

ZEN PHYSICS

The Science of Death, the Logic of Reincarnation

David Darling

I believe that there is some incredible mystery about it. What does life mean: firstly coming-to-be, then finally ceasing-to-be? We find ourselves here in this wonderful rich and vivid conscious experience and it goes on through life, but is that the end?... Is this present life all to finish in death or can we have hope that there will be a further meaning to be discovered?

—Karl Popper

Men fear Death as children fear to go in the dark; and as that natural fear in children is increased with tales, so is the other.

—Francis Bacon

Human kind cannot bear very much reality.

—T. S. Eliot

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INTRODUCTION

Truth sits on the lips of dying men.

—Matthew Arnold

It may happen in five minutes or in fifty years, but at some point you will die. There is no escaping it. And then what? Will it be the end? Is death a void, a nothingness that goes on forever? Or is it merely a phase transition — the start of a new kind of existence, beyond our old bodies and brains? This is the ultimate question a human being can ask: the question of his or her own destiny. Yet to most people it must seem frustratingly unyielding, an impenetrable problem to which only death itself will bring a solution. Try as we might, we seem

never to come any nearer to understanding what our final fate will be. So we look around in every direction for guidance, but what we are asked to believe depends on whom we listen to. When we are young, we quiz our parents, teachers, and friends about what happens when we die, but for the most part we are treated to platitudes, folk tales, or embarrassed hesitations. Later, perhaps less bright-eyed and more pragmatic, we may simply give up asking, having reached the unsatisfying conclusion that no one from the pope on down really has a better insight into the problem of death than we do. The priest, the physicist, the mystic, the brain physiologist, the fellow standing next to us in the bar — all may have something worthwhile to say, providing they are willing to break one of society's greatest taboos and talk freely about death. But their opinions are discouragingly diverse.

Still we cannot help wondering: Do we have a soul? Or are we nothing more than biological machines whose consciousness ends forever at the instant our organic works break down? If it turns out that there is nothing supernatural in the world — no spirits, no heaven, no God in the customary sense — does this also rule out the possibility of survival beyond the grave?

There are many profound, unresolved mysteries in the universe, but none that touches us so deeply and intimately as the mystery of death. It can be unnerving to realize that every breath we take may be our last, that we stand each moment on the brink of . . . what? Everlasting life? Or eternal nonexistence?

The past two decades or so have seen a dramatic upsurge of popular interest in the possibility of an afterlife, similar to that around the turn of the nineteenth century when spiritualism created such a stir and was eagerly espoused by many as offering a possible portal on the world to come. Today's excitement stems mainly from numerous well-publicized stories of near-death experiences (NDEs). However, research into the phenomenon of NDEs, fascinating as it is, represents only one of many current lines of inquiry which can be used to deepen our understanding of what happens when we die. As I hope to show, enough is already known to begin a preliminary mapping of the terra incognita that lies on the other side of death — a mapping based not on faith or traveler's tales of worlds beyond (however valid these may be), but on direct logical and scientific inference.

Science has an outstanding track record. We have been able to apply it successfully to probing the origin of the universe, the composition of stars, the structure of atoms, the evolution of life, and a great range of other problems that might at one time have seemed well outside our scope. So there is no reason to suppose in advance that the problem of death should be scientifically intractable. On the contrary, we can start out with every hope of reasoning our way to a deep understanding of the process, meaning, and consequences of death.

At the same time, in tackling an issue like this, we need to recognize that it has both important objective and subjective elements. And, in fact, it is questions such as "What does death feel like?" and "What will death mean for me?" that interest us most on a personal level. The future of each of us as individuals and the threat that death poses to our identity, our very being, is what fascinates us above all else. Therefore, it would be missing the point to approach death in a too rigidly objective or reductionist frame of mind. We need the analytical tools of the physicist, yes. Rationality has to prevail if we are to make any progress at all. But it must be rationality tempered by a tolerant, human-centered outlook that allows into its inquiry not merely quantitative data but also the sincerely reported feelings and experiences of people who have encountered situations that are relevant in the context of death. Such an approach is more characteristic of Eastern modes of thought. Hence, Zen Physics: Zen for the subjective, Physics for the objective. But there is another, deeper reason for this choice of name, which, it will emerge, relates to the underlying nature of self and consciousness. We need, I believe, a whole-brain approach during life to appreciate what losing our brain at the point of death implies.

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When I first began thinking seriously about the problem of death, some fifteen years ago, I held no firm beliefs about such things as the soul or the afterlife. If pressed, I would have said it was most likely that death was simply the end of us. But I have been surprised and profoundly influenced by what I have found. Two main conclusions will be presented, both of which are remarkable and both of which, were it not for the force of evidence supporting them, might seem entirely beyond belief. The first is that a form of reincarnation is logically inescapable. There must be life after death. And there must, moreover, be a continuity of consciousness, so that no sooner have you died in this life than you begin again in some other. The second and even more significant conclusion is that far from giving rise to consciousness, the brain actually restricts it. Mind, it will become clear, is a fundamental and all-pervasive property of the universe.

Too often, science is seen as a potential destroyer of man's last hope of survival in a greater world. But this need not be so. Science after all simply means "knowledge." And you may find, as I have, that something akin to a spiritual — or at least a deep psychological — transformation can be achieved through logic and thought alone. Science, no less than mysticism and religion, offers a genuinely hopeful path to the future.

A wise man thinks of nothing less than death.

— Spinoza

Soon, very soon, thou wilt be ashes, or a skeleton . . .

— Marcus Aurelius

When life is full and we are young, a bright world surrounds us, open to inquiry. Only in the far distance is there a speck of darkness, a missing point of the picture. But as we age, this speck grows larger. As our lives draw to a close, this region of darkness fills the ground before us like the opening of a forbidding cave. Others have entered that cave before us — billions of others, including our relatives and friends — and it is claimed even that some have returned from a brief sortie across its threshold during so-called near-death experiences (NDEs) or, less convincingly, as ghosts. Yet, despite what comfort we may choose to draw from accounts of NDEs, tales of spiritual manifestations, or the reassurances of various religions, most of us remain deeply uncertain, and afraid, as to what lies ahead. Death is the great question mark at the end of life, the mystery we long to solve but seem unable to. And yet it is an event, a transition, a portal, we must each go through sooner or later. It is a question that, in the end, holds an answer for every one of us.

Your death became a future fact at the moment a particular sperm cell from your father united with a particular ovum inside your mother. At that instant your personal hourglass was upturned and the sands of your life began to fall. Now no matter how hard you try to stay vigorous in body and mind, it will not affect the final outcome. No amount of progress to combat the effects of aging, through drugs, surgery, or other means, can do more than briefly postpone the inevitable. Your body is destined progressively to wear out and ultimately to fail. And then?

As soon as a person's heart stops beating, gravity takes hold. Within minutes a purple-red stain starts to appear on the lowermost parts of the body, where blood quickly settles. The skin and muscles sag, the body cools, and within two to six hours rigor mortis sets in. Beginning with a stiffening of the eyelids, the rigidity extends inexorably to all parts of the body and may last for between one and four days before the muscles finally relax.

Two or three days after death, a greenish discoloration of the skin on the right side of the lower abdomen above the cecum (the part of the large intestine nearest the surface) provides the first visible sign of decay. This gradually

spreads over the whole abdomen and then on to the chest and upper thighs, the color being simply a result of sulfur-containing gases from the intestines reacting with hemoglobin liberated from the blood in the vessels of the abdominal wall. By the end of the first week, most of the body is tinged green, a green that steadily darkens and changes to purple and finally to black. Blood-colored blisters, two to three inches across, develop on the skin, the merest touch being sufficient to cause their top layer to slide off.

By the end of the second week the abdomen is bloated. The lungs rupture because of bacterial attack in the air passages, and the resulting release of gas pressure from within the body forces a blood-stained fluid from the nose and mouth — a startling effect that helped to spawn many a vampire legend among peasants who had witnessed exhumations in medieval Europe. The eyes bulge and the tongue swells to fill the mouth and protrude beyond the teeth. After three to four weeks, the hair, nails, and teeth loosen, and the internal organs disintegrate before turning to liquid.

On average, it takes ten to twelve years for an unembalmed adult body buried six feet deep in ordinary soil without a coffin to be completely reduced to a skeleton. This period may shrink dramatically to between a few months and a year if the grave is shallow, since the body is then more accessible to maggots and worms. However, soil chemistry, humidity, and other ambient factors have a powerful effect on the rate of decomposition. Acid water and the almost complete absence of oxygen in peat, for instance, make it an outstanding preservative. From Danish peat bogs alone, more than 150 well-kept bodies up to five thousand years old have been recovered in the last two centuries. And likewise, astonishingly fresh after five millennia was "Otzi the Iceman," found in 1991, complete with skin tattoos and Bronze Age tool kit, trapped in a glacier in the Ötztal Alps on the Austro-Italian border.

Accidental preservations aside, people throughout the ages have frequently gone to surprising lengths to ensure that their corpses remained in good shape. Most famously, the ancient Egyptians were obsessed by corporeal preservation, to the extent of mummifying not just themselves but also many kinds of animals which they held to be sacred. The underground labyrinths of Tuna-el-Gebel, for instance, are eerily crowded with the mummies of baboons and ibis. Incredibly, at least four million of the latter went through the elaborate embalming process — a process that made copious use of the dehydrating salt natron, excavated from around the Nile and parched desert lakes.

All mummies preserved by the old Egyptian method are very long dead — with one bizarre exception. In 1995, the Egyptologist and philosopher Robert Brier of Long Island University completed the first mummification in this traditional style in more than 2,000 years. His subject was a seventy-six-year-old American who had given his body to science. Brier went to great pains to follow the old methods, traveling to Egypt to harvest his natron (principally a mixture of sodium carbonate and bicarbonate) from the dry shores of Wadi Natrun, and using authentic replicas of embalming tools from the first millennium B.C. Just as the

mortician-priests of the pharaonic tombs would have done, Brier drew out the man's brain (The Egyptians discarded the brain because they drew no connection between it and the person's mind or soul. Mental life, they believed, was concentrated in the heart. To us this seems odd since it "feels" as if thought takes place inside our heads. If we concentrate hard for too long our head aches. Did the Egyptians experience "heartache" instead?) by way of the nostrils, extracted the major organs before storing them individually in canopic jars, and finally left the body for several weeks to completely dehydrate, swaddled and packed in the special salt. Only the subject's feet were visible, wrapped in blue surgical booties. Rejecting criticisms that his research was in poor taste, Brier claimed the experiment had shown beyond doubt that it is the action of natron, more than any other factor, that affords mummies their well-kept look.

The Romans, too, were familiar with the drying and preservative properties of certain chemicals. So-called plaster burials, in which lime or chalk (both drying agents) or gypsum (a natural antiseptic) was packed around the body in the coffin, have turned up in Roman cemeteries in Britain and North Africa.

More recently, wealthy Victorians went to enormous trouble to carefully dispose of their corpses. Burial in crypts and catacombs came into fashion — and not only because it gave the well-heeled, through the ostentatious grandeur of family vaults, a way to display their social standing. There were more sinister reasons to try to ensure a safe place for burial. Locked doors were a deterrent to body snatchers who might otherwise hawk your remains for illegal medical dissection or, worse, pry out your teeth for use in making dentures. Also, the Victorians had an acute fear of being buried alive — better, they reasoned, to revive in a room with some chance of escape than in a horribly cramped coffin piled over with earth.

It is no coincidence that the average interval between death and burial in Britain lengthened from about five days in the late eighteenth century to eight days in the early nineteenth century. The object was to allow plenty of time for obvious signs of decay to develop, which would serve a dual purpose: to reassure relatives that their loved one was indeed dead and also to render the body less desirable to thieves.

People at this time often included in their wills bizarre requests concerning the disposal of their bodies. They would ask, for instance, that bells be attached to their corpse or that a razor be used to cut into the flesh of their foot to make absolutely sure they were not still alive before being interred. And in Imperial Russia perhaps the most wonderfully eccentric precaution of all was dreamed up to counter the possibility of premature burial. In 1897, having witnessed the remarkable revival of a young girl during her funeral, Count Karnice-Karnicki, chamberlain to the czar, patented his "life-signaling coffin." The slightest movement of the occupant's chest would trigger a spring-loaded ball, causing a box on the surface connected to the spring by a tube to open, thereby letting light and air into the coffin. The spring was also designed to release a flag on the

surface, a bell that would ring for half an hour, and a lamp that would burn after sunset. Alas, history does not record if the count's ingenious invention ever left the drawing board.

Our choice of whether to be buried or not may be made on purely aesthetic grounds. We may be somewhat comforted by the idea of our bodies returning to nature as part of the grand recycling process. Alternatively, we may find the thought of being consumed by insects and bacteria too revolting to contemplate and, as a result, opt for a less organic mode of disposal. But, for some people, burial after death is important for religious reasons. Most obviously, according to Christian doctrine, there will be a resurrection of the dead on the Last Day of Judgment. The graves will be opened, say the scriptures, and saints and sinners will stand before the Son of God and be judged. Interpreted literally, this might suggest we should do our best to try to preserve whatever we can of our erstwhile selves so that there is at least something left of us to resurrect. And yet, in all honesty, it is hardly a realistic ambition. Whatever precautions we take to have our remains securely interred, nothing of our bodies — not even our bones — will survive the many millions of years that lie ahead in the Earth's future.

By contrast with burial, today's most common mode of disposal, cremation, annihilates a corpse at tremendous speed. In less than an hour, in a gas fire at temperatures of between 1100 and 1750 degrees Fahrenheit, the body reduces to just a few pounds of white ash, which can then be stored or dispersed according to whim — scattered over a favorite hillside perhaps, or, in the most exotic way imaginable, jettisoned into space from a rocket to boldly go where Gene Roddenberry, creator of *Star Trek*, has gone before.

Alternatively, organs of the body may be bequeathed so that they go on serving a useful function, other than as fertilizer, inside someone still alive. Yet another option was that chosen, in pretransplant days, by the British geneticist and writer J. B. S. Haldane:

When I am dead I propose to be dissected; in fact, a distinguished anatomist has already been promised my head should he survive me. I hope that I have been of some use to my fellows while alive, and I see no reason why I should not continue to be so when dead. I admit, however, that if funerals gave as much pleasure to the living in England as they do in Scotland I might change my mind.

Tragedy and dark comedy often seem to be companions in death. We take ourselves so seriously, invest such effort in our public image, work so hard at building a secure and comfortable niche for ourselves — and then what? All the pretense of modern life is stripped away and we end up desiccated, dissected, or decomposed.

Or do we? Our organic forms are obviously doomed. But are we more than just our living bodies and brains? Does some part of us — an inner essence, a soul or spirit — escape the dissolution of flesh?

Haldane put the case for the prosecution:

[S]hall I be there to attend my dissection or to haunt my next-of-kin if he or she forbids it? Indeed will anything of me but my body, other men's memory of me, and the results of my life, survive my death? Certainly I cannot deny the possibility; but at no period in my life has my personal survival seemed at all a likely contingency.

If I die as most people die, I shall gradually lose my intellectual faculties, my senses will fail, and I shall become unconscious. And then I am asked to believe that I shall suddenly wake up to a vivid consciousness in hell, heaven, purgatory, or some other state of existence.

Now, I have lost consciousness both from blows on the head, from fever, anesthetics, want of oxygen, and other causes; and therefore I know that my consciousness depends on the physical and chemical conditions of my brain, and that very small changes in the organ will modify or destroy it.

But I am asked to believe that my mind will continue without a brain, or will be miraculously provided with a new one.

The basic materialist view of death, now widely held by scientists and layfolk alike, seems, on the face of it, bleak beyond despair. "We" — our minds — appear to be nothing more than outgrowths of our living brains, so that inevitably we must expire at the moment our neural support structures collapse. Death, from this perspective, amounts to a total, permanent cessation of consciousness and feeling — the end of the individual. Considering how anxious most of us are at the thought of losing merely our jobs or possessions, it is hardly surprising that, in an increasingly secular society, the fear of death — of losing everything, including ourselves — has become so deep and widespread. Yet exactly what are we afraid of?

Epicurus pointed out the irrationality of fearing the end of consciousness in his *Letter to Menoeceus*:

Become accustomed to the belief that death is nothing to us. For all good and evil consists in sensation, but death is deprivation of sensation. And therefore a right understanding that death is nothing to us makes the mortality of life enjoyable, not because it takes away the craving for immortality. For there is nothing terrible in life for the man who has truly comprehended that there is nothing terrible in not living.

Others have echoed this view, including Ludwig Wittgenstein: "We do not experience death," he insisted; "Our life has no end in just the way in which our visual field has no limit." To use a mathematical analogy, just as an asymptotic curve comes closer and closer to a line but never actually touches it, so we move closer toward death throughout life but never actually reach death in experience (if by death we mean the end of an individual's consciousness).

Ironically, one of the possibilities we tend to dread the most — that death represents a one-way trip to oblivion — turns out to be something we need have no fear of at all. Socrates even enjoined us to look forward to it. In his *Apology* he explained:

Death is one of two things. Either it is an annihilation, and the dead have no consciousness of anything, or . . . it is really a change — a migration of the soul from this place to another. Now if there is no consciousness but only a dreamless sleep, death must be a marvelous gain . . . because the whole of time . . . can be regarded as no more than a single night.

We can put it even more dramatically than this. If death marks a permanent end of your consciousness, then *from your point of view* when you die, the entire future of the universe (running into tens of billions of years or more) must telescope down not just into a night, as Socrates described, but into a fleeting instant. Even if the universe were to go through other cycles of expansion and contraction, then all of these cycles as far as you are concerned would happen in zero time. What conceivable basis for fear could there be in such an absence of experience? We may as well be afraid of the gap between one thought and the next.

Marcus Aurelius was among those who offered another way to come to grips with the prospect of nonbeing: the period after death, he pointed out, is like the period before birth. You didn't spend the billions of years before you were born in a state of anxiety and apprehension, because there was no "you" to be aware of anything. Looking back now, it doesn't seem frightening that there was once a time when you were not conscious. Why then should you be concerned about returning to that nonexistent, nonconscious state when you die?

On a purely academic level, we can follow these arguments and appreciate the logic in them. And yet, for most of us, they ring hollow. They fail utterly to dispel the visceral dread we have of plunging into the terminal darkness, alone. The fear of death, *timor mortis*, the horror of the ultimate abyss that waits to claim us all, is far too deeply ingrained in our nature to be alleviated by mere rhetoric. Indeed, it is a fear whose origins go back to the very dawn of our planet.

On Earth, at least, life began as molecules of increasing complexity came together purely by chance in the primitive terrestrial ocean. In one scenario, a rich chemical broth activated by unshielded high-energy radiation from the sun and powerful lightning strikes gave rise to the first molecules that could make copies of themselves — the precursors of today's DNA. There is no mystery about this. Any assortment of objects, especially "sticky" objects like molecules, randomly stirred for long enough will give rise to every conceivable possible combination. Over millions and millions of years, the simple atomic and molecular units bumping into one another, under energetically favorable conditions, must have come together in all sorts of different ways. Most of these complicated associations would have been unstable. And even if they had been stable under normal conditions, a hard enough collision with some other particle or a well-aimed ultraviolet ray would have broken them apart. Eventually, however, a certain formation of molecular units combined to give a supermolecule that, by chance, could act as the template and docking station for making precise copies of itself. No sooner did this happen than the

supermolecule spread rapidly throughout the waters of the young Earth. Possibly there were several variants of such self-replicating substances which competed for resources. Not that there was any thought of competition at the time; there was as yet no substrate for thought at all. But in the chance emergence of self-copying molecules we can discern, from our future vantage point, the first stirrings of life, the beginnings of the struggle to survive in a potentially hostile world — and the origins of self.

Nature lays down no boundaries between life and nonlife. What we choose to call living is our own affair. Is an intricate self-replicating molecule alive? What if the molecule, through natural selection, acquires a kind of protective skin? The point at which we want to say that life has developed from nonlife is open to interpretation and debate since it is purely a human issue — a question of labels. In reality, self-copying materials just became progressively more effective at surviving, more elaborate, and more capable through a process of blind, natural competition. Having internalized, as it were, their own blueprint, they became subject to random mutation. Struck by a penetrating photon from the sun or possibly a cosmic ray, a self-replicator risked its internal code being minutely altered. And, if this happened, then in the next generation an individual built according to a slightly different design would be created (providing the change had not altogether impaired the assembly mechanism). Most commonly such a mutant would prove less effective than its parent at staying in one piece long enough to have offspring of its own. But very occasionally a mutant would be born with an advantage over its parent and peers — the ability, for instance, to make copies of itself more rapidly, or to better resist attack from competitors.

In general terms, then, there is no problem in understanding how a variety of competing life-forms — primitive but steadily evolving toward greater sophistication — appeared on Earth long ago. None of these early creatures was anything more than a bundle of biochemicals wrapped up in a membrane bag. Even so, in their makeup and activity, we can recognize the inception of a new quality in the universe. These ancient gelatinous specks of matter showed the beginnings of self-interest and purpose. They had established barriers, definite, sustainable boundaries between themselves and the outside world. And although the heady heights of human intellect and introspection lay almost four billion years away, even the most elementary of life-forms harbored information at some level about what was part of their own constitution and what was not. They were, at least chemically, self-aware. Thus, the foundations for dualism — the belief in the separation of self and the rest of the world — were laid.

What we see from our biased viewpoint to be the most significant advance in evolution is the movement toward increased cerebration — the development of bigger, more elaborate brains and nervous systems. The ability of a creature to retain within itself a sophisticated representation of the world outside is held by us in high regard. But the greatest accolade of all we reserve for ourselves and

the capacity we alone seem to have to be conscious of ourselves as free agents in a world amenable to our control.

Natural selection gives no vector of progress. There was never any master plan to build bigger, better brains. But with hindsight, it seems almost inevitable that once life had become established it would develop in the direction of increased self-awareness. To be aware of yourself is to have an effective knowledge of where you end and the rest of the universe begins, so you know precisely on which battle line to fight. And being an individual in the wild *is* a battle, a continual, desperate struggle to stay alive. Any number of events can destroy you. A terrifying array of predators are out there trying to make you their next meal. Or, if you are not sufficiently aware of what is going on around you, you may fall victim to some other unfortunate accident. Or you may simply not find enough to eat. And no one is going to help you. On the contrary, your equally determined adversaries will take full advantage of any sign of weakness that you display. Given such perilous circumstances, the stronger your sense and skills of self-preservation, the better it is for you. Indeed, being and remaining an individual *necessitates* that you be uncompromisingly selfish.

We sometimes wonder how humans can be so cruel and ruthless, how they can lay waste to the planet with impunity, how they can exterminate other species and kill one another in alarming numbers. But such acts are not difficult after four billion years' practice. To stay alive at any cost, at anyone else's expense, is in our nature. It is the prime directive of our genes.

We are driven relentlessly to survive. And to aid us in this quest we have become equipped with the most remarkable survival organ in the known universe — the human brain. Such is the brain's power that it can construct and maintain a vivid sense of its own identity, its own unique selfhood. And yet it can also, with equal ease, cast its thoughts into the future and see its own inevitable demise. Here, then, is the source of our greatest fear. We know full well that the brain and body will eventually break down. Yet such is our urge to carry on living that we cannot come to grips with the notion that the self presently associated with this doomed receptacle may similarly come to an abrupt end. The world and other selves will survive our personal death, we know. But this seems like small consolation if the particular selves that are you and I cannot, at least in some recognizable form, continue indefinitely.

