain the wholly different characteristics of the vegetation, animal life, landscape, culture and economy of these two regions, as well as no doubt much else that differentiates their ‘feel’ and the ways of life there. But it is still true that the lowest average annual temperature in Indonesia is *lower* than the highest average annual temperature in Iceland – and of course the average temperature varies considerably from month to month, as well as, less predictably, from day to day, and indeed from place to place within each region. The nature of generalisations is that they are approximate, but they are nonetheless of critical importance for understanding what is going on. A misplaced need for certainty may stop the process altogether.

This also implies that generalisations can never be rules. As far as the hemispheres go, there is almost certainly nothing that is confined entirely to one or the other. I want to stress that, because I really do not wish to encourage simplistic dichotomising. The differences that I hope to establish are too nuanced to be encapsulated in a few words or simple concepts, but, I believe, they are nonetheless important for that. Descartes was a great dualist. He thought not only that there were two types of substance, mind and matter, but that there were two types of thinking, two types of bodily movement, even two types of loving; and, sure enough, he believed there were two types of people: ‘the world is largely composed of two types of minds . . .’¹⁵ It has been said that the world is divided into two types of people, those who divide the world into two types of people, and those who don’t. I am with the second group. The others are too Cartesian in their categorisation, and therefore already too much of the party of the left hemisphere. Nature gave us the dichotomy when she split the brain. Working out what it means is not in itself to dichotomise: it only becomes so in the hands of those who interpret the results with Cartesian rigidity.

BRAIN ORGANISATION VARIES FROM INDIVIDUAL TO INDIVIDUAL

Then there is the question of individual difference in hemisphere dominance and laterality. I will speak throughout of ‘the right hemisphere’ and ‘the left hemisphere’ as though these concepts were universally applicable. Clearly that cannot be the case. The terms represent generalisations about the human condition. Handedness is related to such organisation, but not in any straightforward way: for this reason, I will have little to say about handedness, fascinating as it is, in this

book – except where it seems legitimately to reflect evidence of hemisphere preference.¹⁶ In talking about any biological variable, one is making some sort of generalisation. Men are taller than women, but the fact that some women are taller than some men doesn't render the point invalid. Handedness is one such variable. The situation is complicated by the fact that handedness is not a single phenomenon; there are degrees of handedness in different individuals for different activities (and different 'footedness', 'earedness', and 'eyedness', for that matter). However, in the West at present, about 89 per cent of people are broadly right-handed, and the vast majority of these have speech and the semantic language centres in the left hemisphere – let's call this the standard pattern.¹⁷

In the other 11 per cent, who are broadly left-handed, there will be variable conformations, which logically must follow one of three patterns: the standard pattern, a simple inversion of the standard pattern, or some rearrangement. The majority (about 75 per cent) of this 11 per cent still have their speech centres in the left hemisphere, and would appear to follow broadly the standard pattern.¹⁸ It is, therefore, only about 5 per cent of the population overall who are known not to lateralise for speech in the left hemisphere. Of these some might have a simple inversion of the hemispheres, with everything that normally happens in the right hemisphere happening in the left, and vice versa; there is little significance in this, from the point of view of this book, except that throughout one would have to read 'right' for 'left', and 'left' for 'right'. It is only the third group who, it has been posited, may be truly different in their cerebral organisation: a subset of left-handers, as well as some people with other conditions, irrespective of handedness, such as, probably, schizophrenia and dyslexia, and possibly conditions such as schizotypy, some forms of autism, Asperger's syndrome and some 'savant' conditions, who may have a *partial* inversion of the standard pattern, leading to brain functions being lateralised in unconventional combinations. For them the normal partitioning of functions breaks down. This may confer special benefits, or lead to disadvantages, in the carrying out of different activities.

Dealing with these anomalous situations, intriguing and important as they are, lies beyond the scope of this book. But one point is worth making in relation to this last group, those with unconventional alignments of functions within either hemisphere. If it should turn out that the development of the semantic and syntactic language centre in the left hemisphere is a key determinant of the way of seeing the world associated with that hemisphere as a whole, its translocation to the other hemisphere – or alternatively, the translocation into the left hemisphere of normally right-hemisphere functions – could have widely different, even opposing, effects in different cases. The point is this: does the coexistence in the *same hemisphere*, be it right or left, of language and what are normally right-hemisphere functions, lead to language being 'reinterpreted' according to the characteristic mode of a normal right hemisphere, or does it lead to the opposite effect – the other functions going on in that hemisphere being transformed by (what would be normally) a left-hemisphere way of seeing things? To put it simply, does placing a maths professor in a circus troupe result in a flying mathematician, or a bunch of trapeze artists who