Perhaps it was bound to happen that our race would go through this stage of uncertainty in its development. Maybe all creatures in the universe who become self-aware pass through a lengthy phase when they wrestle with the potentially devastating contradiction of a self-conscious survival machine that knows beyond all doubt that it *cannot* survive. But our combined intellect is formidable, capable of revealing deep, unexpected truths about the origin and nature of the cosmos. And there are no grounds a priori to suppose that it cannot also penetrate the more personal mysteries of the human self and mortality. Considering the

importance of these issues to us, the time is surely ripe to embark upon such an investigation. And, providing we are prepared to take a broad-minded scientific approach, we can expect after millennia of doubt to shed real light on the problems of who we are and what happens to us when we die.

2

THE SOUL IS DEAD, LONG LIVE THE SELF

And we, who are we anyway?

—Plotinus

Throughout history, people have countered the threat of death by believing in the existence of an immortal human spirit or soul. This soul, which is supposed to encapsulate all that is important about a person, is generally thought of as being like a pilot who, during life, works the controls of the body and brain. At death, as the physical body plunges to its doom, the ghostly pilot ejects in the nick of time (or is rescued by divine intervention) and hence survives to live on in some hereafter. Or so the hope goes. It is an attractive and comforting idea. And there is no doubt that most of us do need some notion of this sort to hold on to, if only to imbue our lives and the lives of our loved ones with more meaning.

It would be immensely reassuring, for instance, if a theory like that of the seventeenth-century French philosopher René Descartes were to be scientifically vindicated. Descartes believed strongly in the separate existence of the body and the soul. And he went so far as to identify the seat of the soul as the pineal gland, a neurological structure he chose because it was both centrally located and the only bit of the brain he could find that was not duplicated in the two cerebral hemispheres. The tiny pineal gland, in Descartes' view, served as the meeting place, or interface, between the material brain and the immaterial soul, which he equated with the mind or ego.

At first sight, it seems a reasonable enough conjecture (even though we might dispute the choice of the pineal). But the problems for any seat-of-the-soul hypothesis start as soon as we focus on the exact means by which the brain and the soul might interact. The brain is demonstrably built of ordinary matter, whereas the soul is presumed to consist of something else entirely — "mind stuff," or *res cogitans*, as Descartes called it. Crucially, the soul is held to be not merely tenuous, with an elusive nature similar to that of photons (light quanta) or neutrinos (capable of passing straight through the Earth without being absorbed),

but actually *nonphysical*. In its very conception the soul stands outside the normal scheme of physics. And so, from the outset, we are at a loss to understand how it could possibly influence or be influenced by material objects, including the brain.

By the same token, the soul could not be expected to leave any trace on a detector or measuring device — a point, however, that has failed to deter some researchers. Sporadic efforts have been made over the past century or so to disclose the departure of the soul by weighing people shortly before and after death, but with negative results. The intriguing electric fields that surround living things and that can be visualized through the technique of Kirlian photography have also been posited, unconvincingly, as evidence for a spiritual life force. And, most recently, advanced scanning methods have been employed, notably by the American neurologist Richard Restak, to search the inner recesses of the brain for a soul in hiding, but to no avail. The fact is, the soul as it is normally presented is not a phenomenon open to scientific investigation. Nor is there any logic in claiming, on the one hand, that the soul is nonphysical or supernatural and, on the other, that it can have physical effects. Science will never be able to disprove the existence of the soul, any more than it can disprove the existence of fairies or fire-breathing dragons. The gaps between what we know can always be filled with whatever people choose to dream up. But any rational inquiry into death must start from the evidence at hand.

We also need to be cautious before jumping to conclusions about the soul when there is such a clear and powerful motive for us to *want* to believe in it. (The same argument applies to other marginal phenomena, such as ghosts, telepathy, and UFOs, all of which appeal to our need for a "higher" truth.) Potentially, the soul is a lifeline, a way of avoiding the terrifying finality of death. Imagine what a difference it would make to us psychologically if we knew, as certainly as we know we have a brain, that there is part of us that cannot die. We have a vested interest in the soul hypothesis being correct. And *this fact alone* is sufficient (whatever other elements may be involved) to account for the global, intercultural, long-standing belief in souls and an afterlife — a belief that has flourished in spite of a conspicuous lack of evidence.

Clearly, there is something very different between a lifeless corpse and a living, breathing, sentient person. But *what* is different? During life, is there an aspect of us that is above and beyond the mere workings of a biological machine? Or are we, after all, nothing more than a temporary aggregation of chemicals and cells?

We have a strong tendency to feel as if we are something extra beyond our bodies and brains — that we are, in effect, an intelligent life force dwelling within an organic shell. This makes it easy to go along with the suggestion of dualists such as Descartes, that the mind is not just an upshot of the functioning brain but, on the contrary, is a deeper and further fact. In the dualist's scheme, each of us has — or is — a "Cartesian ego" that inhabits the material brain. And from this

position, in which the mind is held to be distinct from the living brain, it is a short (though not inevitable) step to the assertion that the mind is capable of an entirely independent existence, as a disembodied soul.

Dualism is simple and desirable to believe in. But then, from a child's point of view, so is the Easter Bunny. In time, we come to appreciate (often with regret) that an extremely large, beneficent rabbit is not essential to explaining the origin of a surfeit of concealed eggs at Easter. Similarly, most neurologists have now reached the conclusion that a Cartesian ego or self is not needed to account for the existence of the self.

It is a consensus fast approaching unanimity in scientific circles that "we" (ourselves) are no more than the consequences of our brains at work. In the modern view, we are mere epiphenomena or, more charitably perhaps, culminations, of the greatest concentration of orchestrated molecular activity in the known cosmos. And although it is true we don't yet know exactly how the trick is done — these are still frontier days in the brain sciences — it is widely held to be only a matter of time before those who are teasing apart the circuitry of the human cortex lay bare the hidden props of the illusion. The situation is as brutally materialistic as that. There is not the slightest bit of credible evidence to suggest there is more to your self, to the feeling of being you, than a stunningly complex pattern of chemical and electrical activity among your neurons. No soul, no astral spirit, no ghost in the machine, no disembodied intelligence that can conveniently bail out when the brain finally crashes to its doom. If science is right, then you and I are just transitory mental states of our brains.

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We think of ourselves as being definite people, unique individuals. But, at birth, within the constraints of our genetic makeup, *we are capable of becoming anyone*. For the first year or two of life outside the womb, our brains are in the most pliable, impressionable, and receptive state they will ever be in. At the neural level this is apparent in the fact that we are all born with massively overwired brains that contain many more embryonic intercellular links than any one individual ever needs. Such was the surprising finding of the first extensive electron microscope study of human neural synapses (brain cell connections) by pediatric neurologist Peter Huttenlocher of Chicago's Pritzker Medical School in 1979. By staining and examining tissues from the frontal cortex, Huttenlocher found that the infant brain has, on average, about 50 percent more synaptic connections than has an adult brain, though the immature synapses are different in shape and much less well defined. It is as if a wide selection of the potentialities of the human race, acquired over millions of years, are made available to each of us at birth.

During the first twelve months of life, a remarkable 60 percent of a baby's energy intake goes toward fueling the development of its brain. In this critical period, huge numbers of embryonic connections between neurons are lost (through lack of use) while others are reinforced and developed (through repeated use). From

being an incredibly sensitive, information absorbent, but otherwise useless lump of flesh, the brain rapidly acquires a highly patterned infrastructure that encodes a particular set of memories and beliefs about the world. Each brain loses the potential to become anyone, but gains, instead, the much more useful ability to conceive of itself as being a certain someone.

This transformation might seem almost magical if it weren't for the fact that we know, at least in general terms, how and why it comes about. A brain that was simply passive, naively experiencing its environment, reflecting everything but interpreting nothing, like a grinning Buddha, would quickly end up as a juicy morsel inside someone else's stomach. And so it would die, in blissful ignorance, before it could pass on its genes. And so there would be less grinning Buddhas in the future, but plenty more non-Buddha Buddha-eaters.

A real human brain starts out like a Buddha, all-receptive. But four billion years of ultraprimitive live-and-let-die evolution have ensured that it immediately, under preprogrammed genetic control, gets down to the business of metamorphosing into a tough, practical survival machine. Its onboard genetic commands swiftly guide it in the process of condensing from a sort of gaseous state of total, nondiscriminating naivety to a sharp, crystalline state of effective self-centeredness with the wits and street savvy needed to stay alive.

Unfortunately, we are absolutely, pathetically helpless throughout the period that this momentous development takes place, which is why a lengthy, protective, nurturing environment is so essential to humans (and other brainy animals). Simpleminded creatures, like amoebae, ants, and even alligators, come into the world "knowing" as much about their self-boundaries as they will ever know, albeit this knowledge is based purely on dumb reflexes and instinct. But our self-knowledge is a much more elaborate affair. Survival in the *Homo* niche demands being able to experience the self as an *agent* in the world, as an individual with the power to plan and predict and decide among alternative courses of action. Such knowledge can only be garnered through individual experience, by watching and learning from others who are already proficient at being the most ruthlessly effective survival machines in the known universe — men and women.

A crucial part of the development of our self-image involves the brain latching onto the game rules by which the individuals around it play. During infancy, and continuing into childhood and adolescence, the brain organizes itself around the prevalent attitudes and beliefs to which it is exposed. But it goes beyond building a general sociocultural belief system; otherwise everyone within a given race or clan would turn out pretty much the same. The brain *personalizes* its belief system by consolidating numerous, often highly subtle impressions it picks up from others about its particular character, intelligence, and status; its bodily appearance, gender role, and capabilities. Whether these impressions, received from parents, siblings, friends, and other people who are most influential during childhood are, in any absolute sense, "right" or "wrong" is not the issue. The brain will take them onboard whatever their merits, because they have come

from the only authorities it recognizes and has access to. As these specific, private details are absorbed and assimilated, they begin to form the personal dimension of the brain's emerging worldview. Consequently, the brain starts to think of itself not just as being in a particular world, but as being a particular someone in that world — a person, an agent with powers of its own, with qualities, both good and bad, desirable and undesirable, by which it is uniquely distinguished from all others.

With the rudiments of a belief system in place, the brain starts to *interpret* and *evaluate* everything that comes to its attention in terms of this resident catechism of received wisdom. Every sensation and perception, every incident and event, every word, gesture, and action of other people, is construed within the context of how the brain understands the world and itself to be like. Thus the brain steadily becomes more and more dogmatic, opinionated, and biased in its thinking. It tends to hold on to — that is, to remember — experiences that comply with and support its acquired worldview, while at the same time it tends to reject or deny anything that seems incongruous with its system of beliefs. So, the emerging belief system is further strengthened and validated. And in this way the brain builds for itself an island of stability, a rock of predictability, in the midst of a vast ocean of potentially fatal chaos and inexplicable change.

We are inventions of our genes, our culture, our society, our particular upbringing, but oddly enough we're not aware of being so utterly contrived. We recognize that other people in other places and times may hold views different from our own. But we tend greatly to underestimate the extent to which we ourselves are caught up, constrained, and molded by the paradigms imposed upon us. Our indoctrination begins at such an early age and is so all-pervasive that the rules and theories we acquire become hard-wired into our brains. In particular, the power of our closest caretakers to shape us is awesome. Our parents or guardians reflect back at us, with approval, those sounds and actions we make as infants which are considered most desirable and appropriate in progressing toward the people they want us to become (just as they, too, were once similarly shaped). Subsequently, we fail to recognize that the beliefs about the world and about ourselves which we carry around with us like sacred relics are tentative, and possibly completely wrong. Instead we go through life fully convinced that they are true. We come to share and accept with unquestioning obedience the concepts of normality held by those around us, because these concepts are literally part of ourselves: we are their embodiment.

Our early environment and interpersonal relationships determine the precise neural circuitry of our brains, and this circuitry in turn determines who we are. Having encoded a particular model of reality, the brain, without "us" even realizing it, gives a spin to every sight, sound, smell, taste, and touch that enters through the senses. In fact, the conditioning begins even before the conscious brain goes into action. Evolution has furnished us with a range of sensory repression systems that save us from having to be aware of and thereby

hopelessly overloaded and distracted by every minutia of our surroundings. So, just as the president has a team of minions to deal with all but the most crucial, relevant paperwork, the brain is able to deploy its attention, its executive power, where most needed by having the bulk of sensory input weeded out at a lower level.

Human vision, for instance, is an active process in which signals and perceptions are highly filtered, screened, and manipulated before they ever reach the higher centers of the cortex. We may feel as if we are directly and immediately aware of whatever images fall upon our retinas, but we are mistaken. Most of the handling of data from our eyes takes place at a subconscious level through a variety of largely independent specialized subsystems. And, strange though it may seem, some of the visual subsystems in our brains produce an output that "we" cannot see. They contribute to brain function and even to our awareness of the world, but no amount of introspection can make us aware of the subsystems themselves. One of the ways this is made most strikingly clear is by the strange neurological condition known as blind sight. Following some kinds of injury to the visual cortex, people may become blind in one half of their visual field. But although they claim an inability to see anything in their blind half, they sometimes seem capable of absorbing information from that half. For example, if asked to point to a spot of light on a screen on their blind side they will say they cannot see it at all and that they are just guessing its position. Yet they are able to point to it correctly far more often than would be expected by chance alone. Many other investigations, too, over the years have shown that much of what is actually registered by our eyes and brain escapes our conscious attention.

Survival for our ancestors would have been impossible if every datum of sensory input had been allowed to gain access to the inner sanctum of consciousness. By various means, then, we are shielded from the endless flux, the seething, ceaseless commotion both outside and among our neurons, the fact that neither we nor the world are ever the same from one moment to the next. Only when the integration is complete, and the flux has been smoothed and transformed into stability, does a final, coherent picture appear in our awareness.

All human beings are subject to similar biological and genetic conditioning. A Pygmy's eye works in the same way as a Parisian's; a neurologist would be at a loss to distinguish between the brain of a Japanese and that of a Scot. But the impact of different societies and cultures upon the developing self is much more diverse. We tend to underestimate this impact and so assume that people have always held their individuality and mortality clearly in mind, as we Westerners do today. However, looking at the history of death, and of how death was dealt with by people in the past, gives some clues to a possible evolution of self-awareness even over the past few hundred years. This is not to say that our relatively recent ancestors had no concept at all of themselves as unique individuals; to believe that humans have not always been self-aware to some degree is radical in the extreme. (Just such a view is expressed by Julian Jaynes in his book *The Origin*

of Consciousness in the Bicameral Mind. Jaynes, an American psychologist, has suggested that human self-awareness originated within the last two thousand years.) But it does seem as if there was a trend toward a more intensely focused awareness of self, especially during the early modern period.

In medieval Europe, society was rigidly structured. Everyone knew their place in the scheme of things — a scheme based on lineage, gender, and social class. There was virtually no chance of escaping one's birthright, whether as a peasant or a feudal lord, no scope for social mobility. To appreciate more readily the mentality of this time we have to recognize that our modern emphasis on the fundamental, overriding importance of the individual is not universal. Medieval attitudes lacked this emphasis, in large measure because of the overarching influence of the Church of Rome. The medieval faith in Catholicism was absolute. But what mattered in this faith was not the individual's role but the broad cosmic sweep of holy law and salvation. Personalities, individual differences and opinions, were considered irrelevant and undesirable in the face of such totalitarian religious belief. And this downplaying of the personal is reflected in the fact that medieval times produced virtually no autobiographies and very few biographies — and then only inaccurate, stereotypical lives of saints. In these writings, the psychology of the person makes no appearance; all that comes across is a cardboard cutout of a man or woman, an anodyne approximation to the Christian ideal, unashamedly embellished with archetypal miracle tales.

By the end of the Middle Ages, however, a change was evident. Instrumental in this was the rise of Protestantism, particularly in its most extreme form — Puritanism. John Calvin preached that some, "the Elect," were *predestined* to enter heaven, while most were doomed to spend eternity in hell. Absurd and intellectually offensive though this idea may appear now, it had the effect at the time of casting the individual into sharp relief, of differentiating between one person and another. And, in general, Protestantism of every kind argued for the private nature of religion. Catholics did not need, and were not expected, to face God alone. Priests, nuns, saints, the Virgin Mary, and all manner of rituals were on hand to intercede for the masses, so that the masses didn't have to think too hard or deeply for themselves, didn't have to become too involved as individuals or worry too much about the implications to themselves of the great issues of life, death, and redemption. Protestantism, by contrast, sought to diminish the gap between layperson and God, while Puritanism sought to close it completely. The Puritan faced God alone — in the privacy of the individual mind.

And there were soon to be other factors at work in the West, helping to turn the spotlight even more fully on each man and woman, forcing the self out of hiding. Not the least of these was the Industrial Revolution and, at its heart, that great engine, literally and figuratively, for change. Suddenly, the old agricultural lifestyle in which son did like father, and daughter like mother, generation after generation, and in which it was frowned upon and futile for the individual to act any differently from the rest, was swept away. And in its place was development

(often for the worse for those who lived in the new slums) and technological progress, the rise of personal ambition, of the entrepreneur, the winner and loser, and a new emphasis on individuality and concern for one's own welfare. Suddenly, it was good and potentially profitable to be an individual, to go one's own way, to be different from the crowd. And that attitude has not altered to this day.

In the modern West, we revere the self, we set it up on a pedestal. There has never before been a culture, a time, in which people focused so obsessively on the well-being and elevation of their egos. And what do these egos turn out to be? Nothing, says science, but artifacts of the brain. We — our feelings of being someone in the world — survive as long as the brain lives. And when the brain dies . . .

Our prospects look bleak. The very mode of inquiry that has helped shape the modern world and that we have come to rely upon so much informs us that, in effect, we are the dreams of carbon machines. There is no real substance to us, no deeper, further fact to being a person than just one feeling after another after another. Impressions, sensations, thoughts, emotions, continually well up into awareness and the sequence of these experiences, bound together by that fragile thing called memory, is projected by the brain as you and me.

Our choice of how to respond seems simple. We can despair or we can deny. We can throw up our hands and acknowledge that we are nothing more than illusions that will be exposed as such at the instant our brains die. Or we can reject the tenets of reductionist science and insist, based on faith alone, that some form of immortal soul *does* exist.

But there is a third option — one that appeals both to the intellect and to the heart. And this is to recognize that although, at one level, selves may not be as substantial as they normally appear, at another level they are real and important objects of inquiry. The very same situation applies to atoms, because modern physics has revealed beyond reasonable doubt that atoms consist almost entirely of empty space. And even the supposedly tangible nuggets of matter inside atoms — quarks (which make up protons and neutrons) and electrons — give no sign whatever of having any extension. Knowing this, it might seem incredible that, in large numbers, atoms can give such a convincing impression of solidity. And yet, in the everyday world, solid they undeniably are. If you bang your head, it doesn't ease the pain to be lectured on the fundamental immateriality of matter. In the same way, it is totally unconvincing, in the light of what we experience every day of our lives, to be told that selves have no real existence. On one level, at least, they certainly *do* exist. And we are just as entitled to regard selves as entities in their own right as we are to credit an independent existence to anything, from germs to galaxies, that fundamentally is composed only of empty space and pointlike particles.

The soul — whether it exists or not — appears to lie outside the realm of scientific inquiry. But this is not true of the self. We can probe the self in many different ways and, as a result, hope to learn more about what it means to have a self — and to lose it.



HEADS AND TALES

There was a young man who said "Damn!
It is borne upon me that I am
An engine which moves
In predestinate grooves
I'm not even a bus, I'm a tram!"

—*anonymous*

We would rightly regard someone who habitually spoke of himself as being a robot or a machine as being crazy. Yet this is precisely what science seems to be telling us about ourselves. The brain? An organic computer. Love? A process in those neurological systems that underpin mood. Anger? An activation of neural impulses in the amygdala/hypothalamus structures. And self-consciousness as a whole? A fairly recent, emergent phenomenon of matter.

All of this may be true. We may, in one sense, be awesomely complex machines. But such a description fails to do proper justice to the human condition, because we are not only objects in the world but also *objectifiers* — and both aspects of our nature, the outer and the inner, need to be encompassed by any credible worldview.

Other people see you objectively, from a spectator's standpoint, as a living human being with certain unique characteristics. They observe a body and, most importantly, on that body, a head. On that head they see a face — a face that in the subtleties of its ever-changing expressions projects a certain persona to the world. The eyes, in particular, have been called "the windows of the soul." But this pretty description does not allow for the fact that the face may be, and generally is, a kind of mask (the Latin *persona* refers to the mask worn by actors in ancient theater: *per* = "through," *sonus* = "sound"; hence, literally, the sound

that comes through the mask) hiding our genuine feelings. The outward face we present for the benefit of others (and so, indirectly, of ourselves) more often than not is a pretense, a concealment or misrepresentation, of the true state of the mind.

There is, then, this exterior view of you as a *dramatis persona* — an actor playing his or her part on the world's stage with the help of a convincing disguise. But there is also an interior view, to which you alone are privy. In mechanistic terms, as well as the appearance of the brain-body machine, there is the feeling of what it is like to be that machine — the subjective experience of being a certain someone. Consciousness, we might say, is the symmetry-breaking factor between the objective and the subjective.

To make this more clear, imagine that you are having your brain monitored by a superscanner. This scanner creates a detailed three-dimensional image highlighting the regions of the brain that are most active at any given time. Suddenly, a large screen in front of you, which had been dark, glows bright red. At the same instant, the scanner reveals a new region of activity in your brain — the physical correlate (presumably) of your perception of redness. Next, several other people have their brains scanned under exactly the same conditions. The result is a series of scans, including the one of your own brain, all of which are very similar. As far as you are concerned, the brain scans of the other people encapsulate all you can know of their reaction to the color red. In the language of physics, they represent complete "state descriptions" of your companions' brains. But when it comes to the scan of your own brain, it is patently obvious that it falls well short of capturing everything about your experience of redness. For what it leaves out is nothing less than the conscious experience itself! A more precise definition of consciousness follows, then, as that property which makes a detailed state description of the observer's own brain seem incomplete when compared with equally detailed state descriptions of the brains of other people. Another way of saying this is that no form of symbolic communication, verbal, graphical, or mathematical, can convey the essence of what it is like to be someone. Fortunately, each of us, being human, is already intimately familiar with what it is like to be one person. And since there is no reason to suppose that there are any great differences between the subjective experiences of one person and those of any other, language is *in fact* a useful way of telling each other what we are feeling.

Still, you are you, and I am me. Alike we may be in many ways, but undeniably we have our differences. Indeed, to a large extent, we are *defined* by our differences. To be a self is to be different from anyone else and to know it. And to be different and to know it involves having a clear conception of where "you" end and the rest of reality begins — an awareness of one's boundaries.

At first sight, it may seem obvious that a person's boundary — their interface with the external world—is just the surface of their skin. As Sigmund Freud put it: "The

I is first and foremost a bodily I." And it is certainly the simplest criterion of "I-ness" to apply. When we look at another human being, we have no trouble in deciding what is part of him or her and what is not. But the bodily I, by itself, is too simplistic a notion to capture all the possibilities of what we might consider ourselves to be. There is the question, for instance, of whether we are our bodies or whether we simply own them. The reductionist, the materialist, would claim the former, the Cartesian the latter.

In fact, the physical boundaries of self are nowhere near as fixed or well defined as we sometimes imagine them to be. If I lose an arm and have it replaced by a sophisticated prosthesis, does the artificial substitute become part of me or merely a new possession?

Today, implants, transplants, and prostheses can act as highly effective surrogates for so many bits of our original bodies that we are being forced to confront the issue of how much of a person can be replaced before a new individual is created. This dilemma will reach new proportions as partial transplants and prostheses for the brain become available. And in other ways, too, our physical bounds can appear to shift accordingly to circumstances. Normally mild-mannered and soft-spoken individuals, for instance, can at times seem to mutate alarmingly into aggressive, raving monsters when behind the wheel of a car, while skilled drivers and pilots often feel their vehicles to be seamless extensions of themselves. Has the link between man and machine become so close that we can sometimes regard the combination as being effectively like a new individual? And if so, what will be the consequences of even more intimate relationships between ourselves and our technology in the future as developments such as virtual reality take hold?

If you are nothing more than your body (or extended body), then is your corpse still you — or yours — after you die? Semantic problems obscure an easy answer. But more to the point, we are not really interested in our corpse, or the issue of its ownership, any more than we care about the fate of our hair once it has been cut off. What really matters to us is not what happens to our bodies when we die, but what happens to *us*. The implication is clear: we instinctively consider ourselves to be something more, or at least something very different, than just the material contents of our bodies and brains. We are the "what it is like to be" experience that our bodies and brains give rise to. And it is the long-term future of this "what-it-is-like-to-be-ness" that concerns us above everything else.

William James wrote: "Each of us spontaneously considers that by 'I' he means something always the same." We know that our moods and attitudes alter from one day to the next. And we recognize, too, that great changes are associated with going through the various stages of life. Adolescence, in particular, is a time of dangerously rapid physical and psychological transformation — a time of enormous upheaval and insecurity. Yet, through it all, we believe that at root we remain one and the same person.

Two aspects of ourselves stand out as appearing to be of crucial importance. First, *personal identity*. You may not look or even think much like you did when you were five years old, yet in spite of this you believe that, in a deep, underlying sense, something about you — your identity — has remained uncompromised. This belief of yours is shared unquestioningly by the rest of society and has to some extent been cultivated in you by society's influence. How very different the world might be if this belief were not widely held. If people did not generally maintain that personal identity were an inviolable fact then it would bring into question, for instance, whether an individual could be held responsible for a crime that he or she was supposed to have committed some time ago. If a person could not be uniquely or conclusively identified with any past self, then that person could not be said to have existed at the time of a particular crime. By the same token, we would not be able to take credit for anything worthwhile we thought we had done, since the achievements would be considered by others to belong to someone else who was no longer alive. Conventions such as marriage, parental rights, nationality, and ownership or membership of any kind would lose their meaning.

The second aspect of ourselves we consider to be fundamentally important is *continuity*. Identity and continuity may be spoken of as different qualities, but clearly they are related. The former implies the latter. Your identity is rooted in the continuous existence of your body. You look more or less the same as you did last year. And last year you looked more or less the same as you did the year before that. The chronologically arranged photos in your family album testify to the smooth and steady development of your body and appearance from infancy to the present day. No one would seriously argue with this. And just as obviously there seems to be a continuity in your mental life because of the relationship between your awareness and your brain.

"A person," says philosopher Jonathan Glover, "is someone who can have I-thoughts." To be capable of I-thoughts seems to imply the existence of self-consciousness. And yet both are elusive concepts. You know that you have I-thoughts. You know you are self-conscious. But in others it is not obvious how to decide when self-consciousness shades into a less focused form of awareness and when this, in turn, merges into an almost unconscious state. With regard to nonhuman species, for instance, how can we judge if any other animals might qualify, in a limited or modified sense, as persons? Does the brain of a bonobo (a pygmy chimp, the creature most genetically similar to ourselves) or a dolphin integrate its experiences in a manner that enables something resembling I-thoughts to emerge? Or, are I-thoughts the exclusive privilege of life-forms that have evolved a language sophisticated enough to subtend a symbolic image of self? In considering such matters we need constantly to bear in mind that just because we have words such as "I," "self," and "person" in our vocabulary gives us no guarantee that they correspond to anything real outside of our cultural context. How we choose to define and interpret the terms we have invented is entirely up to us, and nature is not compelled to follow suit.

Most people would be happy to agree that a jellyfish is not a person in that it almost certainly can't think of itself as an "I." To say that it can't think at all would be going too far — a jellyfish can process some kinds of information in ways that today's artificial intelligence researchers would be only too glad to be able to emulate in their machines. But a jellyfish cannot (as far as we know) generate thoughts such as "I'm happy," "I am being touched," or "I am stinging my lunch to death."

Children sometimes ask: "If you had to be a different kind of animal, what would it be?" Few people in their right minds (or rather, in their left minds — see chapter 6) would choose to be a jellyfish, or an ant, a worm, or a grasshopper. To be any of these, most of us might imagine, would probably be not much better or worse than being nonexistent. On a wish list of alternative life-forms, creatures with small brains or no brains at all would tend to come near the bottom, for the simple reason that we use mental prowess (gauged roughly by brain-to-body-size ratio) when differentiating between lower and primitive animals and those considered to be further up the evolutionary ladder. If you couldn't be human, the chances are you'd choose to be an ape, a cetacean, or a relatively smart domesticated animal such as a dog or a horse. You would naturally opt for a species that seemed to have a relatively secure, pleasant life, and that also had the wits to appreciate it — a species, in other words, that was as nearly human as could be arranged.

We sometimes wonder what it would be like to be a different kind of creature. Yet, in a sense, we already know, because we have effectively *been* different kinds of creatures during our own development. The growth of an individual human parallels, or recapitulates at a vastly accelerated rate, the general evolution of life on earth. We start out as a single-celled organism, like a bacterium or an amoeba. Then we progress through a simple, undifferentiated multicellular stage (a blastula) to become an embryo that, early on, is barely distinguishable from the embryos of many other animals, including reptiles and amphibians. For the first few weeks after conception we are truly a lower form of life ourselves, bathed in a warm amniotic sea. So, how *did* it feel to you? Can you recall? The problem seems to be that *you* were not really around at the time. And, consequently, it is difficult to imagine in what form any memories of this primal, pre-you phase of existence could be meaningful to or capable of being experienced by you now. By the same token, our brief spell as primitive creatures in the womb strongly suggests that lower life-forms have no well-developed conscious sense of self.

It seems that what we really mean by ourselves — the *feeling* of being an "I" — is not an all-or-nothing affair. In other species it may exist in a guise unfamiliar to us. In humans, it develops and changes over time. What we call self-awareness surely emerges as our minds construct an increasingly sophisticated symbolic representation of the outside world — an internalized portrayal of reality that, at some point during early childhood, comes to include our own bodies. Almost certainly, the same process took place during the evolution of mankind as a whole.

Much of what we believe about ourselves derives from how others relate and react to us. And, for this reason, total isolation from society can prove devastating. In 1988, a French woman, Veronique Le Guen, spent a record-breaking 111 days alone underground, 250 feet below the surface at Valat-Negre in southern France. Deprived of a clock, natural light, and any form of contact with others, Le Guen had only her diary for company. In one of the entries she described herself as being “psychologically completely out of phase, where I no longer know what my values are or what is my purpose in life.” It was an experience from which she never properly recovered, and in January 1990, at the age of thirty-three, she committed suicide. Her husband said, “She had an emptiness inside her which she was unable to communicate.”

Regular, close social interaction is vital to our self-definition, to bringing the fuzzy edges of our psychological bounds back into focus. (This is strangely analogous — and I wonder if it may be more than that — to the situation in quantum mechanics [see chapter 10] where repeated observations of an atomic nucleus serve to prevent it from decaying.) We assimilate the responses of our fellow humans both to our appearance and our behavior. And this results in a feedback loop. Our appearance and behavior are subject to change according to the internal image we hold of ourselves. And any modifications in how we appear outwardly affect people’s responses to us, which may result, again, in further alterations to our inner beliefs about ourselves. If people approve of how we look and act — if we conform to some positive, preconceived stereotype — then we will be praised and generally treated well, a response that will strengthen the already good self image we hold. On the other hand, if we deviate much from the norm and act disreputably, the feedback we receive will serve to confirm our worst fears that we are among society’s outcasts.

Experiments have been carried out in which people’s usual personas and roles are temporarily and drastically altered. In one of these studies, a group of college students was arbitrarily divided into two groups — prison warders and prisoners. The students were cut off from the outside world and encouraged to act their respective parts as realistically as possible. The warders pretended to treat their charges as potentially dangerous and untrustworthy criminals, while the latter feigned to look upon the uniformed officers as hated oppressors. After a short time, however, the students found themselves completely taken over by their roles; they were no longer acting. The warders genuinely regarded the inmates as being inferior and often behaved toward them in a brutal and domineering way. The prisoners, on the other hand, became cowed and actually afraid. It is remarkable how much and how easily our self-image can be changed by outside influences. Dress one day in torn jeans and unironed shirt, your hair unkempt, your attitude careless; then the next day go out to the same places in your best attire, immaculately groomed, acting confidently and assured. The difference in how others will treat you is staggering (I speak from experience!). Moreover, this dramatic shift in the attitude of others will have a powerful

influence on how you feel about yourself. You will feel, literally, like a different person.

Of course, most of the time we don't go out of our way to fabricate a new image of ourselves every day. We wear a uniform, in the broadest sense — a stable overall persona — because in this way we ensure that the reactions of others to us are reasonably predictable. And so the world is rendered less threatening and stressful. Our efforts at conforming to some particular role, whether it be as a rebel or as a stalwart of society, and the subsequent stabilizing of others' reactions to us, results in the creation of what seems to us, on the inside, a fairly well-defined, consistent self. We recognize "ourselves" more and more easily as we age; our life patterns become more and more predictable. But this is not to say that the self is ever *really* solid or secure. The self, the inner "I," remains no more than whatever feeling we are having at the present moment — a feeling shaped by the memories our brains have laid down of past experiences.

You and I are different not because different things are happening to us right now, but because, throughout our lives, our brains have acquired different narratives and ways of responding to the world. We are the products of our life stories. Your story is different than mine. But what is crucial in defining and distinguishing between us is not so much the differences between the actual events and surroundings that you and I have encountered, as it is the different way in which our brains have interpreted and remembered what has happened to us. An essential part of being human involves trying to make sense of the world, seeking and finding meaning (whether it is there or not). We have to do this from one moment to the next, every second of our lives. So, inevitably, a lot of what we remember is not what *actually* happened — whatever this may mean — but rather a kind of myth or confabulation that helps us sustain the impression that we know what is going on. We tell ourselves white lies all the time to bridge the gaps in our understanding of an impossibly complex world. And not only do we fail to realize they are untruths (indeed this would undermine all our efforts) but we lay down these countless little fictions in our memories and subsequently treat them as if they were factual. We maintain a sense of continuity and so provide a basis for our feeling of personal identity at the cost of never knowing what is true. We are as much a myth as the stories we tell ourselves.

How then can we discover what is real — assuming there is such a thing? Stories we may be. The self, the "I," the ego, whatever we choose to name what we thought was our true essence, may be as insubstantial as a unicorn's fear of a dragon. But we cannot just leave it there. We do feel like someone, a being with inner depth. And we do want to know what it will feel like to die, and whether what follows death feels like anything at all.

REMEMBER ME?

You have to begin to lose your memory, if only in bits and pieces, to realize that memory is what makes our lives.

—Luis Buñuel

Almost everything you do and think is based on what your brain remembers has happened to it in the past. And everything you do and think in the future will serve to reinforce the patterns of behavior and response associated with the particular person that you, and others, think of yourself as being. All new experiences and perceptions from one moment to the next are interpreted in the context of your apparently central, abiding self. Memory is your link with the past and your basis for action in the future.

To be a person, one must have a memory — a unique, accessible set of recollections — because to be a person means to hold one's life story and be actively, intimately involved with it. We must be able to see who we are now in terms of who we have been at different, successive stages along our journey from early childhood. We must hold the script to the inner drama that is ourselves, to know our own narrative. For if we cannot do this, we are without an identity or self.

Fortunately, our memories are remarkably durable. They survive despite the never-ending metabolic turnover of particles in every cell of our bodies, a fact lyrically captured by Loren Eisley in *The Immense Journey*:

I suppose that in the forty-five years of my existence, every atom, every molecule, that composes me has changed position or danced away and beyond to become part of other things. New molecules have come from the grass and the bodies of animals to be part of me a little while, yet in this spinning, light and airy as a midge swarm in a shaft of sunlight, my memories hold, and a loved face of twenty years is before me still.

Atom for atom and cell for cell substitution poses no threat whatever to the self, as experience clearly shows. In the case of people who recover fully after having been in a coma for several months there has been an almost complete replacement of their constituent atoms in the period during which they were unconscious. Yet, upon waking, they have no sensation of being any different or of any time having passed.

A far more extreme case of the “persistence of self” was imagined by H. G. Wells in *The Sleeper Awakes*, in which a young man falls into a trance that lasts two centuries. As the trance begins, Wells asks: “Where was the man? Where is any man when insensibility takes hold of him?” And two hundred years later:

What a wonderfully complex thing! this simple seeming unity — the self! Who can trace its reintegration as morning after morning we awaken, the flux and confluence of its countless factors interweaving, rebuilding . . . the growth and synthesis of the unconscious to the sub-conscious, the sub-conscious to the dawning consciousness, until at last we recognize ourselves again. And as it happens to most of us after the night’s sleep, so it was with Graham at the end of his vast slumber.

When he conceived this fantasy Wells could hardly have imagined how close reality was to emulating his fiction. Between 1916 and 1927, there occurred a worldwide epidemic of *encephalitis lethargica*, or sleeping sickness. Nearly five million people contracted this devastating illness, one third of whom died shortly after as a result. But for others there followed a bizarre trancelike state — not unconsciousness but a conscious stasis — in which time seemed to stand still. It was for them as if the world, instead of giving the appearance of continuous change as in a movie, had instead become stuck in a single frame.

Then, as in Wells’s story, came the awakening. More than forty years after they had been struck down, the victims were temporarily and almost miraculously freed from their frozen state by the administration of massive doses of the anti-Parkinson’s drug L-dopamine. For those who had been more deeply affected, their last living memories were of the world as it had been shortly after World War I. More than four decades had elapsed during which all the substance of their bodies and brains had been replaced many times over. But upon resuming relatively normal consciousness, the patients were in no doubt as to who they were. It was for them as if there had been no vast temporal chasm. And for this very reason, they were confused, disoriented, by what they found, or did not find, in the new world into which they had been catapulted. One profoundly affected patient, for instance, upon being revived used strangely outmoded turns of phrase and spoke of Gershwin and other contemporaries as if they were still alive. She knew it was 1969, because during her trance she had absorbed news of current events such as the bombing of Pearl Harbor and the assassination of Kennedy, but she felt with overwhelming conviction that it was 1926.

In his remarkable account of such cases in his book *Awakenings*, the neurologist Oliver Sacks supports the argument, first expressed by Leibniz (“*Quis non agit non exitit*”), that we must be active or we cease, in any ontological sense, to exist — that activity and actuality are one and the same. How else, he wondered, could the instantaneous return to normal movement and speech be explained in a person who had been totally inactive for more than forty years. Most of us stiffen up if we remain in the same position for a couple of hours. Six weeks with a broken leg in a cast and we need at least a few days to recoup the strength in our muscles and the flexibility in our joints. Yet some of the sleeping-sickness

victims, having been virtually motionless for half a lifetime, were, within a few seconds of their “unfreezing,” jumping up, walking about with great energy, and chattering excitedly to anyone who would listen. The only satisfactory conclusion Sacks could draw was that during their trance there had been no subjective duration for the victims whatever. It was as if the “current of being” (Sacks’s phrase) had been abruptly turned off and, more than forty years later, turned back on again. In between, for the victim, time had stood still and memory remained intact. Nothing was added to it, but nothing was subtracted either.

We occasionally curse our memory when it lets us down. Yet overall, the powers of memory are prodigious. They enable a credible (though not necessarily objectively accurate) recollection of the life’s journey of a particular human brain, built up from numerous perceptions, feelings, thoughts, actions, and conversations with other brains — a series of complex experiences stored coherently, so it appears, and in a form that corresponds with their actual chronological order. At the same time, most of us cannot remember anywhere near everything that has happened to us. And whatever we imagine might be the benefits of having an eidetic or photographic memory, those who actually possess one know that it can be a blight and a handicap — in fact, in its most extreme manifestation, a crippling neurological disorder. Jorge Luis Borges wrote a disturbing short story, “Funes the Memorious,” about a young man who remembered every detail of his past:

He knew by heart the forms of the southern clouds at dawn on 30 April 1882, and could compare them in his memory with the mottled streaks on a book in Spanish binding he had seen once and with the outlines of the foam raised by an oar in the Rio Negro the night before the Quebracho uprising.

Such exquisite retention might seem entirely fantastic. But the eminent neurologist A. R. Luria documented an actual case of total recall in his astonishing book, *The Mind of a Mnemonist*. The subject was a Russian man, Sherashevsky, who could remember — or, more to the point, could never forget — any detail, however small, of the experiences of his life: every sight, sound, taste, smell, and touch, every thought and impression, every way of looking at and analyzing a situation. And, of course, it was disastrous for him because he had no sense of discrimination. He could never focus on a specific problem or situation because as soon as he turned his attention to it, his mind was choked full of irrelevancies. Every trivial item spawned the recollection of a thousand others. He could not follow through a particular chain of reasoning, or make decisions, or take an interest in one topic over any other. In fact, he could not function normally at all and spent many of his days in abject depression and misery.

Recent research by scientists at the Cold Spring Harbor Laboratory, New York, suggests that photographic memory may have a genetic basis. Their work has centered on the so-called CREB gene in the fruit fly *Drosophila*. This gene is suspected of being the master switch that regulates other genes for synthesizing

the key proteins involved in long-term memory. The Cold Spring Harbor team created a strain of fly carrying a modified form of the CREB gene which produced unusually large amounts of activator protein — the protein required for laying down memories. In addition, they arranged matters so that the altered CREB gene would only be turned on above 98 degrees Fahrenheit. Kept at room temperature, the genetically modified flies behaved normally, taking about ten training sessions to learn to avoid an odor associated with an electric shock. When warmed above 98 degrees, however, they learned the association after just one session. It seems likely that a similar “faulty” master gene, leading to the overproduction of activator protein, exists in people with exceptional powers of memory.

For survival reasons, a normal memory is selective and patchy, even if, to its owner, it doesn't seem to be that way. The brain holds on to what it needs and quickly forgets what is irrelevant. Having organized itself, during childhood, around a particular worldview, the brain tends to consolidate mainly those memories that appear to fit in with and enhance this system of belief. Normal memory, then, is heavily biased toward a particular conception of reality. It is gappy, but good in parts, and may be exceptionally good with regard to some specific life episodes.

Just how good it can be was graphically demonstrated by the Canadian neurosurgeon Wilder Penfield and his team in Montreal in the 1950s. While operating on people under local anesthesia, in an effort to cure focal seizures by excising damaged brain tissue, Penfield would cut and turn back a portion of their skulls, expose their cerebral cortices, and then touch an electrical probe to specific points on the surface of the brain. This allowed him to identify and map regions of special importance, such as the language centers, that it was crucial were left intact by the surgery. Depending on exactly where on the cortex the mild pulsing current from the probe was allowed to flow, the patient would react in a highly specific, often comical way. He might utter a short, incomprehensible sound, or be prevented from saying anything at all. He might twitch the index finger of his left hand. And if the probe made contact somewhere on the lateral side of the temporal lobe, it would often trigger in the patient a particular, vivid reliving of a past event, as if the play button of a tiny video recorder had been pressed. Touching one spot on the cortex might cause a patient to hear her mother and father singing Christmas carols around the piano as they did in their youth; stimulation of another point nearby might spark off the recollection of a winter walk through fresh-fallen snow, or of a childhood incident in the schoolyard, or of an encounter with a menacing stranger. Each episode would seem strikingly realistic and detailed (much more so than a normal recollection), and each could be played again from the start, exactly as before, by an identical touch of the probe.

Our sense of being someone, a distinct person in the world, depends upon the unique chain of experiences that connects the moments of our lives — and

which, through memory, we carry into the present. In his poem "The Mother's Breast and the Father's House," B. Reed Whitmore writes:

Your seemingly small mind is in truth an enormous
warehouse devoted to documenting and buttressing the persistence of
you

Stuff with the dust of decades is in it
books, faces, tears, fears,
loves, hates, games, names
all in relation to you

colors, odors, textures, travel incredible distances with us
even the weakest among us is a sort of god of preserving of that which
would be wholly trivial if it were not ours . . .

In the broadest sense, memory means more than just information stored in our heads. We "remember" about the past — even the very remote past — in our genes. And because of our onboard genetic program the stability of our selves is enhanced through the readily recognizable appearance, from day to day and year to year, of our bodies. Genes, too, inevitably have some influence on the basic architecture of our brains. But by far the most important contribution to personal identity and continuity comes from the memories our brains hold about what has happened to us during life.

Every day we gain some memories and lose others, have different sensations, and find ourselves in new situations, yet the brain copes with all of this change, adapts to it, and emerges at the end feeling as if it were the same person. This is its evolutionary legacy: the brain's primary urge (like that of our body's other systems) is to maintain the status quo. It works ceaselessly, automatically, to keep the impression it holds of itself constant and intact, whatever circumstances may prevail. To survive, biologically, means to stay the same, for if you change at all you become someone else, a new individual. So the brain is driven, relentlessly, to do everything it can to reinforce the feeling that it is unified, consistent, continuous. And in this mission, its ability to retain a chain of detailed past experiences is crucial.

Selves are defined by memories. But for many different reasons it is not always possible for a brain to maintain a complete or unbroken memory record. For instance, there is a certain kind of sleeping drug that induces a mild form of the effect known as retrograde amnesia. It does this by blocking the brain's ability to transfer memories from short-term store to long-term store: if you take this drug you cannot, upon waking, remember anything that happened in the hour or so before you fell asleep. That hour, as far as you are concerned, may as well never have existed.

Imagine, now, that you have just taken a dose of this drug. For an hour you feel perfectly fine, in no way different than you did before. But, knowing what the eventual effect of the drug will be, you decide to write a detailed message to yourself. This describes all of the main events that happen during the next hour

— the phone call from your friend, the sudden heavy shower of rain, the last minute goal you saw on TV that won the game for your team. Suddenly you feel an irresistible weariness creeping over you and decide it's time to lie down. Eight hours later you wake up. The last thing you remember is taking the sleeping pill. But where did this note come from by the side of your bed? The handwriting looks familiar. It's from you! Yet you have absolutely no recollection of having written it. You will never, at any moment during the rest of your life, remember having sent that message to yourself. It may as well have been written by a stranger. You are forever cut off from the thoughts and actions of the individual who lived through that missing hour of your life. He or she, though obviously *physically* continuous with you, is completely detached from your *psychological* continuum.

Blows to the head often produce a similar effect. Years ago, my son fell down while playing in the street one evening and banged his head against the curb. For a short time he lay unconscious before coming round, clearly still dazed and groggy, with an unfocused look in his eyes. He came inside, sat down, and suddenly looked in surprise at what he was wearing. "Where did I get these clothes?" he asked. In fact, they had been newly bought that afternoon. Yet to this day he cannot remember having gone shopping or anything else that he did in the four hours prior to his accident. His memories hold none of the experiences that his body and brain had during that time. As far as he is concerned now, it may as well have been someone else who had these experiences.