can no longer perform unless they have first calculated the precise trajectory of their leap? Probably both scenarios are realized in different individuals, leading to unusual talents, and unusual deficits. This may be the link between cerebral lateralisation and creativity, and it may account for the otherwise difficult to explain fact of the relatively constant conservation, throughout the world, of genes which, at least partly through their effects on lateralisation, result in major mental illnesses, such as schizophrenia and manic-depressive psychosis (now known as bipolar disorder), and developmental disorders, such as autism and Asperger's syndrome. It may also be associated with homosexuality, which is thought to involve a higher than usual incidence of abnormal lateralisation. Such genes may, particularly in the case of mental illness, be highly detrimental to individuals, and have an impact on fertility for the population at large – and would therefore have been bred out long ago, if it were not for some hugely important benefit that they must convey. If they also, through their effects on lateralisation, in some cases led to extraordinary talents, and if particularly they did so in relatives, who have some but not all of the genes responsible, then such genes would naturally be preserved, on purely Darwinian principles.

Whether that is the case or not, we need to understand better the nature of the normal left and right hemispheres. In this book, therefore, I propose to deal only with the typical cerebral organisation, the one that has greater than 95 per cent currency and which, by the same 'winner takes all' argument, has universal applicability to the world in which we live for now.

ESSENTIAL ASYMMETRY

'The universe is built on a plan, the profound symmetry of which is somehow present in the inner structure of our intellect.'¹⁹ This remark of the French poet Paul Valéry is at one and the same time a brilliant insight into the nature of reality, and about as wrong as it is possible to be.

In fact the universe has no 'profound symmetry' – rather, a profound *asymmetry*. More than a century ago Louis Pasteur wrote: 'Life as manifested to us is a function of the asymmetry of the universe . . . I can even imagine that all living species are primordially, in their structure, in their external forms, functions of cosmic asymmetry.'²⁰ Since then physicists have deduced that asymmetry must have been a condition of the origin of the universe: it was the discrepancy between the amounts of matter and antimatter that enabled the material universe to come into existence at all, and for there to be something rather than nothing. Such unidirectional processes as time and entropy are perhaps examples of that fundamental asymmetry in the world we inhabit. And, whatever Valéry may have thought, the inner structure of our intellect is without doubt asymmetrical in a sense that has enormous significance for us.

As I have said, I believe that there are two fundamentally opposed realities rooted in the bihemispheric structure of the brain. But the relationship between them is no more symmetrical than that of the chambers of the heart – in fact, less so; more like that of the artist to the critic, or a king to his counsellor.

There is a story in Nietzsche that goes something like this.²¹ There was once a wise spiritual master, who was the ruler of a small but prosperous domain, and who was known for his selfless devotion to his people. As his people flourished and grew in number, the bounds of this small domain spread; and with it the need to trust implicitly the emissaries he sent to ensure the safety of its ever more distant parts. It was not just that it was impossible for him personally to order all that needed to be dealt with: as he wisely saw, he needed to keep his distance from, and remain ignorant of, such concerns. And so he nurtured and trained carefully his emissaries, in order that they could be trusted. Eventually, however, his cleverest and most ambitious vizier, the one he most trusted to do his work, began to see himself as the master, and used his position to advance his own wealth and influence. He saw his master's temperance and forbearance as weakness, not wisdom, and on his missions on the master's behalf, adopted his mantle as his own – the emissary became contemptuous of his master. And so it came about that the master was usurped, the people were duped, the domain became a tyranny; and eventually it collapsed in ruins.²²

The meaning of this story is as old as humanity, and resonates far from the sphere of political history. I believe, in fact, that it helps us understand something taking place inside ourselves, inside our very brains, and played out in the cultural history of the West, particularly over the last 500 years or so. Why I believe so forms the subject of this book. I hold that, like the Master and his emissary in the story, though the cerebral hemispheres should co-operate, they have for some time been in a state of conflict. The subsequent battles between them are recorded in the history of philosophy, and played out in the seismic shifts that characterise the history of Western culture. At present the domain – our civilisation – finds itself in the hands of the vizier, who, however gifted, is effectively an ambitious regional bureaucrat with his own interests at heart. Meanwhile the Master, the one whose wisdom gave the people peace and security, is led away in chains. The Master is betrayed by his emissary.