Most instances of amnesia are short-lived and have no important lasting effects on a person. But as a result of certain kinds of serious brain injury or disease, a profound and permanent form of amnesia may overwhelm its victim to the extent that he or she is unable to lay down any new memories at all. Such was the predicament of a certain musician who suffered from Korsakoff's syndrome. On one occasion, she had just completed, with three friends, a rendition of Beethoven's Quartet in E Minor, Opus 59, No.2, having given a virtuoso performance on the violin. A few minutes later, the cellist urged that they try another piece to which the lady in question replied, "Let us play Beethoven's E Minor Quartet, Opus 59, No.2." An embarrassed silence followed, after which a member of the company gently pointed out what had happened.

In one of his essays, Oliver Sacks gives a moving account of another victim of Korsakoff's syndrome, whom he referred to as Jimmie G. When Jimmie first met Sacks in 1975 he was forty-nine years old but had no memory of anything that had happened for the previous thirty years (the damage to his brain having been caused by alcoholism.) To him it was still 1945, World War II had just ended, and he was an ebullient nineteen-year-old working aboard submarines in the U.S. Navy. A moment of crisis and panic ensued when Sacks asked Jimmie to look into a mirror and describe what he saw.

"Jesus Christ," he whispered. "Christ, what's going on?" What's happened to me? Is this a nightmare?"

Two minutes later, having left the room, Sacks reentered to find Jimmie cheerful again, the mirror incident entirely forgotten, greeting him as if for the first time. He had absolutely no recollection of their earlier meeting or conversation. In his notes, Sacks wrote: "He is, as it were, isolated in a single moment of being, with a moat or lacuna of forgetting all round him.... He is a man without a past (or future), stuck in a constantly changing, meaningless moment."

The problem for Jimmie and for others like him is not that life (in a caring, sheltered environment) need be impossible or even generally unpleasant, but that it is fraught with potential anomalies and contradictions. To believe with all your heart and mind that it is one time when it is really three decades later is to be in continual peril of confronting horrible, inexplicable inconsistencies. It is like living in an alien world — a world peopled by strangers who will always remain strange, and by relatives who appear unaccountably aged. Any moments of panic, it is true, are quickly and permanently forgotten — the syndrome at least ensures this degree of protection from itself. But to be in such a state, with no hope whatever of recovery, is to live permanently on the edge of an abyss of unreason.

We may think ourselves lucky that we are not afflicted with some such deep-seated neurological disorder. But none of us in truth stands far from the brink of personal chaos. Serious malfunctionings of the brain serve not to emphasize how much removed we are from the pathological but how frighteningly close we all stand to insanity's edge. They expose the fragile basis of our lives: the extraordinary importance of a carefully ordered repository of facts in defining the beings that we are.

For victims of Korsakov's syndrome, there is the continual problem of how to reconcile, how to make sense of, the crazy world in which they find themselves in terms of the only world they know — a world that may be many years out of date and that becomes increasingly anachronistic and irrelevant with each passing day. It is a problem that can be resolved or avoided in only one way: by confabulation, by making what (to others) seem facile or absurd rationalizations, "throwing bridges of meaning," as Sacks says, "over abysses of meaninglessness." The alternative, as when Jimmie was caught off guard and saw a middle-aged head on what he took to be a young man's body, is total disorientation, disbelief, and denial. Doubtless we all have, at one time or another, felt a momentary rush of panic when, for example, we wake up thinking we are in one place when, in fact, we are elsewhere. For us, the crisis soon ends as memories flood back and we remember the recent chain of events and how we came to be where we are. But for the Korsakov victim there is no such prospect of relief — only the complete failure, a few minutes later, to remember even the state of panic or its cause. And there is the danger with every new moment and every new incident of the experience being repeated.

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As we age, our memories, especially for details such as phone numbers, place names, and other odd snippets of information, inevitably falter as a result of a general, modest neurophysiological decline. Our brains lose about 15 percent of their mass between the ages of twenty-five and seventy. And in the hippocampus, a structure vital to the laying down of new memories, approximately five percent of the neurons die for every decade in the second half of life. But this gentle decline doesn't seem to make much difference to us. We are born with a more than generous supply of around one hundred billion neurons (plus ten times as many glial or connecting cells), each of which becomes synaptically linked to as many as ten thousand of its neighbors. So we can well afford to lose several hundred million cells and their connections in a lifetime without being seriously inconvenienced. And, reassuringly, positron emission tomographic (PET) imaging has shown that the brains of spry eighty-year-olds are almost as active as those of people in their twenties. It seems that, along with many of the body's other organs, the brain has immense physiological reserves — more than sufficient to be able to cope with what seems like an alarming loss of its component parts.

For most of us, then, memory loss in old age will amount to no more than a minor nuisance, like nearsightedness or stiffness in the joints. The continuity of our life's story, the integrity of our brain's gallery of remembrances, is essentially uncompromised so that we have no difficulty in retaining a stable impression of our own identities or those of people with whom we are familiar. However, for a significant percentage of the population (about 11 percent of those over sixty-five in the United States), there is the prospect in later life of a fairly rapid and catastrophic loss of cognitive functioning, including all levels of memory, due to various forms of dementia.

Because of the devastating effects it has on both the victim and the victim's family, Alzheimer's disease has justifiably become one of the most dreaded of terminal illnesses. It is like a cancer that affects the mind rather than the body. Typically within two to five years, it reduces a person from a state of near normality to one of total mental and physical disintegration and helplessness. By stages, Alzheimer's patients become disconnected from their past. Their forgetfulness deepens until it becomes so profound that victims can no longer remember the names and faces of people they have known for many years, including their own children and spouses. Upon looking in a mirror they may be terrified to find that they can no longer recognize even their own faces. Unlike those afflicted by Korakoff's syndrome, Alzheimer's sufferers see not an incomprehensibly aged version of themselves, but a total stranger. Yet their terror at being unable to recognize their own reflection is not due to a complete failure of the brain. On the contrary, it stems from the brain trying to struggle on; albeit beset with damage and decay, the brain still contrives to piece together and recall enough about the past and how the world *should* be that it inadvertently triggers a cataclysmic and irreconcilable inner conflict. The Alzheimer's patient, even when the disease is far advanced, remembers (though

perhaps only at a subconscious level) that a person is supposed to *have* a face and that one is supposed to know what one's own face looks like. But the patient's memory of how his or her face actually appears has been lost.

The human brain, shaped and honed by powerful evolutionary forces over many millions of years, is a born fighter. Without prompting, without our conscious intervention, it does everything in its power to promote and prolong the survival of the organism that houses it. To this end, it works ceaselessly, and for the most part successfully, to integrate, accommodate, and reconcile all of the information at its disposal. Even in terminal decline, with the bulk of its neural equipment smashed or faulty, it engages in a titanic but ultimately futile attempt to make up for the devastating effects of massive cellular damage. It even tries to rewire and repair itself from within.

At the University of California at Irvine, Carl Cotman and colleagues examined microscopically the brains of people who had died from Alzheimer's disease and found that the loss of nerve cells in a region known as the entorhinal complex had been compensated for, to some extent, by the growth of other connections. Cells in the entorhinal complex analyze information about smells, but the region is also the site of the most important pathway from the cortex to the hippocampus (a structure crucial to the consolidation of new memories). In rats, cutting the pathway from the cortex to the hippocampus causes the input it receives from elsewhere in the brain (the so-called commissural-associational system and the septum) to rearrange themselves so that they partly take over from the layer of cells previously devoted to the terminals of the entorhinal cells.

Cotman and his coworkers discovered that exactly the same kind of rearrangement took place in the hippocampi of Alzheimer's patients. The brain, then, does not submit easily. Unfortunately for someone in the final stages of dementia, this grim struggle to retain the maximum degree of cognitive capacity possible under the circumstances is not really desirable. To feel yourself inexorably slipping away, to be gradually cut adrift from everything you believed yourself to be, is surely worse than the actuality of death. And in this situation, the sooner the brain gives over the fight to retain its self the better.

An erosion of memory is an erosion of selfhood. Thus, the victim of Korsakoff's syndrome is still a person, but one whose evolution has come to an end — a person robbed of a future, trapped in stasis, without the possibility of further development or change. An Alzheimer's patient, on the other hand, is a person in rapid, irreversible decline, a person whose death is occurring bit by bit, to the distress of everyone concerned, during life.

Such conditions graphically expose the importance of our memories, insubstantial things that they are, in binding us together and helping maintain the impression that we exist as coherent, enduring selves. Deprived of them, as the eighteenth-century Scottish philosopher David Hume remarked, "we are nothing but a bundle or collection of different sensations, which succeed each other with

an inconceivable rapidity, and are in a perpetual flux and movement." Hume recognized that personal identity — the one thing we so desperately want to believe is real — is no more than a masterful sleight of the brain. And modern neurology fully concurs.

We start out from the assumption that we are born, grow up, and live out our life as the same person. We have the strong impression of being a single, unchanging self. And all our dealings with other people and our conventional assumptions about our relationship to the world are predicated upon the notion that a fixed inner "I" exists — that personal identity is an inviolate fact.

Under equilibrium conditions — the normal, everyday situation in which changes to our warehouse of memories are small and gradual — the brain can easily sustain the illusion of self. So we who are this self are generally convinced of its permanence. But faced with a sudden rapid depletion of its memory store, through accident or disease, the brain can no longer cope. It becomes deprived of the means by which to project a convincing feeling of selfhood, a feeling that by its very nature must be based upon security and stability. This breakdown of the brain's capacity to properly integrate the self triggers an inner conflict because the brain, compelled by its survival mandate, is bent upon avoiding change and reacts to it by generating the emotion of fear. In fact, the fear experienced by the Korsakoff's victim or the Alzheimer's patient who can no longer recognize her own face or surroundings is simply a heightened form of the same fear we all feel when we contemplate the prospect of death. It is the raw fear of losing our selves.

Death would lose its sting if we had no fear of it. But how can we overcome this fear when confronted with the almost incontrovertible evidence that we are merely the narratives running inside our brains? It is bad enough that some of us may have whole sections of our life's story ripped away through illness. But in death we all confront the ultimate form of amnesia — total neurological destruction and, with it, the ending of everything we are. How can we possibly discover in advance what this implies and how, when it happens, it will feel?

5

A CHANGE OF MIND

"I can't explain myself, I'm afraid, sir," said Alice, "because I'm not myself, you see."
"I don't see," said the Caterpillar.

—Lewis Carroll

In the 1960s, having been diagnosed as a schizophrenic, Linda Macdonald was admitted to the Allen Memorial Institute in Montreal, a psychiatric clinic and research center established by the psychiatrist Ewan Campbell. Campbell had an interesting background and had managed to acquire some rather extreme views. While working as an adviser to the judges at the Nuremberg war-crimes trials, he formed the opinion that the bitter rivalries of nationalism which had led to the Second World War had to be eradicated. Nationalism, he decided, was a product of people's distorted historical memories. Therefore it was essential, in his opinion, to alter those memories in order to produce a rational world order, free of war.

Subsequently, Campbell joined Wilder Penfield's team and became intrigued by Penfield's concept (erroneous, as it turned out) of memories being stored in the brain as circuits which could be turned on and off by external means, such as the touching of an electrical probe. From this, he envisaged the real prospect of applying clinical techniques to the alteration of memory in mentally ill patients. Sick memories, he concluded, could be wiped clean and replaced with healthy ones. And it was with this extraordinary, disturbing goal in mind that he set up his Institute.

It was the chilliest period of the Cold War, and Campbell was not alone in being obsessed with mind control. The CIA had designs on it, too — but with the even more sinister possibility of using memory as a weapon. Paranoia was rife that the Soviets and Chinese had already developed powerful forms of mind manipulation that would enable them to program agents to infiltrate U.S. security. This fear was heightened by the observation that soldiers taken captive by the Communists showed evidence of altered behavior and often made false confessions, which they continued to repeat even after their release. Campbell became intrigued by how such mind control was being achieved, and whether it could be applied therapeutically. Not surprisingly, his efforts soon had the backing of CIA funds.

At the Allen Memorial Institute, Campbell subjected his patients to electroconvulsive therapy (ECT) on a massive scale. The shocks across the temples, often administered several times a day, day after day, progressively disrupted and erased the patients' memories, just as music recorded on an audiotape is reduced to a vapid hiss by repeatedly passing the tape through a powerful magnetic field. Drugs, including LSD, were also used in large doses in an effort to wipe out memory traces. And, as a further weapon in his fight to eradicate "sick" memories, Campbell pioneered what he called psychic driving — the interminable repetition, night and day, over headphones, of persuasive, positive-reinforcement messages. The end results of this blitzkrieg on the mind were human beings stripped down to the most primitive, vegetable state. Nothing of their old personalities, behavior patterns, or memories remained. As conscious selves, as beings with identities, they had, effectively, been destroyed.

Mercifully, Linda Macdonald recalls none of her traumatic therapy — the miasmic haze of ECT, the relentless psychic driving, and the long periods of drug-induced sleep. All of her experiences during her time at the Allen Memorial Institute were scoured clean from her tortured brain. But erased, too, were her memories of her parents, her childhood, her own children, her home. Her “depatterning” was so comprehensive that, in the aftermath, she had to learn again how to speak and to behave and respond appropriately in a society that seemed utterly strange to her. “I felt like an alien from another world,” she commented in a television recording made years later. Of her old self, absolutely nothing remains.

The same is true of Patsy Cannon of Alabama, though for a very different reason. In 1986, a car crash left her with such severe retrograde amnesia that all of her past memories were rendered inaccessible. Whether, in fact, her brain still retains her old memories in some form is unknown — and entirely irrelevant. It may be that the principal damage is to connections to her hippocampus, in which case, even if the memories from before her accident survive in some latent biochemical form, they will never again be available to her conscious mind.

Patsy Cannon has had to discover how to speak again with the help of tapes and friends. But language is a subtle, complex affair, and its colloquial use especially can be bewildering to a neophyte. On one occasion a visitor casually mentioned to her that it was “raining cats and dogs,” whereupon, in a panic, she rushed to the window expecting to see animals literally falling from the sky. Upon seeing her nine-year-old daughter for the first time after the accident, she felt nothing — no twinge of recognition, no sense of attachment. Even the ability to love her own child had to be relearned.

Patsy Cannon has had to acquire a completely fresh ensemble of memories in order to function once more as a normal human being. But what she has learned the second time around has not made her into the same individual. She has a different character and different interests, wears different types of clothes, and enjoys different foods than before the accident. Even in her dreams she recalls nothing of the “old” Patsy Cannon and having seen photos of her, she maintains with unshakable conviction: “That person is dead; I am a new person.” And it seems for her, at least, there is no sense of loss.

Erode memories and you wear a person away, bit by bit. Erase all memories and you erase a person completely. Then replace the lost memories with fresh ones and you create someone new. In the event of such extreme memory erasure and substitution, there is surely justification in speaking of the death of one individual and the coming into being of another. And, most tellingly, it is precisely in these terms, and without any hesitation, that people to whom this catastrophe has happened described their inner experience.

Selves are defined by memories. So, if a brain’s memory chain is badly disrupted or destroyed, the brain will feel very different. It may feel afraid and even panic-stricken if the memory loss is severe but not total, because under such circumstances the brain may no longer be able to reconcile what it sees from one moment to the next with what it falsely believes (due to its damaged memory) the world and itself should be like. Such is

the terrible predicament of the Korsakov's or Alzheimer's victim. On the other hand, if all memories are lost, the accompanying self is lost too.

Instances of total, permanent amnesia challenge us to reevaluate our concept of death. For if we consider the most relevant aspect of death to be "what it feels like" (the subjective experience) rather than "what it looks like" (the objective view) then total memory loss does seem to qualify as an event remarkably similar — and, indeed, ontologically identical — to death as we normally understand it. If the experience of being a particular person, say person A, is contingent upon having a particular stock of memories, then if this stock is irretrievably lost the feeling of being person A must be lost as well. Person A, as a psychological entity, has effectively died—died, that is, as far as the victim and the victim's family and friends are concerned. Medically, genetically, legally — objectively — it is a different story, and someone whose memories have gone but who remains cortically alive is considered by society at large to be still the same person. However, to those who know the individual well, and, most importantly, as actually experienced by the victim of total memory loss, it is clear that there has been a radical, irreversible change.

Yet the brain, as a result of its evolutionary heritage, is a resilient organ. And, if it remains fully functional, then no sooner has it been deprived of one complete set of memories than it begins to lay down a fresh set, like a camcorder that keeps on running. This reacquisition of memory takes place automatically, just as it does in the case of an infant. Moreover, it involves an actual physical change in the brain — a major regrowth and rearrangement of neural connections. As the brain that once generated the feeling of being a person builds up its new collection of archives so, at a conscious level, it begins to give rise to the feeling of being a different individual, person B. And, significantly, this is not a problem or a concern either for person A or for person B. At the time at which the old memories are lost (which in an accident is more or less instantaneous), person A ceases to exist and so cannot subsequently experience any regret, sadness, fear, or sense of loss at what has happened. (These negative feelings can only be experienced by others who knew person A.) Person B, on the other hand, emerges gradually as new memories are acquired and, having no recollection or sense of attachment to person A, has no cause to be troubled by A's demise. B's main problem will be that, as an adult rather than an infant, she will almost inevitably have commitments carried over from her previous "life" to which she has to readjust. New attachments may have to be forged to children and to a spouse who, to begin with, may just as well be anyone else in the world. And it is during this period of recovery, this time of reentry into the human atmosphere, that the extent to which all of us are culturally conditioned becomes starkly apparent. A brain that has been wiped clean has lost its social acumen, its knowledge of how to behave and function appropriately in a particular "civilized" (and highly artificial) setting with other people. This cultural veneer has to be reacquired. And during the process of reacquisition, the new, emerging person, who looks like an adult but unfortunately acts like an infant, has ample opportunity to feel bewildered and out of place — a stranger in a very strange land.

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Our awareness of others stems, in the first instance, from an awareness of their physical presence. We see and define a particular person by the physical continuity of their bodies. And so, however differently an individual may behave from one day to the next, we maintain that it is nevertheless the same person. Our society revolves around, and inculcates in us, this fundamental belief. Exceptions are rare: we sometimes make comments like “She’s not herself today,” but without any serious conviction that a new self has temporarily taken over. More importantly, the outcome of a criminal trial may hinge upon whether an individual is judged to have committed a serious offense while mentally disturbed and therefore not responsible for his or her actions. Yet, for the most part, our identification of other selves and our belief in their stability rests firmly upon bodily appearance and continuity.

As each of us perceives our own self, however, it is a very different matter. We naturally care about the looks and health of our bodies. But what is of paramount concern to us is the psychological continuity that we habitually feel. Most of us would probably not recoil in horror at the prospect of having a new (healthy) body and brain, providing that we could transfer to it our mental selves.

Now, under normal circumstances in life, we are not moved to think deeply about the distinction between our outer and inner conceptions of self. This is because there does indeed appear to be a one-to-one correspondence between particular bodies and particular selves. But abnormal and pathological situations compel us to reexamine this most basic assumption. These unusual situations reveal clearly that there is a difference, a very great difference, between the objective and subjective viewpoints of a person — one, moreover, that is pivotal to any exploration of issues surrounding death and individual survival.

When I talk about “you,” I implicitly refer to a particular body and brain, and to what I perceive as being a certain, unique, reasonably consistent personality that is projected to the outside world. But as far as you are concerned, “you” are what it is like to be a certain stream of consciousness. My view (which forms part of my stream of consciousness!) is of a specific organic machine and its persona, its outward face. Your view — your direct experience — is of being the subjective entity that the machine gives rise to. It cannot be emphasized enough that these two phenomena — the machine and the feelings of this machine — must be considered with the utmost care with regard to both how they are distinct and how they interrelate. The brain and the mind belong to two different categories of existence, different facets of reality. And although all the evidence of science is that there is a clear dependent relationship (in particular, “you” cannot exist without a brain — or an adequate substitute for a brain) there is nothing *prima facie* that insists there must be a unique correspondence between the feeling of being you and a particular brain, or vice versa.

If we are to take both objective and subjective factors into account then our definition of what it means to be a specific person must involve two separate criteria. That is, given A at one time and B at some later time are both persons, it appears reasonable to suppose

they are the same if (1) they have the same physical body, and (2) B, at the later time, has memories of A's activities and memories. This definition seems to be consistent with the belief we each individually hold that from birth to death we remain one and the same person. But the reality of the situation is not so simple.

There are, undoubtedly, times in the past of "your" body of which you have no conscious recollection. Indeed, if you are anything like me (which I assume in many ways you are), you can't actually remember most of what has happened during your life. So, from the apparently commonsense definition of what is involved in remaining the same person, it appears to follow that there were many occasions in the past when you were not who you are now! The fact that we all suffer numerous minor bouts of natural amnesia every minute of every day suggests that despite the strong impression we have of smooth continuity and personal sameness we are actually, to a large degree, psychologically disconnected. And this being so, the possibility emerges of seeing our lives in a different way: not as one unbroken unit but as divided into the lives of many successive selves.

Again, focusing on examples beyond the commonplace helps us get to grips with this elusive problem of who we are. In the case of the amnesia-inducing sleeping pill, mentioned in the last chapter, there is clearly a break in psychological continuity caused by the drug's influence on the brain. Label as A1 the person who lived up to the point of taking the drug, A2 the person who lived through the subsequent hour up to the moment of falling asleep, and A3 the person who awoke eight hours later. At a casual glance, we would tend to assume that A1, A2, and A3 were one and the same person (and if it happened to us, we would certainly take this view). But A3 has no memories at all of what happened throughout the hour when A2 was alive. From the subjective viewpoint of A3, A2 never existed and may just as well have been someone else entirely. The criterion of bodily continuity has been satisfied. But if a person cannot remember anything about themselves during a particular waking period, then mentally the person who was conscious during this period is a being apart. Evidently, for as long as A2 existed he felt himself to be a continuation of the stream of consciousness of A1. But at the moment of falling asleep, A2 curiously disappeared from the chain of continuity to be replaced by A3. Who, then, in retrospect, was A2? Wouldn't it have felt a little strange to have been A2 and to have been told that all the fresh memories you were laying down during the hour the drug was taking effect would shortly be lost forever and that you were effectively traveling down a cul-de-sac of consciousness? Possibly, it might have felt strange. But it wouldn't have been a cause for great fear, like the fear of being someone who knew he was soon going to die — for a simple reason.

If a brain suffers only a minor, localized form of amnesia then it still retains more than enough information about its past to be able to reconstruct a self virtually indistinguishable from the one in prior residence. And so if you or I "lost" merely an hour from our memories we would not, in practice, be inclined to think of the person who lived during that missing hour as being someone else. We could conveniently and easily gloss over the hiatus. But imagine now extending the period of amnesia back in time from a given point — a week, a year, ten years, twenty years, and, ultimately, to the moment of birth. This brings us back to cases of total amnesia such as those of Linda

Macdonald and Patsy Cannon. And while it is true that these are extreme pathological examples, we can see now that in principle they are no different from instances of more confined memory loss. The fact is that whenever there is a memory loss, however great or small, there must inevitably be a corresponding break in psychological continuity. So, what may seem from the inside to be a coherent, continuous self — the “I” with which we are all intimately familiar — is in reality highly disjointed. How can two such radically different perspectives on the self both be valid?

To make matters clearer, suppose I were to keep a diary of your consciousness in objective (clock) time. It might run something like this”

7:30 A.M. After a good night’s rest, you wake up.

3:00 P.M. While doing work outside, you unfortunately stumble and bump your head, rendering you temporarily unconscious.

3:03 P.M. You recover, take two aspirins for your headache, and spend the rest of the day indoors.

11:00 P.M. You go to sleep and quickly fall into a deep sleep.

2:15-2:30 A.M. You have the first of three dreams during the night (as registered on an EEG).

4:00-4:20 A.M. Second dream.

6:15-6:30 A.M. Third dream.

7:30 A.M. Your alarm goes off and you wake up.

According to these records, there were five periods (of three minutes, three hours and fifteen minutes, one hour and thirty minutes, one hour and fifty-five minutes, and one hour, respectively) during this twenty-four hour span, when you were completely unconscious. And by referring to your watch throughout the day you would have been able approximately to verify these times. But this objective view of your day is not what you would actually have experienced. By definition, you cannot experience or be aware of the passage of time during spells of total unconsciousness. So, as it actually felt to you, you were always there. In subjective time, there are no breaks — there can be no breaks, otherwise there is no subject. If you are knocked out or faint or fall asleep (except for intervals of dreaming in which there is an attenuated form of self-consciousness), you don’t notice any gaps. One instant you lose consciousness and the very next instant you regain it. Subjectively, there is no — can be no — hiatus. Subjectively, you never disappear, for who would there be on the inside to notice the disappearance?

It is easy to understand, then, why there should be such a great contrast between the objective and subjective views of self. The objective or conventional scientific notion of the self is illusory in the sense that it doesn’t correspond with anything definite either in substance or duration. Moreover, from an objective standpoint the consciousness of an individual is repeatedly punctuated. It comes and goes on a macroscopic level as a result of incursions such as sleep and general anesthesia. And there is every reason to suppose that it flickers in and out at a microscopic level, too. From your internal perspective, however, “you” are never unconscious — for this represents a contradiction in terms. There has never been a moment in your life when subjectively you have not been present. And nothing will or can happen in the future to change this fact.

“The feeling of being you” is a persistent phenomenon. It is simply not possible from your point of view to know or experience or even conceive what it would be like not to be you. And this applies to everyone else. It is true even for people who have suffered the most profound forms of amnesia. Before the onset of the amnesia there was “the feeling of being you” (in other words, a specific self-awareness). Then, an instant later in subjective time (though possibly months later in objective clock time), there was “the feeling of being you” again — only a different you based on a different set of memories.

The persistence of “you” is a phenomenon of vital concern to us. But at any given moment, what seems crucial to us is being and remaining precisely who we happen to be — not just any old “you.” Our overwhelming desire is to stay who we are now, not to become some other “you” that our present self wouldn’t be able to identify with and that would inevitably involve us becoming someone else. The thought of changing triggers our anticipatory fear of death, of losing our present selves. What we fail to properly recognize, though, is that we are always changing. And when we do become someone else — as happens every moment, whether we realize it or not — then we no longer hanker for the preservation of the self we used to be. The desire for self-preservation automatically transfers to whatever new “you” we have become.

We dread the prospect of becoming someone else because this would mean ceasing to be whoever we are now. Had Patsy Cannon, for instance, known in advance that she would be in an accident that would rob her of all her memories she would doubtless, like any normal person, have been just about as afraid of this as of actual physical death. But in the event, she had no such foreknowledge and therefore no anticipatory fear. Nor was there ever any internal feeling of loss of her “old” self, because there was never any break, subjectively, in her self-awareness. In subjective time, there was no experienced gap between the instant of her accident and the subsequent emergence of her new self — her new “feeling of being you.” And this new self, like any self, wanted above anything else to continue as it was,* not revert to being the stranger who had lived before.

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The dissolution and re-creation of personalities in the middle of a human lifespan following profound memory loss is remarkable enough. But there are even more bizarre and complex manifestations of this effect due to multiple personality syndrome, or MPS. In cases of MPS it is as if a group of individuals is vying for control of a single body. Different members of the group take it in turn to become conscious and decide what the body will do and say. Talking to someone with MPS can be disconcertingly like trying to hold a telephone conversation with a number of people fighting over a single receiver — you can converse with only one at a time and can never be sure who will answer next.

The story of one young man plunged into this extraordinary condition was told in Daniel Keye’s disturbing book *The Minds of Billy Milligan*. Billy was sadistically and sexually abused** by his stepfather when he was eight years old. As a result his schoolwork deteriorated, he began to suffer bouts of amnesia, and soon he was being accused of having done things he knew nothing about. Unbeknownst to Billy, he had developed

alternative personalities who took over his body whenever Billy felt threatened. Eventually and incredibly, he was found to have acquired twenty-four distinct personalities who varied widely not only in character but also in nationality, age, and even sex. Billy himself was an American, but Arthur, who was normally the dominant personality, spoke with an English accent and was also fluent in Arabic. Ragen, a fiery Yugoslavian character, spoke both English (with a noticeable Slavic accent) and Serbo-Croat. His function, to take over in dangerous situations, was reflected in his name, which was a contraction of "rage again." Allen was outgoing and manipulative and was the only right-handed personality. Christene, a little girl, was English and dyslexic. And Adalane, another female personality, was a lesbian whose loneliness and longing for physical contact eventually led Billy to be accused of rape. Only after his arrest was Billy's problem discovered and, as a result, he was eventually found not guilty by reason of insanity. This situation can also work in reverse. Recently in Oshkosh, Wisconsin, a man was arrested and put on trial for raping a woman with MPS by seducing one of her alternative personalities.

There was a period, earlier this century, when it was in vogue to criticize the status of multiple personality as a genuine clinical condition. But few researchers today seriously believe that all MPS sufferers are frauds or malingeringers (though it certainly seems possible that additional personalities may be created by indirect suggestion from a therapist.) The real point of contention is to what extent the various personalities are separate, given that they are obviously products of the same brain. In most cases, the original or root personality is seldom aware that the newer personalities exist, though the latter are often aware of each other and of the original. One way to check for true separateness is to look for consistently differing brain wave patterns among the separate personalities. At the National Institute of Mental Health in Washington, D.C., Frank Putnam did this and discovered differences as great as those between separate individuals in electroencephalograms (EEGs), visually evoked cortical responses, and galvanic skin responses (as used in lie-detector tests). More controversial tests of personality and intelligence have produced similar results. And, most dramatically, 3-D scans have shown that entirely distinct regions of the brain are active depending upon which character is in charge.

There seems to be no getting away from the fact that the separate personalities inhabiting the brain of someone with MPS are real in the objective sense that they display measurable physiological states as diverse as those of a group of different people; and real in the subjective sense that they are experienced internally by the patient as distinct streams of conscious thought.

The core personality of someone with MPS may suddenly and alarmingly find that several hours or even days have elapsed without their knowledge. In an instant, it will seem to them as if they have leapt forward in time and been transported to a different, possibly unknown place. They may be wearing different clothes, be carrying unfamiliar objects, be facing strangers who act as if they are not strangers, and be somewhere they have never seen before. For a lost slice of their lives, they were literally not themselves;

an alternative personality had taken control of their body, with a character and set of memories of his or her own.

One particularly astonishing and well-documented case of MPS, from around the turn of the century, was that of Miss Christine Beauchamp (a pseudonym) who was studied and treated by the American psychotherapist Morton Prince. As a child, Christine had been raised in a strict, stifling, puritanical atmosphere rent tragically by repeated abuses by her father. The fuse for MPS thus having been set in the most usual way, it took only a spark later on to lead to the explosion of her fragile personality. That spark came in 1893, when Christine was eighteen. She was working as a nurse in a hospital one terrible, stormy night when three separate events, any one of which would have proved unnerving, conspired to blow her world apart. A lightning flash illuminated a figure in white, a patient, who grabbed hold of her. Barely had she recovered from this when when she caught sight of a face staring in at her through a second-floor window. It turned out to be her boyfriend, who had climbed up a ladder and peered in as a prank. Finally, and most devastatingly, the boyfriend entered the hospital and, according to Christine, ended up almost raping her in a darkness broken only by occasional flashes from the storm. The combined effect of these shocking, nightmarish incidents was to immerse her further in abject depression, accompanied by severe headaches, insomnia, and nervousness. So, in desperation, she sought the help of Morton Prince.

Under hypnosis, Christine, who was normally painfully reticent, relaxed and became less restrained. Prince, in his analysis of the case, referred to her waking state as B1 and her trance B1A. B1A knew of and claimed as her own B1's thoughts and actions, but B1 (in the usual manner of a hypnotized subject) could remember nothing of what she said and did as B1A. There was no reason, however, to suppose that B1 and B1A were different people. But then, one day, quite spontaneously, B1A started referring to B1 not as "I" but as "she." This was to mark the emergence of a new personality — one who chose to call herself Sally.

From then one, whenever Prince hypnotized B1, Sally would be likely to appear. And Sally, it turned out, was not at all impressed by B1. In her words, "she [B1] is stupid; she goes around mooning, half asleep, with her head buried in a book; she does not know half the time what she is about." Sally claimed to have lived passively alongside B1 since early childhood. And then, finally, Sally emerged. During one particular hypnosis she opened her eyes and stepped out into the waking world as a vibrant, vivacious, energetic, and (Prince thought) likable person in her own right. As far as B1 was concerned, Sally did not exist. But Sally knew all about B1 — her every thought, action, and dream. Sally could recall B1's dreams better than B1 could herself, because Sally was there all the time, in the background, watching and monitoring B1 even when B1 had control of the body. (It is less confusing when discussing MPS cases to use terms like "the body" instead of "her body," since it is not clear who the "her" is referring to!) By contrast, when Sally was in charge, B1 was not merely pushed aside, she was not there at all. Times when Sally was "out" were times completely lost to B1. On one occasion, for instance, B1 plucked up courage and admitted herself into hospital to get treatment for her severe depression. But almost immediately, Sally took over, pretended to B1,

convinced the hospital staff that she was much improved, and was discharged ten days later. When, shortly after, B1 “came back” it was as if the hospital stay had never happened, so that for all her efforts to improve her health she gained nothing.

B1 suffered terribly at Sally’s hands. When Sally was in charge of the body she would spend B1’s money on frivolous clothes, undo B1’s knitting and sewing, stitch up the ends of her sleeves, tear up her letters, and even mail packages to B1 containing spiders. Furthermore, Sally drank and smoked (which B1, being very proper and deeply religious, would never do) and kept her own circle of friends. And this often proved devastating and embarrassing to B1, who would abruptly regain consciousness in the midst of a social gathering with people she had never met, holding a cigarette in one hand and a glass of wine in the other.

Prince maintained that Sally’s maliciousness to B1 was born of jealousy, because B1 was so much more refined and better educated (apparently Sally hadn’t bothered to pay attention in class when they had attended school “together”). In fact, to confound Sally and prevent her listening in on conversations Prince didn’t want her to hear, he would sometimes communicate with B1 in French, a language in which B1 was fluent but Sally could not understand a word.

Then B4 appeared — another personality with another highly individual set of character traits. B4 was impatient, short-tempered, and fiercely independent. It turned out that she knew nothing of what had happened since the traumatic night in the hospital six years earlier. In fact, on her first appearance in Prince’s office she thought it was that very night. Then, realizing her mistake, she quickly withdrew, became reserved and curt, and subsequently fantasized to try to conceal her amnesia. The ever-present, ever-watchful Sally (she claimed that she never slept) reacted strongly to B4’s arrival, regarding her as another, unwelcome rival for control of the body. Although Sally knew about B4’s actions, she did not, as it happened, have access to her thoughts. Even so, from listening to what B4 said, it didn’t take Sally long to realize that B4 was making up her own version of events from the last six years, and Sally started referring to her as “the idiot.”

Prince discovered that by putting either B1 or B4 into a deep hypnotic trance, yet another personality, B2, emerged who claimed to be both B1 and B4. Because B2 appeared to combine the virtues of B1 and B4 without their excesses, Prince decided that B2 was in some sense the real or whole Christine Beauchamp. Therefore he explained to B1 and B4 that he wished to awake B2 from the deep trance as a unified, fully conscious individual. But this immediately created problems. Although B1 and B4 were components of B2, they effectively ceased to exist as independent entities when B2 was present. To B1 and B4, life as B2 was the equivalent of death. In characteristic fashion, B1 was ready to meekly accept extinction. But not so B4. She formed an alliance with Sally, who, although not deprived of consciousness by the arrival of B2, was in her own words “squeezed” back to her previous state as a passive, coexisting awareness. Sally much preferred her active existence, in which she could, at least sometimes, be in full control of the body. And independent Ms. B4 was certainly in no mood to die for the greater good. So, in order to thwart Prince’s plans, both Sally and B4 broke appointments with him that

B1 had previously made, and B4 even went so far as to book tickets for a passage to Europe. However, in the end they were defeated. Sally confessed that in B2 she recognized the pre-1803 Christine Beauchamp and that it had been she (Sally) who split B2 back into B1 and B4 whenever Prince tried to draw B2 into normal waking life. She withdrew her influence, and, after completing her autobiography and a Last Will and Testament, voluntarily committed herself to what she regarded as oblivion. And thus B2 awoke as Christine Beauchamp.

The epilogue is that B2 proved quite stable, though on occasions, at times of strain, she would temporarily split back into B1, B4, and Sally. And when B1 and B4 did reemerge, it was for them as if they had woken from a coma; months would have gone by as if in the wink of an eye. As for Sally, she returned to the state she had occupied since 1898 — an intraconsciousness, a passive, aware cohabitant alongside Christine.

A century on, MPS is still not fully understood. In particular, it is unclear whether the syndrome generally starts when a single personality is broken up or when a still developing personality fails to coalesce. The latter possibility is suggested by some recent work by Peter Wolff at the Children's Hospital in Boston. Wolff's research shows just how rapidly and easily young children switch moods. They laugh one moment, then cry the next, as if they haven't yet learned how to integrate these different moods and feelings into a single self. It may well be that childhood abuse interferes with the normal process of integration , leading to fragmentary personalities that then evolve in isolation to become essentially separate (though pathological and highly depleted) selves.

The fast-changing moods of early childhood are indeed reminiscent of a mild form of MPS. But then so, too, are many examples of adult behavior. The psychologist Robert Jay Lifton pondered the mental state of doctors who committed atrocities on prisoners of the Auschwitz death camp in the name of science. How could these people, who had been trained to heal and cure, resume in the evening their role of kind fathers and husbands after hearing the screams of their victims during the day? Lifton concluded that they were essentially split personalities composed of two relatively autonomous selves: the prior "ordinary self," which for doctors includes important elements of the healer, and the "Auschwitz self," which includes all of the psychological maneuvers that help one avoid a conscious sense of oneself as a killer. The existence of an overall Auschwitz self more or less integrated all of these mechanisms into a functioning whole, and permitted one to adapt oneself to that bizarre environment. The prior self enabled one to retain a sense of decency and loving connection.

It is hard to imagine what goes on in the minds of torturers or brutal dictators who seem at times capable of genuine compassion toward their families. But to a lesser degree we are all split personalities, capable of love and thoughtlessness, moderation and indulgence, ambition and sloth. And our lives are further compartmentalized by the different hats we are expected to wear — those of friend, lover, partner, parent, child, leader, follower. Our behavior and personality change markedly depending on the social roles we play.

We start out from the assumption that we are each a single person with a definite, unique personality. We take our self to be a fixed entity (like a soul) that endures from womb to tomb. But MPS and various manifestations of amnesia, as well as apparently related conditions like sleepwalking, “automatic writing” under hypnosis, and schizophrenia, throw into question this standard folk psychology about who we really are. It seems that behind the stable facade we try to present to the world lies more than a touch of Jekyll and Hyde. We are far more fragmented and disconnected, less a single, smoothly flowing river of consciousness, than we conventionally imagine and project. And this realization has crucial implications for our quest to penetrate the mystery of death. To understand what will happen when we die we have to be clear about what it is that can die.

So far, the evidence presented that the self can be altered, fragmented, entirely destroyed, and remade during the course of life is primarily psychological. But there is also a wealth of intriguing data about the nature of self from a very different source — from people whose brains have been surgically partitioned or even partially removed.

6

DIVIDED OPINIONS

I have a splitting headache.

—Patient’s comment following his cerebral commissurotomy

Redundancy and symmetry in the form of duplicated organs are not uncommon in the human body. We each have two lungs, two kidneys, two ovaries or testes. And we each, effectively, have two brains. The fact that these two brains normally work in perfect accord as the cooperating hemispheres of a single brain is made possible by the band of connecting tissue that provides a natural information superhighway between them. The main bundle of (about two hundred million) nerve fibers linking the brain’s two halves, the corpus callosum (a structure present in all mammals except the marsupials, which are considered the most primitive of the class), is thought to have several functions, one of which is to allow memories and skills garnered during an individual’s lifetime to be laid down simultaneously in both hemispheres. Because of this replication,

if part of one hemisphere is damaged through accident or disease (such as a stroke), there is a reasonable chance that the matching portion of the other hemisphere may eventually be able to take over some or all of the lost mental functions for the whole brain.

Normally, the corpus callosum supports a heavy two-way flow of data traffic so that each half of the brain is kept almost immediately abreast of what its partner is doing or thinking. But what happens if this communications link is broken?

During the 1940s, the American surgeon William Van Wagenen severed the corpus callosums of about two dozen patients who were suffering from grand mal epilepsy. In some cases, the condition was so severe that the victims would experience several violent seizures an hour, every hour, without respite. Epileptic attacks originate in a specific, small region of one hemisphere that may differ from one patient to another. The attacks quickly spread, invade the opposite hemisphere, and thereafter overwhelm the victim. By decoupling the hemispheres, Van Wagenen hoped to confine the seizures to the hemisphere in which they started and so allow the other hemisphere to continue functioning as normal. To his disappointment, his patients showed little or no improvement.

Twenty years later, two surgeons in California, Joseph Bogen and Philip Vogel, suggested that the earlier operations had failed because Van Wagenen had not cut through all of the commissures (the bundles of nerve connections) between the two halves of the cortex. As well as the corpus callosum there are other, smaller cortical links, including the anterior and hippocampal commissures. To test their idea, Bogen and Vogel carried out complex commissurotomies on sixteen grand mal epilepsy patients in the 1960s and 1970s, and achieved remarkable postoperative success. The epilepsy was cured. But it was for another, very different reason that many psychologists were intrigued by the surgery. What effects, they wondered, had there been on the patients' minds and behavior? To investigate this question, Roger Sperry of the California Institute of Technology and other researchers subjected several of the "split brain" patients to a battery of ingenious tests.

The split-brain studies made use of the well-known but bizarre (and unexplained) fact that the left side of the body and the left visual field are controlled by the right hemisphere, and the right side of the body and the right visual field by the left hemisphere. (Control of the auditory fields is more complex, while our sense of smell, the most neurologically ancient of the senses, is not crossed over at all, each nostril being "wired" to the hemisphere on the same side of the body.) Under normal circumstances, any thoughts or perceptions first registered in one half of the brain are quickly relayed to the other half through the cerebral commissures. But following complete commissurotomy this is no longer possible, and extraordinary conflicts can ensue. One of the split-brain patients, for example, found himself pulling on his pants with one hand while trying to take them off with the other. On another occasion, he attempted simultaneously to button and unbutton his jacket with opposite hands. With neither hand knowing what the other was doing, the patient was left bewildered as to why he seemed unable to perform so simple a task. In a particularly alarming moment, the same

individual grabbed his wife with his left hand and shook her violently before his right hand could intervene. Another patient found each hand choosing different clothes to wear in the morning, and reported that every now and again her right hand would slap her awake when she (or, rather, her right hemisphere!) was in danger of oversleeping. Similar but even more startling behavior had been noted in a female patient in 1908 by Kurt Goldstein. He described how the woman had been taken to the hospital because her left hand would repeatedly close around her neck and start to choke her. On each occasion her right hand would come to the rescue and she would then be compelled to sit on her left hand, which she accused of being bad and beyond her control. While in bed, she would throw the pillows on the floor and tear the bedclothes — but only with her left hand. On the basis of his examination, Goldstein surmised that she had suffered damage to the corpus callosum, and that the two sides of her brain had thus been disconnected from each other — a diagnosis eventually confirmed after the woman's death by a postmortem.

Given cases like these in which a patient's hands act in direct opposition to one another, it is hard to avoid the conclusion that the two hemispheres of the brain, when separated, can function independently and without each other's prior knowledge. In Sperry's words:

Each hemisphere ... has its own ... private sensations, perceptions, thoughts, and ideas, all of which are cut off from the corresponding experiences in the opposite hemisphere. Each right and left hemisphere has its own private chain of memories and learning experiences that are inaccessible to recall by the other hemisphere. In many respects each disconnected hemisphere appears to have a separate "mind of its own."

One young woman, when asked whether she could feel her left hand, shouted, "Yes! Wait! No! Yes! No, no! Wait, yes!" Her face twisted as each of her two minds, only one of which could feel the hand, tried to answer. A researcher then handed her a piece of paper with the words "yes" and "no" written on it and asked her to indicate the correct answer. After a moment's hesitation, the woman's left forefinger jabbed at "yes" and her right forefinger at "no." The psychologist Norman Geschwind has gone so far as to say it is misleading even to talk of "the patient" in the case of disconnection of the hemispheres. There are, he believes, really two people living inside the same skull.

Clearly, this idea flies in the face of those who believe, as Descartes did, that every human being has a unique seat of consciousness — a single mind that cannot be divided or fragmented whatever happens to its host brain. But one objection can still be raised from the Cartesian camp on the grounds of hemispherical asymmetry. Among the chief critics of the idea that separating the hemispheres inevitably leads to the creation of two separate minds was the English neurophysiologist Sir John Eccles, one of the few remaining dualists in his profession. Eccles pointed to the well-known fact that, in most people, the two halves of the human brain are not mirror images of each other. At a casual glance they may give this impression, but in fact they reveal subtle differences in structure and quite extensive differences in function. In particular, only one half of the brain normally houses the regions equipped to deal with language at a high level. In most people the left hemisphere is responsible both for speech and for the majority of language

comprehension skills, whereas the right hemisphere is generally aphasic (speechless) and has only a childlike ability to understand words.

That language processing is both localized and lateralized within the brain has been known for more than a century. It is well established that damage to specific regions called Broca's area and Wernicke's area, which are normally found only in the left hemisphere, impairs a person's speech and his ability to understand language, respectively. Because of the great importance of these regions, surgeons are especially anxious to avoid disturbing them if at all possible during brain surgery. A simple preoperative procedure known as the Wada test is carried out to determine in which hemisphere of a patient's brain the main language centers lie. This test exploits the fact that each cerebral hemisphere is supplied independently with blood via a carotid artery running along the same side of the neck as the hemisphere. If sodium amytal or a similar drug is injected into the artery on the same side as the hemisphere controlling speech, the patient temporarily loses the ability to talk and cannot answer any questions for several minutes until the effects of the drug wear off. By contrast, there is generally no loss of speech if the opposite hemisphere is anesthetized.

Studies have shown that around 99 percent of right-handers have their primary speech and language centers in their left hemispheres (the same side of the brain which controls their dominant hand), while, surprisingly, 70 percent of left-handers are also linguistically left-hemisphere dominant. Of the remainder of left-handers, about 15 percent have their main language centers in the right hemisphere and 15 percent show evidence of speech control in both hemispheres.

Interestingly, research by Sandra Witelson, a psychologist at McMaster University in Hamilton, Ontario, has shown that left-handed and ambidextrous people have corpus callosa that are, on average, 11 percent larger than those of right-handers. This suggests a greater potential for communication between the hemisphere (assuming that the nerve fibers are equally dense) and, therefore, possibly a more equitable division of labor in many aspects of cognition, including language. It may be that we all start out potentially ambidextrous and with similar sized corpus callosa at birth but for some reason most of us rapidly lose twenty million or so neurons in the connecting body and develop a specialization in the brain that is associated with right-handedness. But why this should be is not clear.

Significantly, patients who are known to have suffered damage to the left side of their brain early in life are much more likely to show right-hemispherical or bilateral speech control. This backs up the view that, although we may have an innate, presumably genetic tendency to develop primary speech and language centers in just one hemisphere (usually the left), the other hemisphere can take over these functions if necessary. However, this plasticity of the brain falls off sharply with age so that by adolescence the capacity of one hemisphere to assume the specialized functions of the other is severely limited.

The objection of dualists, such as Eccles and his one-time colleague the late Sir Karl Popper, to the idea that commissurotomy creates two distinct minds or streams of consciousness rests on the grounds that one hemisphere — the dominant (and therefore usually the left) hemisphere — is overwhelmingly the better at handling high-level language. And it is the sophisticated use of language, the argument goes, that is the crucial ingredient in making us fully conscious. Eccles portrays the speechless right hemisphere as being primitive, bestial, and essentially unconscious. In his view, each human being has an indivisible self, a Cartesian ego or soul, that is associated exclusively with the left side of the brain. However, this argument does not bear up well under the weight of clinical evidence.

Dualists face a problem, for instance, in explaining the extraordinary postoperative recoveries of patients who have undergone hemispherectomy — the surgical removal of one entire brain hemisphere. This drastic procedure is now performed several dozen times a year in the United States, usually as a treatment for a rare condition known as Rasmussen's encephalitis, which afflicts its victims with rapidly recurrent life-threatening seizures. Extraordinarily, it is found that if hemispherectomy is carried out in infancy or early childhood, the remaining hemisphere, whichever it happens to be, can take over all of the functions usually lateralized to the other half.

Typical is the case of Matthew Simpson, a young American boy who at about the age of four began to experience violent seizures. Rasmussen's disease was diagnosed, and when medications failed to relieve his symptoms it was decided to proceed with a left hemispherectomy. With the removal of Matthew's left hemisphere went his principal language centers. Yet today Matthew is doing well in school and, with the help of weekly language therapy sessions, is rapidly making up for lost ground — and lost cortex.

Apparently, the normally aphasic side of the brain has just as good a latent capacity to mediate speech and to understand language at an advanced level as does the side which, if undisturbed, becomes language-dominant. This fact is demonstrated, too, by patients who undergo hemispherectomy later in life. Those who have had their right hemispheres removed (and were preoperatively left-brain language dominant) display no obvious language problems. But, remarkably, patients who have undergone left hemispherectomy show much less linguistic impairment than do individuals who have simply suffered lesions to their speech and language centers. It seems that not only is language represented to a considerable extent in both hemispheres but also that the left hemisphere normally exerts an inhibitory influence over the right. So, as far as language goes, we may actually be better off losing one entire side of our cortex rather than suffering localized damage to the language areas. Only when the left cortex is removed altogether can the full language potentialities of the right hemisphere be realized.

Patients who have had their language-dominant hemispheres taken out after early childhood do show some loss in the production of language, as would be expected, but are hardly impaired at all in comprehension. And even in language production, these people can still use the surviving half of their brain to confer messages in some oral form: they remain highly proficient at swearing (since the right cortex is largely in charge of

emotional responses) and can continue to express themselves musically (again, a predominantly right-hemisphere skill). A female patient who underwent a left hemispherectomy could communicate much better in song than in speech after her operation. Some loss of oral skills may be inevitable, but those who are close to people who possess only a right hemisphere for a brain need no convincing that these individuals still possess a full, vigorous mind and a personality that can express itself in many different modes.

Of the split-brain patients studied, one, referred to as P.S., was unique in that both of his detached brain hemispheres had a pretty good command of language. He was sixteen years old when he had his commissurotomy, and was believed to have suffered damage to the left side of his brain when very young (causing the right side to compensate by becoming more language proficient than usual). For some time after his operation he could, like all of the other split-brain patients, communicate verbally only via his left hemisphere. But after two to three years, he acquired a useful language ability in the right side of his brain. Although his right hemisphere did not have access to the speech centers, P.S. could use his left hand to spell out words with Scrabble letters. This allowed researchers to establish a reasonable level of dialogue separately with each hemisphere — a breakthrough that was to lead to a striking confirmation of Sperry's dual mind hypothesis. The separate "conversations" revealed that each hemisphere did indeed appear to house an independent stream of consciousness, to the extent that the two halves of P.S.'s brain would often respond in completely different ways to the same question. Asked on one occasion about future ambitions, for instance, the right hemisphere expressed a desire to become a race-car driver while the left hemisphere said it hoped to pursue a career as a draftsman. On a scale of one to five ranging from "like very much" to "dislike very much," the right hemisphere frequently responded with a higher figure, though inter-hemispherical differences varied from day to day. Generally, it was found that on days when the two hemispheres gave more similar answers, P.S. was happy and relaxed, while at other times when the responses were in sharp disagreement, P.S. seemed more emotionally out of sorts.

Two of the researchers closely involved with studies on P.S., Joseph LeDoux and Michael Gazzaniga, concluded:

Each hemisphere in P.S. has a sense of self and each possesses its own system for subjectively evaluating current events, planning for further events, setting response priorities, and generating personal responses. Consequently, it becomes useful to consider the practical and theoretical implications of the fact that double consciousness mechanisms can exist.

In a similar vein, in his book *The Bisected Brain*, Gazzaniga wrote:
Just as conjoined [Siamese] twins are two people sharing a common body, the callosum-sectioned human has two separate conscious spheres sharing a common brain stem, head and body ... A slice of the surgeon's knife through the midline commissures produces two separate, but equal, cognitive systems each with its own abilities to learn, emote, think, and act.

Only one observation, on the face of it, seems to pose a threat to the idea that commissurotomy results in a definite bifurcation of consciousness, the creation of two minds where previously there had been only one. Although on rare occasions, split-brain patients do, for instance, find their left and right hands working in opposition, most of the time their behavior is bafflingly normal. You could spend all day with a commissurotomy patient and never suspect the drastic change that had been wrought in his or her brain. In fact, as experience has shown, only sophisticated psychological testing can consistently reveal that anything unusual is going on. How can this be? How can someone have two hundred million neurons sliced clean through and continue to function more or less as if nothing had happened?

It is true that split-brain patients no longer have any direct connections between the two halves of their cortex. But the absence of cerebral commissures can apparently be circumvented to a surprising degree by other linking mechanisms that are not affected by the operation. For instance, there are commissures in the lower parts of the brain. One of these, the superior colliculus, is involved in locating objects and tracking their movements. So, even after the higher commissures have been cut, the two hemispheres can continue to tap into the same primitive "radar" system giving the whereabouts of things in the outside world (albeit that they lack the means to reach a consensus on what these things actually are). The brain stem, too, which is believed to play a vital role in generating basic emotional responses, continues to feed identical messages to the severed hemispheres.

Other ways of harmonizing the two disconnected brain halves are furnished by the senses. Each eye, for instance, projects to both hemispheres: the contents of the left visual field of each eye to the right hemisphere and the contents of the right visual field to the left hemisphere. As a result, eye movements initiated by one hemisphere to bring an object into direct view serve also to bring that object to the attention of the other hemisphere. A similar but more complex crossover of signals takes place with respect to hearing. And although the great majority of tactile signals are carried by contralateral nerve fibers (that is, fibers crossing over from the opposite side of the body) there are also a few ipsilateral fibers running from the left side of the body to the left hemisphere and from the right side of the body to the right hemisphere. All these subsidiary unifying mechanisms, which remain intact after complete commissurotomy, help the divided brain to continue to work as if it were a single unit.

That the brain should be so adept at keeping up the appearance of unity, even after it virtually has been sawn in two, is not really surprising. The brain has been exquisitely shaped and honed by evolutionary forces over many millions of years so that it is now perfectly tailored to protect and serve the interests of the organism in which it resides. It is the consummate survival machine. And one of the chief reasons for its phenomenal success is its ability to function so coherently. Despite the awesome complexity of activity among its two hundred billion neurons — a cell for every star in the galaxy — at the level of the whole organ it manages to act as a single, purposeful entity. In most situations, it presents to its owner and to the world at large a unified strategy. Why should we suppose, then, that it would start to behave differently, giving out conflicting messages, speaking discordantly with more than one voice, just because it had suffered

some damage? Surely, the likelihood must be that whatever happens to the brain, whatever calamities it suffers, it will still make every attempt to stay true to its prime evolutionary directive. Like any effective committee, political party, or federation of states, it will continue to try to present a unified public face, to at least behave as if it harbored a single mind.

Apart from occasional instances when their left and right hands seem bent on different courses of action, split-brain patients don't report being aware of an inner conflict. They don't describe experiencing the presence of two different minds. But again this is hardly surprising. When a split-brain patient speaks, it is only his or her left hemisphere that is producing the speech and expressing itself. The right hemisphere, being mute, is compelled simply to listen. Even if it wanted to put forward an opinion of its own (and the right hemisphere seems much less strong-willed and focused than the left) it would be unable to. Therefore, asking a split-brain if he or she feels like two separate people living inside the same body resolves nothing. Even in the case of P.S., who has two "talking" hemispheres, one hemisphere is clearly more articulate than the other and, under normal circumstances, acts as the spokesperson for the whole brain.

Most of the time, then a split-brain patient appears to have just one mind. Moreover, when the presence of the two minds is overtly revealed, the language-dominated hemisphere, confused by something it cannot readily explain, tries to cover up its ignorance of what the silent mind is seeing and doing. It resorts either to educated guesswork (based on cross-cueing) or confabulation. For instance, in one of Sperry's experiments a split-brain patient was shown a pencil in such a way that the image went only to his right hemisphere. When asked what he had seen, the patient (via his left hemisphere) replied "Nothing." However, when offered a tray of objects and asked to pick up with his left hand (connected to the right hemisphere) the object previously shown, the patient immediately reached for the pencil. Upon being asked why he had picked up the pencil, the patient (that is, his left hemisphere) grew confused and, not wishing to appear foolish, invented a story about the pencil resembling one he had once owned. On another occasion, Sperry showed a series of innocuous pictures in the left visual field of a female split-brain patient, and then slipped in a photo of a nude. Immediately, the woman felt acutely embarrassed, but couldn't explain why. Her talkative left hemisphere, not having seen the photo, had no idea why its owner was suddenly blushing and acting uncomfortably. So it contrived an answer to conceal its ignorance. When asked what the problem was, the woman complained that Sperry's machine was "very peculiar."

Why do we each feel single in spite of changing sensory impressions? Why don't we ever feel literally in two or three or more minds? The answer is simple: there are no conceivable circumstances under which a person could feel double — for who would there be to feel the doubling? Logic and intuition dictate that you can be only one person at a time. And this is a conclusion fully vindicated by the experiences of both MPS victims and split-brain patients.

In the case of MPS, though several personalities appear to inhabit the same brain, typically only one is active at any given time — as if a single searchlight of consciousness illuminated each character in turn. And even in situations where one of the personalities (like Sally) claims to have access to what one of the personalities is thinking, the “supervisory” personality does not feel double. The situation is best thought of as a group of people sharing the same brain, with a few of the individuals being in a position to snoop on some of their cohabitants as if through a one-way mirror.

The case of split-brain patients is different (and less controversial) in that there are clearly two continuous, concurrent streams of consciousness in the same brain. Even so, there is no single entity that experiences dual awareness.

Consciousness, by its nature, is inevitably singular, unitary. Descartes gave the analogy of two one-eyed dogs fighting over a bone. The dogs would behave as if they saw one bone, not two! You cannot be two people at once. And no matter how hard you try to imagine your own stream of consciousness dividing, you always imagine the period after the split from the vantage point of one of the resulting streams.

In discussing such issues we quickly run into linguistic problems. We assume we know what words such as “you” and “person” mean. But it turns out that we normally use these terms in the Cartesian sense of being definite, indivisible objects. Our language therefore incorporates a philosophy of the self that fails to correspond with the reality science has now disclosed. What was one person can become two. What was “you” can become more than one you. Such bifurcations in the river of consciousness have happened. But the important fact is that when a “you” divides, or changes, or ends, or begins, it is not a problem for anyone concerned. From the point of view of the person you are now, change of any kind — especially death — seems to be a problem. But the only problem in fact is the advance fear of change itself. Once you actually stop being who you are now, the fear disappears, and you are free to continue life as someone else — a new you.

BEING SOMEONE AND BECOMING SOMEONE ELSE

Our claim to our own bodies and our world is our catastrophe . . .

—W. H. Auden, *Canzone*

I wake up, I wash and dress, I notice in the mirror with some alarm a few more gray hairs, an unfamiliar wrinkle. I enjoy my morning cup of tea. I venture out and feel the chill of a December morning. Who or what is this “I” that does these things and has these experiences?

Each of us takes in the world from a unique vantage point. We see our surroundings through one particular pair of eyes and feel our awareness to be seated in one particular brain. We each think of ourselves as being unique and different from the rest. In your lifetime, you have had many experiences, sensations, thoughts, and emotions. But the one thing they all have in common is that they seem to be specifically associated with you. To varying degrees you have felt angry, happy, excited, in love, gloomy, anxious, and every other emotional state a person can feel. You have fallen asleep, daydreamed, possibly had general anesthesia, probably been under the influence of alcohol, and enjoyed who knows what other altered states of mind. You have been different ages. Yet despite all of these extraordinarily diverse experiences you are firmly convinced that you have remained, in some sense, one and the same person. You believe, as do those around you, that there is something — your “self” — that remains steady, secure, and identifiable amid the unpredictable flux of life. Furthermore, you believe that this self is distinct from all others. You feel, too, as if you did not exist before you were born, that your mind flickered into existence at some point, or over a limited period, in the not-so-long-ago past. And this raises the fear that you will similarly fade from existence in the not-too-distant future, when your body and brain stop working.

This feeling each of us has of unique individual consciousness and selfhood, of having an ego inside us, is both commonly accepted and, at the same time, profoundly mysterious. How did the conscious agency inside you come to occupy this particular body? Why were you born at a certain place and time, and not, for instance, two thousand years ago in Egypt or Rome, or a million years in the future in another part of the galaxy? Why is our personal existence unique?

If we think only about other people, it hardly seems surprising that there should be different selves, different eddies of being, characterized outwardly by different personalities. Each of us has a unique collection of genes and is exposed to a unique set of circumstances, so it would be unreasonable to expect any two people to turn out the same. But as soon as we focus on our own particular consciousness, mind-boggling paradoxes seem to arise. Of all the billions of centers of human (and nonhuman) awareness that have existed and do exist and will exist throughout time and space, why are you the one individual you are, in this body, here and now?

You would hardly expect to wake up tomorrow and find yourself, literally, stepping into someone else’s shoes. You don’t expect to be looking out, from one moment to the next, through the eyes of a succession of unfamiliar people. Your consciousness doesn’t flit around like a hummingbird from one place and time to another. Why should that be? We can breathe the same air and eat the same food, so why can’t we share or swap consciousness? Why can’t you be me, and I be you?

There's no reason to suppose that the day-to-day experiences in your life are very much different from mine or anyone else's. In matters of detail, it is true, they may differ quite a bit. But if you and I were to look at the same tree together, it's reasonable to assume that we would inwardly perceive pretty much the same thing. Your experience of the tree — your feeling of its "treeness" — would, in all probability, closely match mine. We can say this with some confidence because the way the human senses and brain work doesn't vary much from one person to another, so there are no grounds to suspect that our inner perceptions differ much either. It seems as safe as it possibly could be to conclude that a lot of what goes on inside our heads is not unique to us as individuals. The warmth of the sun, the smell of a rose, the throbbing pain of a toothache, and innumerable other sensations almost certainly feel more or less the same to you as they do to me. What, then, if two people in the same place could stop thinking for a moment about anything to do with themselves — the money he owes on his car, the itch she has on her arm, and so on — and instead simply take in their surroundings. What would happen?

Imagine, for instance, you are sitting on a boulder on the shore of a remote lake in the Canadian wilderness, a place little changed since the end of the last ice age. You see the sun glinting off the cool blue water, the rocky shoreline, the tall pines stretching away on either side. You have let your mind settle into a state as clear and tranquil as the cloudless sky, undisturbed by any personal thoughts or concerns. Beside you is a friend, and together you simply absorb and enjoy all the rich sensations this wild place has to offer — the cry of a bird overhead, the exhilarating feel of a fresh breeze, the gentle lapping of waves on the shore, the aroma of leaf and flower. Both of you experience the same scene, thinking no other thoughts, just letting the sights and sounds of your immediate environment wash over you. How is your consciousness, in this entirely open and receptive state, any different from that of your friend? How could it be different if the only aspect of experience that distinguishes two people — thoughts to do with themselves — have been suspended? Two bodies, two sets of sense organs, two brains, there might be — in objective space. But what matters, and is of primary importance to each of us, is the view from the inside. How can two minds differ internally if they are experiencing, purely and simply, the same underlying reality? When experience is exclusively of what is happening here and now, uninfluenced by personal memories, then it is — and must be — the same for everyone.

Now imagine that, a thousand years ago, another person sat on this same boulder savoring this same view of the lake and shoreline under the same bright sun. How is your consciousness, your immediate experience of this situation, any different from this other individual's? You might argue that he was a different person who lived a different life at a different time and so inevitably had different thoughts from your own. But, again, leave aside these circumstantial differences, the very differences that define individual selves, and focus only on what you and this other fellow have in common — the unadulterated awareness of sitting on a boulder by an ancient lake, with no other thoughts intruding. Under these circumstances, what distinguishes your consciousness from his?

We are brought up to suppose that the consciousness of a particular person is entirely separate and distinct from the consciousness of anyone else, that we each inhabit our own

little bubble of awareness. We are led to believe that the inner experience of being a particular person, a “you” or an “I,” is an exclusively private affair. And so we accept without question that this inner experience must be associated uniquely with one particular body and brain — the one that happens to be “ours.” But this belief is groundless, a mere social convention.

Most of the elements of what you and I experience are the same. So why do we regard ourselves as being utterly different? Why does it seem as if you are only conscious of what goes on inside your own head and not mine, or anyone else’s — or, for that matter, everyone else’s? It would be easier to accept that consciousness is a partly shared affair if it were not for the fact that you and I acutely feel as if we are looking out on the world from particular vantage points. Everything apparently comes not just to any observer, but constantly and unremittingly to you or to me. If you stub your toe, the whole population of the planet doesn’t groan along with you. If you have a long, cold drink after a long, hot game of tennis, the rest of humanity doesn’t share in your moment of bliss. As William James remarked:

Other men’s experiences, no matter how much I may know about them, never bear this vivid, this peculiar brand.

We are alike, and therefore able to communicate with each other, inasmuch as part of our consciousness is the same. But we are different and distinguishable in that everyone has a unique life story. I know what it is like to feel pain, but I didn’t feel pain at the same times or in the same physical surroundings or in the same psychological contexts as you did. I know what it is like to fall in love, but not with that certain blond-haired girl or boy with the out-of-state accent you met at your high school dance when you were seventeen.

For most of the time we have an overwhelming impression of there being a central unifying agency inside us that remains steadfast and secure. This agency is the power that relates sensations, from one moment to the next, as if they were experienced by the same person, that seems to will actions, erects boundaries between itself and the outside, and seeks self-preservation. The brain, in effect, appears to have a resident storyteller that works ceaselessly to link everything into a single coherent narrative. And even as you read this, the story is continuing. Your brain is drawing upon a knowledge of its own history to generate the feeling of being you, interpreting every new idea and sensation it receives in terms of the information it already has stored.

The brain manufactures us, integrates us, moment by moment, from bits and pieces it finds in its database of memories. So, inevitably the contents of this database are crucial in fashioning the particular persons we become. Childhood circumstances, especially, play a vital role in laying down the basic infrastructure of our brains. However, the process of brain modification continues throughout our lives; the network of neurons, the pattern of synaptic links, alters and evolves over time in response to the demands placed upon it. Our brains change — and so, as a result, do we.

We are never the same, objectively, from one moment to the next. As sensations and emotions fluctuate, as the brain’s repository of memories is added to or depleted, we

change too. And yet the change is not apparent from within. Every moment the brain is bombarded with fresh sensory data, and every moment, without fail, it filters, sorts, and merges this data with past recollections at an unconscious level to give a single, coherent, conscious experience. Across time, too, the brain unites, building bridges between its separate conscious experiences to create the impression of a smoothly running narrative. And, as its pièce de résistance, the brain conjures up the illusion of a character as its story's heart — the self.

All the evidence of neurology suggests that you are nothing more than what it feels like to be a particular brain at a particular moment in time. And although this experience is determined by what has happened in the past, through the influence of memory, who you were in the past is not who you are now. It is one of the cleverest and most beguiling of the brain's tricks to foster the belief that this is so — but you do not feel now as you did ten years ago, or even ten minutes ago. You are the feeling of one brain at one moment in time, this moment, no more. And part of this feeling, the illusory part, is that you are identical and continuous with what has gone before.

We are brought up to take pride in our individuality, to value being a particular person with a mind of our own. But however well this belief serves us in many ways, it comes at a heavy cost. Our tendency to accept unquestioningly the existence of a distinct, unchanging, private ego makes us terrified at the prospect of its loss. How, in the light of what science and psychology have revealed about the self, can we come to terms with the inevitability of death.

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Suppose that neurosurgery develops to the stage where whole or partial brain transplants become possible. And suppose, for some reason, that you and I decide to have our brains swapped. After the operation, your brain, and therefore your continuing sense of self, would have taken up residence in my body, and my brain and sense of self in your body. A total brain transfer like this seems to pose no serious dilemma in deciding what happens to each person involved. We instinctively accept that “you go where your brain goes,” though it might well be that having a new body and appearance would eventually lead to marked changes in how you thought and felt. This would be especially so if the new body was very different than the original — say, a man’s body instead of a woman’s, or an adult’s instead of a child’s (as comically portrayed in the movie *Big*).

More problematic, though, would be the case where instead of a whole brain transfer we opted for a gradual swap of our brains. After the first operation, small clumps of cells from corresponding parts of the two brains would have changed places. How would this feel for you and for me? One possibility is that, upon regaining consciousness, we might notice the presence of a few new memories, the loss of some others, and perhaps a hard-to-define feeling of being not quite ourselves. If so, then if more such operations were carried out a point would presumably be reached at which you had become me and I had become you. Is this a reasonable theory?

Of course, no progressive transfer of healthy brains is ever likely to be carried out in practice. However, the surgical repair of damaged brains through the grafting on of healthy tissue from donor brains is a possibility. And some preliminary work in this area has already been done.

As long as as 1903, Elizabeth Hopkins Dunn, an anatomist at the University of Chicago, showed that small groups of cells or fragments of nervous tissue could be successfully grafted from the brain of one newborn rat onto that of another. The brain, it turns out, is surprisingly unfussy about having foreign material patched on to it (though it may, after several weeks or months, reject it). But the graft will not take at all unless it consists of very young cells, because only these have sufficient plasticity to form viable connections with the host brain.

Like their human counterparts, old rats tend to be forgetful. They have trouble, for instance, remembering their way around mazes that they have previously negotiated. But a graft of cells from a rat fetus, providing it comes from a specific little region of the brain known as the septum, serves dramatically to boost an aging rat's maze-solving ability. This is because the septum regulates how much of a neurotransmitter (a chemical by which nerve cells communicate) called acetylcholine is fed to the hippocampus. And the hippocampus, as already mentioned, plays a vital role in helping lay down new memories. In an old rat — or an elderly person — the supply of acetylcholine in the hippocampus dries up because the necessary signals no longer come through from the septum. Fresh septum cells grafted onto the hippocampus help restore the supply — and hence the ability of the animal to remember.

Since the 1980s, brain grafts have been given to several hundred human patients around the world in an effort to relieve the symptoms of Parkinson's disease. Parkinson's victims face acute problems in exercising voluntary muscle control. Although not paralyzed (at least in the early stages of the disease) they may have great difficulty in initiating or controlling movements. Their limbs may tremble violently one moment and be struck in frozen immobility the next, and the normal gait of walking may be replaced by rapid shuffling steps. Unlike Alzheimer's disease, which is characterized by a catastrophic loss of cells from virtually all parts of the brain, the effects of Parkinsonism can be traced principally to the death of cells in one specific structure — the substantia nigra. This part of the brain regulates the amount of the neurotransmitter dopamine reaching an important motor-control center called the striatum. The experimental transplant treatment involves taking substantia nigra tissue from aborted human fetuses and attaching it to the striata of affected patients in the hope that it will trigger the production of dopamine and so suppress the symptoms of Parkinsonism. It is far from being a cure, and in many cases it produces little or no improvement. But for some Parkinson's patients, brain grafts have led to a marked recovery of independence and mobility.

The important point about this type of graft is that the connections formed between the transplanted cells and the existing brain cells don't have to be precise. The substantia nigra just modulates the activity of the striatum like a volume control, so the details of the circuitry aren't crucial. All that matters is that the right amount of dopamine gets through

to where it is needed. This is obviously a very different form of communication from, say, that between the eyes and the visual cortex, in which the exact plan of the neural circuitry is absolutely critical.

More extensive brain grafts may be carried out in the future. But they will continue to involve immature cells that have the capacity to bind to existing tissue. Obvious ethical problems surround the use of brains from aborted fetuses, particularly as several brains are needed to provide sufficient dopamine-producing neurons for a transplant. This process will become much more efficient — and less ethically contentious — as it becomes possible to grow large numbers of dopamine neurons in the laboratory from a tiny amount of fetal brain material. But the necessity for using foreign tissue at all is likely to be short-lived as techniques are evolved to generate new brain cells *in situ* through tissue and genetic engineering.

Whatever method is used for future brain repairs, there is no conceivable threat to the identity of the patient. The new tissue will simply become integrated into the structure of the existing brain without introducing foreign elements into the recipient's memories or character.

In fact, even if it were possible to transplant tissue from one mature brain to another, this would not raise the specter of memory transfer. Neurologists no longer subscribe to the idea that specific memories are carried by specific neurons or clusters of neurons. Instead, the modern view is that memories depend upon the overall associational network of connections within the cortex.

Reality, then, precludes a would-be Dr. Frankenstein from gradually changing one person into another by progressively swapping bits of their brains. But we can still envisage another method of achieving the same end. Suppose that it becomes possible to map a living brain down to the level of every neuron and synapse. And suppose further that we develop the means to reconfigure a brain's connections by as little or as much we desire. This would allow us, for instance, to make any number of the connections in one brain identical to those in another brain. Thus equipped we are ready to ask again: what would such a progressive change feel like?

A contemporary philosopher who has done a great deal of groundbreaking work using thought experiments like these is Derek Parfit of Oxford University. Imagine, then, to borrow from one of Parfit's own gedanken experiments, that the two brains involved are those of Parfit himself and Napoleon Bonaparte. The question is, at what stage in the rewiring procedure would Parfit start to think of himself as being Napoleon rather than his old self? It would be ridiculous to suppose there would be a sudden switchover of identities. Clearly, we would be dealing with a continuous spectrum of possible mental states ranging from the feeling of being 100 percent Derek Parfit (a feeling that only Parfit is privy to) to that of being 100 percent Napoleon (a feeling known only to the emperor). In between these two extremes, memories from both individuals would be present together and so, for instance, Parfit/Napoleon might be ambiguous as to his loyalties to England and France or to Mrs. Parfit and Josephine. The storyteller in the

Parfit/Napoleon brain would be working overtime trying to reconcile the conflicting bits of narrative at its disposal and doubtless around the midpoint of the operation, Parfit/Napoleon would be seriously confused as to his true identity. However, there is absolutely no reason to suppose that at any stage in the neural reconfiguration there would exist the feeling in the Parfit/Napoleon brain of being two people at once. Observers would certainly be forced to agree that the person who emerged from the operation, behaving exactly like Napoleon, was very different from the original Derek Parfit. On the other hand, as experienced by the Parfit/Napoleon brain, there would never have been a moment in which the “I” inside ceased to exist or at which this “I” experienced a dual or fragmented consciousness. The “I” inside may have felt disoriented, unsettled, afraid, or uncertain as to its identity, but it would nevertheless have experienced a single continuity of awareness.

Who should we think of as being the individual who walks away from the operation? He looks like Parfit and has Parfit’s old brain (extensively rewired, but with all the original atoms). Yet he acts like Napoleon. He talks in immaculate French of his military campaigns, his love for Josephine, and his despair at being sent into exile. He is, legally and biologically, the father of Parfit’s children and the husband of Parfit’s wife, but he retains not a single memory of being Parfit. Who then is this person? As experienced internally he is Napoleon (though an extremely confused Napoleon, having suddenly found himself in twentieth-century Oxford in an unfamiliar body!). But as far as others are concerned, he has the appearance of Derek Parfit apparently having gone mad and now doing a ludicrous (but brilliant) impression of the French emperor. What label should we pin on this person?

Such a question may prove difficult or impossible to resolve unless we are prepared to adopt a radically new outlook. We have to accept that there is a difference — a very great difference — between what we conventionally believe to be true about people, including ourselves, and what is actually the case. We have had it drummed into us that particular selves exist and that personal identity is all-important. We have been conditioned, both by evolution and by the society we live in, to think that the “I” inside us is clearly defined, extremely special, and worth preserving at almost any cost. As a result, we imagine ourselves as being at a privileged focus of the world, at the center of a special bubble of awareness that is different and more significant than any other.

So intently focused are we on our own self-centered domains that we consistently overlook the fact that the “feeling of being you” is universal. Everyone has to be someone, and everyone happens to be the particular someone they are right now. Say to a crowd of five hundred people, “Put up your hand if you feel like you,” and five hundred hands will go up. The simple but underrated fact is that we all feel like you. Right now, six billion people are busily “being you” — and not one of them is anyone special.

You might argue: “But there’s only one me, one self that’s exactly like me. Why is it that, of everyone I might have been, I happen to be me?” Yet, the fact is that anyone else could reply: “I think exactly the same way — and so does she, and so does he.” So where is the problem? I may not be having exactly the same thoughts or seeing the same things or

experiencing the same emotions as you are right now, but why does that matter? Neither did you feel the same way last year or yesterday or even five minutes ago. The fact is that the range of subjective experiences you have been through in your life is as great as the range of subjective experiences being felt by many different people at any given moment in time. How can you claim to be a unique, definitive thing, this supposedly immutable “you,” when the succession of many past yous and the present you are as different from each other as a large collection of totally different individuals? It may be that at this moment (the moment at which you are reading this sentence) you have more in common with the way I am feeling right now than the way you yourself were feeling at this time yesterday. How then can we avoid the conclusion that conscious experiences are much more communal, much more commonly shared among everyone, than we normally suppose?

We have to realize, difficult as it may be, that there is absolutely nothing special about any of us. Only when we can grasp at the deepest level that personal identity is not what matters can we make progress toward understanding our true nature. The fact is, you could have been anybody. If your mother had conceived five minutes later than she did, a different sperm cell from your father would almost certainly have fertilized your mother’s egg, and a child having a different genetic makeup from your own would have developed. Ask yourself: would you have been that child? Or would you instead have been the brother or the sister of who you actually turned out to be? The child that might have been conceived five minutes later would have grown up to think of itself as being a particular person, would have had an inner world of experience as rich and coherent as anyone else’s, and would have been referred to by others as “you.” Its unique genetic constitution would have made it different from you in some ways (including possibly its sex), though its almost identical upbringing and environment would inevitably have made it similar to you in other ways (just as brothers and sisters are similar). Since the child would effectively have taken your place, is it reasonable to say it would actually have been you?

Or take a different example. Imagine you have an identical twin and that your parents divorced when you were three years old. Your mother and twin went to live in New York, while your father and you remained in San Francisco. Thirty years later, having been out of contact for all that time, you learn that whereas your own upbringing, while happy, was materially modest, that of your twin was extremely privileged. He or she attended a private school, won a scholarship to a first-rate medical college, had the opportunity to make all the right social connections, and is now a successful cardiologist. You, on the other hand, sell seafood on Fisherman’s Wharf. Though content with life, you wonder aloud to yourself one day what might have happened if you had been able to take your twin’s place. I overhear and in my newly constructed time machine travel back three decades to the moment at which your mother is about to leave for New York. I surreptitiously swap her twins around. Subsequently, the twin who goes to New York becomes a cardiologist while the other twin finds eventual employment as a purveyor of clams and crabs. One question we might ask is, given this new state of affairs, would you now be your twin (the cardiologist), or would you still be you (the seafood seller) in spite of the exchange? A more meaningful question, however, might be: does it matter? In the end, there are still two people — one a heart surgeon, the other a food merchant — who

are conscious and happy and have complete, continuous sets of memories and other characteristics that help define the individuals that are. They are not confused about their own identities. Nor, to go back to the earlier example, would the person who might have been conceived inside your mother five minutes later have grown up confused about his or her identity. Why then should we make such an issue of who is who?

You chose to read this book. It may revolutionize your life, or it may not. But what is certain is that, simply by having absorbed these words — whether you believe them or not — you are, in at least some small way, not quite the person you would have been had you decided to do something else instead. This is a physical fact. As a result of processing the ideas about self and consciousness and death that this book has already invoked, your brain has acquired a slightly different atomic and neurophysiological configuration than it would otherwise have done. Therefore, since you are undoubtedly influenced by the state of your brain, you are not quite the same person you would have been had you never started reading. Ask yourself: does this matter to you? Would it matter to you if I said I was going to throw a switch and turn you into this “other you” who would have existed if you had not picked up this book? Why should it matter to you? The person you would then become would still have a complete chain of memories and a secure sense of identity — a feeling of being “I.”

The future, on a human scale, is almost totally unpredictable. For example, I have no idea what I shall be doing in three years’ time. If this book sells well, I may be sunning myself on some warm Caribbean beach marveling at how wonderful a writer’s life can be. On the other hand, if you are my only reader, I may be pawning my computer and ruining the day I ignored my parents’ advice to find a real job. I know that, in any event, I shall continue to be me because I can never be anyone else (or, to put it another way, even if I did become someone else, in an existential sense, I wouldn’t be aware of it and would therefore still think of myself as being me). However, I also feel sure that the me who might be basking on some faraway desert isle would not be quite the same me who, if fortune fails to smile, ends up impecunious and untanned.

Even if we think we know who we are now, we haven’t a clue who we are going to be tomorrow or next year. Whatever happens, you will still think of yourself as being the same person — a continuation of the “old you.” But you will in fact have changed. You will be composed of different atoms, your body will have aged, your brain will be wired up somewhat differently, and your feelings about the world will have matured and evolved. Despite the fact that received wisdom tells us we retain the same personal identity throughout life, the reality of the matter is different. Personal identity does change, all the time. You are not the same “you” that you were a week ago or even a second ago. You, as a fixed entity, are an illusion that we have been persuaded to believe is real. Personal identity as a constant, enduring thing is a myth — a myth that on a day-to-day basis, it is true, serves a useful purpose. But to grow in understanding we need to move on, both individually and as a society, in the direction of laying less stress on the particular people we think we are — because being particular is not important. You and I are nobody special. We are simply brains having thoughts and that is all there is to it.

YOU AGAIN

What is a friend? A single soul dwelling in two bodies.

—Aristotle

So here we are: brains in conversation, trying to understand and come to terms with death. We want to know what it will involve, what it will feel like, what will happen after the last shallow breath and feeble heartbeat, after the sheet is finally drawn over our still features. Of this much we can be certain: within a matter of minutes, at some future time, our brains will become terminally starved of oxygen and will cease to function. All of the memories they so recently held, together with the power to integrate two selves — you and I — will be lost. Put this way, it sounds catastrophic. It sounds hopeless, terrifying, terrible. But how will it really be for us when the time comes?

Our great difficulty in thinking about death is that we can see it only in others, never in ourselves. (I'm reminded of a quote from a dying student nurse in Allegra Taylor's book *Acquainted with the Night*: "Death may get to be a routine for you, but it is new to me. You may not see me as unique, but I've never died before.") And viewed objectively it does look depressing — lifeless corpses, despair, mourning, decay, loss. Since our only contact with death is as an outsider this is our natural basis for envisaging what our own death will be like. But our own death is special and unique, because we shall be part of it, inside it, the one who actually dies. And as experienced, rather than observed, death is a very different proposition.

Witnesses regularly report that in the last days or hours of life, a dying person will appear serenely calm and at peace with the world, and even, on occasions, extraordinarily joyful and elated. And there are the reassuring testimonies, too, of people who have been through near-death experiences in which reference is often made to almost indescribably blissful sensations. The final passage leading to death is evidently, in the great majority of cases, not at all unpleasant. Indeed, for those who have suffered from a long, painful, or debilitating illness, such as cancer, the immediate prelude to death can be anticipated as a time of welcome deliverance from suffering. As for the moment of death itself, if we take this to mean the total breakdown of cognitive function (brain death) at the end of a person's life, then, as experienced, it will be over in a painless, trouble-free instant.

To those who knew and loved a person who has just died there is obviously great regret and sadness at his or her departure. But, if we are being honest (and it is especially hard

to be objective about such matters following a bereavement), at least a part — and perhaps a very large part — of the sadness we feel is for ourselves because we have lost someone dear, like a cherished possession. We will no longer have the pleasure of their company, and so we are consumed, understandably, by self pity. Moreover, the death of another, especially a close family member like a parent or spouse, reminds us keenly of our own mortality.

The terrible thing about death, then, is not the actual experience that awaits us — we all know what it is like to lose consciousness — but the angst and feeling of insecurity it instills in us now. It preys on our mind that, despite all the assurances of religion and the many tales of people who claim, in all sincerity, to have glimpsed wonderful visions of the other side of life, there may, quite simply, be nothing to come. And however irrational, however futile it may be to fret about death, we are psychologically paralyzed by the thought of a timeless, mindless void.

We seek comfort. But what does science do? It rejects the soul as an implausible and unnecessary hypothesis and reduces what is left of us to the musings of a moist, cauliflower-like (though nonetheless remarkable) lump of tissue. Have general anesthesia, go comatose, or just fall into a deep, dreamless sleep, it asks, and where are you? You are nowhere, because in such situations the brain temporarily stops generating the feeling of being someone. The brain makes you, it dissolves you, it brings you back again. And, as psychology and neurology have emphatically shown, when the brain's workings are altered or impaired, the sense of self they give rise to is correspondingly changed or diminished so that you become no longer the person you were. The scientific evidence for an intimate brain-self link is overwhelming. But the problem seems to be that if we are persuaded by such no-nonsense materialism, and if at the same time we abandon faith in a higher, spiritual domain, our hopes for the future will be dashed. Such is the brooding and pervasive concern of contemporary Western society. But it is a concern that is wholly unjustified.

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What most of us instinctively hope for is to be able to continue, after we die, as the person we are now. We may be happy to accept a change of scenery and circumstances, but our overwhelming desire is to survive death with our current selves intact. There is a general assumption that, in denying the existence of the soul, science precludes such a possibility. But it does not. On the contrary, science can supply an astonishing variety of scenarios, any one of which amounts to nothing short of secular reincarnation.

To take just one example: we know from experience that we carry on thinking we are the same person throughout life despite the ceaseless turnover of our constituent particles. And this is just what theory would predict. Because all atoms of a given type are identical, it doesn't matter which particular ones happen to temporarily form part of our bodies and brains. Therefore, it follows that if your brain were to be reconstituted, at some point in the future, down to the last atom (and perhaps the replication wouldn't need to be anywhere near this precise), you would live again. The chance of such atomic

level re-creation taking place might seem incredibly remote. But set against this improbability is the fact that the universe is extremely large and long lived. It may also be cyclic, alternating repeatedly between epochs of growth and collapse. Some cosmologists have recently gone further and proposed that our cosmos may be just one of countless universes that exist like bubbles in an inconceivably vast ocean of foaming space-time. In any event, since no one has yet come near to circumscribing the bounds of physical reality, we cannot rule out the possibility that any specific collection of matter, however complex, will recur — and recur many times over — in the distant future. Our uncertainty as to the full extent of the universe leaves open the prospect of a given brain being recreated and therefore the possibility of its associated conscious mind coming back into operation. The same argument applies, with equal strength, to the past of an indefinitely old universe, or collection of universes. If your brain has existed before, then in some sense it must be that “you” have existed before — perhaps an infinite number of times.

Were this mind-boggling scenario of recurring yous to be enacted in reality, the jump from one “phase” of your existence to the next, as experienced by you, would be instantaneous. Since you would not be conscious of anything in the intervening periods (you would after all be dead during these times!), you would not be aware in the slightest of any passage of time between when you last existed, even if tens or hundreds of billions of years had gone by. Any periods during which your brain was not (reasonably) accurately configured would be timeless instants from your subjective point of view.

This may seem like a stratospheric flight of speculation. Nevertheless, it is true that given the limitations of our current knowledge of cosmology, there is as much reason to suppose that materialism leads to a prediction of eternal life as it does to a prediction of nonexistence. And neither need give us any cause for concern. The Epicureans and the Stoics realized more than two thousand years ago that there was nothing to be afraid of in permanent extinction. Now, without assuming anything more than an indefinitely long-lived and varied cosmos, we have arrived at an alternative scenario of eternal life.

Yet it may be premature to start uncorking the champagne. We need to consider carefully what “eternal life” on these terms might mean. Nowhere in the picture of recurring yous just outlined is there a mechanism, an escape pod (like a soul), for transferring memories between successive phases of your existence. So, apparently, there is no way you could know or build upon the fact that you had lived before. Any previous yous might as well have been different people with differently patterned brains. As far as you were concerned, at any moment in time, it would be as if you had only one life, bounded by a single birth and death, not a series of more or less identical lives scattered across different epochs in cosmic history. Frustratingly, you would not be able to carry on where you had left off in your last life, or enjoy interphase continuity of any kind, because you could not inherit or benefit from what your previous incarnation had achieved. At the same time this wouldn’t matter to you since you wouldn’t know about it.

Eternal life punctuated by bouts of total amnesia seems to offer no advantage over an ordinary mortal life followed by permanent extinction. What most of us hope for after

death is something quite different—a chance to live forever under circumstances not unlike those of the popular Christian notion of heaven. We fantasize about spending the rest of eternity in a gardenlike Eden, fraternizing with other kindly souls, without the inconvenience of having to die again at some point. Genuine eternal life on this basis sounds idyllic. But, again, looked at more closely, it rapidly loses its appeal. Imagine spending endless eons — trillions upon trillions of years — with the same people in the same place doing the same things (but not, rumor has it, involving such diversions as sex or alcohol). If this is paradise, one can scarcely conceive what hell might have in store.

In Jonathan Swift's *Gulliver's Travels*, the hero discovers what a curse everlasting life can be during his stay in the land of Luggnagg. Every so often in this country, a child is born with a distinctive mark on its forehead indicating that it is a Struldbrugg — an individual who can never die. Gulliver supposes, naturally enough, that the Struldbruggs must become steadily wiser and wealthier than anyone else since they have all the time in the world to accumulate knowledge and riches. But, in fact, it turns out that the Struldbruggs, though normal until about the age of thirty, thereafter become increasingly dejected, opinionated, peevish, vain, unsociable, and envious — especially of the dead. Eventually, they lose their teeth, hair, appetite, memory, and ability to communicate. They become, in other words, permanently and unpleasantly senile, and are universally despised. Gulliver learns that only in those countries not having Struldbruggs is death considered to be an evil to be delayed as long as possible.

Not having journeyed with Gulliver, we tend to have a superficial and, therefore, exceptionally rosy view of what eternal life would be like. And there is no doubt we have a powerful urge, at least while we are healthy and active, to go on living as long as possible. How many of us would spurn the offer of a safe drug that guaranteed, barring accident, an additional fifty years of top-quality life? That extra half century might allow us to survive to a time when still more powerful drugs, or other techniques, become available for extending life for much greater periods. Gerontologists are already suggesting such breakthroughs may happen in the early part of the twenty-first century. And so we might continue, indefinitely, leapfrogging down the generations. The trouble is that, under such circumstances, we might well become obsessed with clinging on to life, dissatisfied with whatever time was left to us, frightened even to go outdoors in case death came by accident, concerned only with the quantity of life and not its quality.

Voltaire was another who understood well that a longer life is not necessarily a better one. In his comic, cosmic satire, *Micromegas*, an inhabitant of Saturn complains that the people on his planet live only to the age of fifteen thousand years.

So you see, we in a manner begin to die at the very moment we are born: our existence is no more than a point, our duration an instant, and our globe an atom. Scarce do we begin to learn a little, when death intervenes before we can profit by experience: for my own part, I am deterred from laying any schemes. I consider myself a single drop in an immense ocean.

In reply, a creature from Sirius points out that the folk of his world live seven hundred times longer than on Saturn. Moreover, he adds, there are some places where people live a thousand times longer than Sirians, and still complain about the shortness of life.

A long or endless life grounded in perpetual routine and repetition could become a weary treadmill — an existence from which we would be only too glad to escape, even if it meant death. In just such a frame of mind must the aging Jefferson have been when he wrote to a friend: “I am tired of putting my clothes on every morning and taking them off every evening.”

And there is another potential problem with life everlasting. We are all familiar with the worrying sensation that time seems to pass by more and more swiftly as we age. Could it be that the human brain keeps track of the passage of time by the frequency of novel additions to its memory? In our youth, most of the experiences we encounter during the course of a day are new or have some element of newness. This makes them memorable, in the sense that there is potential survival value in the brain adding them to its store for future reference. It seems reasonable to assume that our subjective experience of the passage of time is linked to the availability of fixed objective reference points. And this is evidenced by the absence or gross distortion of time sense which people report when they spend extended periods in total isolation. When we are young, all sorts of events in the outside world catch our attention and are subsequently ferreted away in our brain. With so many novel entries being made in our daily memory diary, the experience of time is stretched out. But as we grow older, more and more of the things we do and see are mere repetitions of what has happened before. Habituated actions, sights, and sounds fail to register in our consciousness: the loudly clicking clock that its owner no longer hears, the daily drive to work that is done on mental autopilot, there are many such examples. As our lives revolve increasingly around set routines so there is less need for the brain to lay down fresh memory traces — our “novel event density” falls dramatically while, at the same time, the passage of our lives alarmingly speeds up.

We seem to be faced with a dilemma. We have a strong urge to remain the same, either by staying alive or by surviving death as the person we are now. Yet the enjoyment of life, and indeed the very experience of life in a fully conscious way, seems to hinge upon novelty and change. We don’t want to die, to stop being who we are now. But continued existence of any meaningful kind seems to demand that we eventually become someone else. How can we make sense of this apparent contradiction?

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Science has revealed that we are the products of an evolutionary process that goes back billions of years. Everything that is part of us — our cells, tissues, organs, and organ systems — has come about because it proved successful in the great survival stakes. And the brain is no exception. The brain evolved, at least in part, as a means to allow a creature to learn from what happens in its life, to retain key elements of experience so that they are available for favorably influencing future action. A physicist might liken the brain to an instrument that automatically records the most relevant parts of its own

“world line,” its unique private meanderings through the four-dimensional realm of space and time. We don’t find this difficult to believe in the case of brains in general. But when it comes to our own brain we are reluctant to accept that it is “just” an information processor — and one, moreover, with a depressingly short mean time to failure. We want to equip it with a soul that offers it a way of escape when the brain dies. We will do anything to avoid facing the possibility that who we are now cannot continue. And it is not difficult to see why this should be so. As Rick Blaine, Humphry Bogart’s character in Casablanca, put it: “I’m the only cause I’m interested in.” Everything about us — our bodies, our brains, our selves — is geared for self-preservation. If this were not so, if the self were not wholly preoccupied with the business of staying alive (ultimately to propagate its genes) then we humans would not be here today. In fact, it is no overstatement to say that the prime biological function of the self is to be afraid of death. Only by being so contrived can the self play its critical survival role.

This seems to put us in a difficult position. Awareness of self and awareness of mortality effectively go hand in hand. Self and the death-fear almost certainly came into existence together, both during the evolution of the human race and during the evolution of each human being from birth to adulthood. They are inextricable. And, as a consequence, only together can they disappear. Nothing that “we” — our selves — can say or do or think will quell our terror of dying. The self can never come to terms with its own extinction. And yet, having said this, the situation is far from hopeless. In fact, we now hold the key to the solution of our problem: to understand what lies beyond death we need only understand what lies beyond self.

And what are selves other than the sum of our differences? At the beginning of our lives, we are all, from a subjective standpoint, equal and undifferentiated. A newborn does not and cannot distinguish itself from the world around it — there is no self, no person, no firm sense of boundary. Only we, as mature selves looking on, make a distinction between the latent individual and his surroundings. Even during childhood, perhaps until late adolescence, the feeling of selfhood is not completely well defined. One indication of this is that young people can be remarkably stoic and even sanguine in the face of impending death, a fact that shines through from the deeply moving, uplifting statements that many children make when faced with terminal illness. It is only as we age that we start to think more and more of the particular brain and self we “own” as having a special, privileged status — of being a unique, treasured possession that we are desperate not to lose. Increasingly we become, in the most basic sense of the word, selfish. And once the self is fully installed, as “you” and “I” are now, feeling secure, confident of its own inner story, then it becomes impossible for it to conceive of its own demise. The psychological barrier preventing us from coming to terms with death, from our self’s point of view, is utterly impenetrable. In fact, it becomes impossible for the self to contemplate any kind of change in itself, because to change is to become someone else, and to become someone else is to cease to exist as the person you are now. Logically and practically, change to the self is the exact equivalent of death. Even to go back and become the child you once were would seem frightening, unless you could take your present cargo of memories with you — in other words, transfer who you are now into your former body. To obliterate the memories of the intervening years would be to destroy an essential part

of your current self. And the self, here and now, is satisfied by nothing less than the prospect of having continued access to all the memories that define it.

Yet the scientific evidence is clear that the brain never stops changing throughout life. Its neural configuration is in a continuous state of flux, the pattern of synapses shifting, individual connections forming and breaking, the dendrites (nerve cell endings) and axons (nerve cell bodies) extending and retracting like the pseudopodia of amoebae in response to every new thought and sensation. And since we arise, at any given time, from the particular configuration and state of our brains, we also, viewed objectively, are subject to continual change. We are forever gaining new memories, losing old ones, having different feelings — or, rather, being different feelings — so that the permanent creature we take ourselves to be is in reality a marvelous artifice of the brain.

For the vast majority of the time, the brain assimilates change so adroitly, its primal urge to maintain coherence and internal consistency is so strong, that the change appears to take place exclusively in the outside world. It seems not to affect “us” at all. As far as the self is concerned, it feels like a rock against which the waves of external change relentlessly and harmlessly break. But there is a limit to how much flux the brain can handle and still maintain the illusion of a constant inner “I.” Once this critical threshold has been passed, the self senses the threat to its continued existence and reacts by becoming afraid. For this reason, although we are not apprehensive about ordinary day-to-day experiences, we become very nervous indeed about situations that represent a sudden shift from our normal way of life. Leaving home, embarking on a new career, getting married or divorced, having children, losing a loved one, all generate internal stress because they confront the brain with a degree and rapidity of change from which it cannot shield the self. These, then, are transformative experiences, sudden twists and jumps in the inner narrative, that alter the self to such an extent that it goes through a period of uncertainty, instability, and doubt before settling down into a new equilibrium state. During such disturbances to the self, a person is launched along a new trajectory in life, surrounded by very different circumstances, and suddenly inundated with fresh memories and ideas. We acknowledge marked outward changes in character that may ensue in phrases such as “Marriage has made a new man of him” or “She has never been the same since her husband’s death.” However, because the individual who has been through the change still looks the same and appears to us to have access to all of his or her old memories, we don’t conventionally go so far as to say that an entirely new person has been created. But this is where we make our mistake. A new person has been created, and it is only by challenging preconceived notions, by bringing our view of self into line with contemporary scientific evidence, that we can hope to properly understand the implications of death.

In physics, the classical mechanics of Newton provides a perfectly workable model for most everyday applications. Only in exceptional situations, for example at very high relative speeds or in very strong gravitational fields, does the Newtonian approximation break down and need to be replaced by the more precise formulations of Einstein. A parallel exists with our conception of the self. In most ordinary circumstances the self approximates well to the Cartesian ideal of a fixed ego, both from an objective and a

subjective point of view. But as conditions deviate increasingly from the norm, it becomes necessary to switch to a new, more realistic conception of the self as a dynamic process subject to continuous and unpredictable change.

The problem we face is that unlike in physics, where Einstein's notions of space and time have superseded those of Newton, our conventional ideas about the self remain strictly "classical" and very outmoded. Despite the startling progress made by neurology in uncovering the mechanisms of the brain, as a society we have not yet moved on from the body-soul dualism of René Descartes. This leaves us as nonplussed as the classical physicists were at the end of the nineteenth century when they were confronted with observations — such as the constancy of the speed of light — that their theories were unable to explain. The old generation of physicists invented the ether. We cling to the idea of the rock-solid self, the indestructible ego, and the possibility of a spirit that will carry away our true essence at the moment of death. But just as the ether failed in the end, so too our antiquated notions about the self have proved inadequate to account for cases in which the inner world of an individual is damaged, fragmented, divided, rejoined, destroyed, or remade.

The crucial point to realize is that the death, or changing, of the self from one moment to the next and death as we normally understand it differ only in degree. In nature, in essence, they are identical. Like radio waves and gamma rays, they simply lie at opposite ends of the same continuous spectrum. Thanks to numerous psychological and neurological case studies we now have the ability to mark off points virtually all the way along this spectrum, so that physical death need no longer be seen as a unique, isolated, inexplicable, phenomenon. At the "little death" end of the spectrum, for example, are cases of minor memory loss that chip away, by varying amounts, at the supposedly immutable thing we think of as personal identity. Further along come more profound cases of amnesia or other manifestations of brain damage — especially to the prefrontal lobes — that can affect the brain's power to integrate a clear and secure sense of self. Somewhere in the middle of the "death spectrum" are conditions such as MPS in which a person may fragment or flicker in and out of subjective existence or even (as in the case of "Sally") effectively die by merging with other personalities. Finally, near the "big death" end of the spectrum are found instances of total, permanent amnesia that completely obliterate one person and are followed by the emergence of a different person as new memories are laid down.

It might be objected that total amnesia differs fundamentally from actual death because in the former case a physical body and brain survive. This survival is recognized objectively by others and can subsequently be pointed out to the new person who arises, even though all memories of the previous occupant of the body have been internally erased and replaced. By contrast, when a person dies in the conventional way there is no functional body or brain left to provide any outward sign of continuity. But this physical continuity is irrelevant, for two reasons. First, although the brain survives overall (and, if we could see it, would look superficially the same) it is almost certainly altered beyond recognition at the level of synaptic connections. In its microscopic details, the post total amnesia brain, following recovery, can be expected to be as different from the preamnesia brain as

it is from any other brain. In computational terms, it is an entirely different neural network — and it is the specific wiring pattern of a brain that is pivotal in determining the characteristics of the self. This, then, represents a definite prediction based on the ideas being advocated here that is, in principle, testable.

The second reason that bodily continuity is irrelevant is that it makes no difference at all to the new postamnesia “person” that there was once some other mind, some other self, occupying the head in which it now resides. And for confirmation of this, one need only reflect back to the comments, recorded earlier, of Linda Macdonald and Patsy Cannon.

Objectively, the extinction of a person following complete memory loss and the physical death of an individual appear very different. But what matters to each of us, in the final analysis, is the inner experience. And from this perspective there is absolutely no difference whatever between, on the one hand, losing all your memories and gaining a new set during life and, on the other hand, the death of one human being followed by the birth of another. (In fact, in some ways, actual physical death is to be preferred, since it does not require the new person to assume a particular, and perhaps unwanted, role or set of responsibilities that, in the case of a victim of total amnesia, is expected by society, family, and friends.)

If this argument is valid, and I firmly believe that it is, then from the reported experiences of people who have had unusual and extreme subjective experiences during life we can begin to build a picture of what the experience of physical death is like. And, in broad outline, what emerges is remarkably simple, straightforward, and familiar. In brief: the act of dying is like falling asleep, the effect of dying is to forget all about being one particular person, and the sequel to dying is the gradual laying down of new memories in a new brain, which will define another particular person. What is crucial is that, from the subjective point of view, although one set of memories (and life circumstances) is completely replaced by another, and one brain by another, there is no cessation of experience, of consciousness, of being. One story ends and, in the wink of an eye as felt from within, another story begins.

You might reply: “But this is no consolation because I happen to be this story, here and now. It does me no good at all that other stories, other people, will follow after my death.” The philosopher Leibniz put it like this:

Of what use would it be to you, sir, to become the king of China, on condition that you forgot what you had been? Would it not be the same as if God, at the same time, destroyed you and created a king in China?

This objection, however, comes from — who else? — the self. The only vantage point we have from which to think about death is the current self, and this is the very entity whose principal biological function is to avoid death at all cost. The fact is, if we die and someone else is born who has no memory of us, then it is perfectly true that it does us — meaning the person who once existed — no “good” at all. But the person you think is going to die is not the person you are now. Who you are now is impossible to lose — and this will be true at all future moments at which you exist. You fear death because you

imagine your self to be a static thing which will continue unchanged (amid an ever-changing world) until the dreaded moment at which your brain stops working. But it is logically impossible for you — the feeling of being one brain in the present — to die. And what else can you ever be except the feeling of being one brain in the present? Death only marks a limit to what new experiences can arise based on the memory chain that a brain has access to.

We assume that if death terminates a particular “you,” then it must mean the end of all subjective experience. But, on the contrary, what death actually involves is a new start. And here it is essential to keep in mind the parallel between physical death and actual clinical cases of total amnesia and related syndromes. A certain concatenation of memories disappears. And after this very minor loss, the world continues as before, life carries on, a new neural network comes into existence, and as this new support system for the mind develops, a new self begins to emerge — a new narrative, a new “you.”

Still, you may argue: “I accept all this. There’s nothing revolutionary in the idea that as some people die, others are born. But if, as you claim, we — our inner selves — die when our brains die, then surely that’s it. We can’t somehow become one of these new yous because there’s nothing to transfer over to the next person in line.”

And this also is perfectly true. There is indeed nothing about “us” — our selves — that can pass into the future for the simple reason, as we have seen, that there is nothing substantial about us during life. The self will do anything to find a way out, to stay alive in some form. So, as soon as it starts to contemplate the period after death, it wonders, “What will happen to me?” and “Who will I be next?” But such questions represent an effort by the self to seek reassurance about its future. The self will not and cannot admit that it is going to perish, that its story is bound to reach an end. It has to believe that, after death, its essence will live on in some new guise, that perhaps it will appropriate some new brain in which to live again. However, this is not going to happen. There is no direct connection between person A who dies and person B who follows. Whether we are talking about total amnesia or physical death, nothing of the old person transfers to the new. (As Patsy Cannon remarked, “That person is dead; I am a new person.”) And yet, such a transfer is not important or problematic, once it happens, either to person A (who never stops existing as far as she is concerned) or to person B (who has always existed as far as she is concerned). All that is relevant is that subjectively, after death, the feeling of being continues — a feeling that, as a new individual condenses, becomes once again the feeling of being a person.

The difficulty we face is in appreciating why this is a conclusion we should be happy about. And again the answer is that we — our present selves — can never be happy about it because the one all-consuming goal of a self is not to end. It is pointless — literally self-defeating — to attempt to understand death while in our typical “selfish” frame of mind. The “I” cannot abnegate itself because it cannot operate outside its own particular field of memories and projections. The “I” may go from level to level seeking release, but its efforts will always take place within the sphere of its own making. This leaves as our only viable alternative to try to adopt a less self-centered mode of thinking — a

nondualistic mode — in which it is possible, I believe, to grasp the idea that the continuity of consciousness in general is more important, more fundamental, and ultimately more desirable than the continued existence or identity of the person we imagine ourselves to be right now.

A determined effort, involving the intuition as much as the intellect, is called for if we are to adjust to this seemingly offbeat way of seeing death. And since our thoughts unavoidably take place within the context of our self-awareness, it is not possible for us to logic away entirely our deep-seated thanatophobia. Even so, I can attest from personal (or, rather, impersonal) experience that the effort is worthwhile and can at least lead to a more philosophical and sanguine attitude to our own mortality.

To be a person is just to have the feeling of being part of an ongoing story, to experience being within a narrative. But what needs to be appreciated is that any narrative will do. While we are in the midst of one particular story we naturally don't want that story to end; we dread the approach of the final chapter, the final paragraph, the final line. And yet it is important to realize that the very obvious discontinuity and impression of finality associated with the objective view of death (seeing someone die) are not what is felt from within. Subjectively, there is never, and never could be, a break in awareness. As experienced, rather than observed, death is not the end of life, but rather the point of entry into a new phase of existence, the coming back into being of someone else. Inevitably, this implies the loss of your current identity. But to have a sense of identity means just to have a continuity of memory — a life history to date. It makes no difference in the long run whether this life history is the one we happen to have now, or whether it is a completely different autobiography that may exist in the future. Whatever happens, whenever it happens, it will happen in the present. And in the present moment there will be a you with a narrative and a secure feeling of self.

What will it be like, though, to be someone else after we die? Our language makes it impossible for us to frame questions that do not seem to imply the direct continuity of who we are now. But as long as we are aware of this limitation, we can never attempt an answer.

As neurological studies of living brains using PET and MRI scanners have shown, we are not as different from each other as was once supposed. The individual experiences and perceptions we have, as the nearly identical measured reactions of different brains to identical stimuli attest, are almost certainly very similar indeed. Therefore, in terms of the kinds of distinct sensations, emotions, and feelings that humans can and do have, being one person is much like being any other. The differences between us lie in contexts, in the particular situations and in the particular combination and order of circumstances that accompany our lives. We tend to emphasize our differences precisely because "we" are the result of our differences. The process that begins in infancy with distinguishing "my hand" and "my foot," the bodily-I, extends by degrees to identifying a whole complex of feelings, experiences, thoughts, ideas, impulses, desires, hopes, and fears as "mine" — a complex that constitutes the self. However, when we look closely at these components, it becomes clear that they are derived from our environment and culture; they are the

common building blocks from which we are all made. Yet in ordinary life we don't see this. And the more actions we perform imagining that the self originates and executes whatever is felt, the more substance seems to be endowed to this wholly insubstantial entity. This ongoing process of self-discrimination makes us overlook, or neglect, how remarkably alike our inner worlds really are. Society and the way the self has evolved lead us to place undue stress on the importance of the individual, on the differentiation and separation of selves, when in truth the basic "feeling of being me" is much the same for us all. Our different-looking faces, our varied personas, conceal the fact that under it all we are pretty much alike, and therefore need no great leap of the imagination to put ourselves in someone else's place.

Consider the actor who studies his part so well that he feels himself to have taken on a new personality. Play Othello well enough, and in some sense for a while you are Othello (or, rather, Shakespeare thinking about Othello!). And consider identical twins who, although they may not have seen each other in many years, turn out to have led incredibly similar lives. They may have almost identical jobs and hobbies; they may even have children and spouses with the same names. And there are many well-documented instances of twins apparently having sensed when their co-twin was unwell or in danger. On such occasions, it is as if the walls separating one self from another have, for a short while, been breached, allowing the awareness of the individuals involved to become shared, overlapped, or merged. More disturbing cases are on record, involving schizophrenics, who seemed to experience directly what another person was thinking. One patient complained to the Canadian psychiatrist Clive Mellor that the thoughts of a television presenter kept coming into his head: "There are no other thoughts there, only his. He treats my mind like a screen and flashes his thoughts onto it." Another patient said, "They project upon me laughter, for no reason, and you have no idea how terrible it is to laugh and look happy and know that it is not you, but their emotions." In such cases it is almost as if the resident self has been displaced or become merely a mirror for reflecting the consciousness of an outsider. Finally, there are numerous examples of the differences between people disappearing almost completely, both subjectively and objectively, when mobs, gangs, or mass movements form. How easily, for instance, the individual's sense of personal identity was submerged and melded with terrifying effect in the all-pervading, tribal identity of the Volk (Nation) of Nazi Germany.

Everyone's life story includes numerous lacunae when we are not our normal selves. We may play at being someone else — empathizing with, imitating, or adopting a specific role (such as that of a parent or child) for another. We may join groups of individuals with a common interest or cause and so, to a certain extent, allow our identity to be subsumed in the cooperative effort. In the most intimate of dialogues and associations with others, we may well feel we are less a distinct self and more a part of a larger consciousness, a communal awareness, that is not localized within any one brain. Such experiences make it much easier to conceive of what becoming someone else is like. But as soon as we slip back into our normal I-mode again, we lose this ability to see beyond our present selves.

Most of the time, with the apparent solidity and uniqueness of the self at the forefront of our minds, we suppose there can be only two possibilities for the future. These are that we carry on as we are, albeit possibly in some less material form, or that after death there is nothing. However, as we have seen, science and logic point compellingly to a third option — that while particular personal identities come and go, subjective continuity, the feeling of being someone, does not end with our death. A useful analogy is to think of a chain of volcanic islands in the middle of the ocean. At surface level, the islands are completely separate and distinct. But at a deeper level, under the ocean, it becomes clear that the islands are part of a single mass and have a common origin — their individuality is an illusion.

Do these ideas amount to a theory of reincarnation? The answer depends very much on what we mean by this term. The picture of death being presented here is not one in which “we” survive or carry through any memories whatever of our present existence. Death is total amnesia plus total dissolution of our bodies and brains. As a result, when we die, not only will there be an internal break with who we once were, as there was for Patsy Cannon and Linda Macdonald, but there will also be no physical link between the old self and any new one that follows by which an objective observer might trace a lineage of “yous.” The experience of physical death could be closely simulated, for example, by a total amnesia victim who, after her accident, recovered in a place surrounded by people who had not known her previous self and who, therefore, could not “re-mind” her of who had previously occupied her body. In fact, situations like this do sometimes arise when people have “fugues” — passages in their lives when they suddenly forget who they are (or were) and find themselves (if the pun can be excused) in an unfamiliar place among people they have never seen before. To the victim of a fugue it is as if they had been suddenly born as an adult with a general understanding of language and the world but without any inkling of their own identity.

So, reincarnation? Yes and no. Death defines the ultimate limits of selves and exposes how fragile, artificial, and essentially unimportant these creations of the living human brain really are. Will you live again? Once more, it is the present self-in-charge that wants to know. And perhaps the best, most reassuring answer we can give it is that death is like a spring cleaning of the mind, a replacement of body and brain — the opportunity to start again and see the world through a fresh pair of eyes. You will live again. But it will seem, as always, as if it were for the first time.

People often wonder: Is there a purpose to life? Are we here for a reason? Or are we trivial bystanders — brief, tiny sparks of awareness in a universe so vast and ancient that it is wholly indifferent to our presence? In seeking the answers to these questions we shall need to broaden the scope of our inquiry, beyond brain science, to include two seemingly very disparate worldviews: those of modern physics and of mysticism. This will lead us to consider more deeply the nature of consciousness and its relationship with the cosmos as a whole. And so, eventually, we shall come back to look at ourselves — but perhaps in a new light, not as frail individuals limited by small, uncertain lives, but as eternal participants in a much greater adventure that extends throughout time and space.

Part II: Beyond the Frontiers of Self

Who need be afraid of the merge?

—Walt Whitman, Leaves of Grass

9

SCIENCE AND THE SUBJECTIVE

Matter is less material and the mind less spiritual than is generally supposed. The habitual separation of physics and psychology, mind and matter is metaphysically indefensible.

—Bertrand Russell

We live in a culture dominated by scientific thinking: by analysis and the partitioning of knowledge. So it is curious to find that science has never really taken root except among peoples who were strongly influenced by the Greeks. All of the other great cultural traditions around the world, particularly those of India and China, have evolved along quite different lines from our own. And while they have spawned artists, philosophers, and poets in great abundance, they have produced no Darwins, no Newtons. It seems strange to us, as if these otherwise marvelously talented folk suffered from some kind of racial myopia which prevented them from seeing how to properly understand the universe, to take it apart, as we do, to reveal the cogs, levers, and springs that make it tick. Shouldn't it be obvious to any intelligent, civilized person — to any child who has dismantled an old clock — that science is the best way, perhaps the only way, to discover how things really are? Yet we need to remember the extent of our own conditioning: from an early age, we are inculcated with a certain approach to looking at nature. We have a very specific attitude and perspective on the world encoded in our brains. And this makes it hard for us to appreciate that there may be other, perhaps equally valid ways of apprehending reality.

The wellspring of science can be traced to Ionia (in present-day Turkey), on the east coast of the Aegean, in the sixth century B.C. Here the sages of the Milesian school of philosophy established as their goal the discovery of the essential nature, or true constitution of things, which they called physis. Yet they were certainly not physicists in

the modern sense because their speculations roamed freely over subject matter that today would be considered not only scientific but also philosophical and religious. To later Greeks they were known as “hylozoists,” or “those who believe that matter is alive,” since as far as the Milesians were concerned, life and nonlife, matter and spirit, were all one. Such a unified outlook is unmistakably mystical in flavor. And it is especially interesting and appropriate, in the light of recent developments, that physics, and Western science in general, should have had such a source.

The mystical attitude to understanding the world was even more evident in the work of Heraclitus of Ephesus. Although Heraclitus accepted the Ionian “physicists” idea of the wholeness of nature, he was strongly opposed to the reality of Being — the endurance of objects — which they upheld. For Heraclitus, there was only Becoming, a continuous flow and change in all things which he saw as arising from the endless cyclic interplay of opposites. Two opposites comprised a unity which Heraclitus called the Logos. But this was a unity soon to be broken — and with it the monistic and organic tradition of the first period of Greek philosophy.

The split was started by the Eleatic school in southern Italy, which assumed that above all gods and men a divine principle operated. To begin with, this principle was equated with the totality of the universe, but later its identity shifted to that of an intelligent and personal God who orchestrated the cosmos from outside. So began a trend of thought which was to have far-reaching consequences. It would lead, in time, to the divorce of mind and matter, of subject and object, and to a profoundly dualistic mentality that pervaded all future Western culture.

A further step along the road to dualism was taken by Parmenides of Elea, who rejected Heraclitus’s notion of continual Becoming. Parmenides argued that change was logically impossible and that its appearance was a mere illusion of the senses. It then fell upon the Greek philosophers of the fifth century B.C. to try to reconcile the sharply contrasting views of Parmenides (unchangeable Being) and Heraclitus (eternal Becoming). This led to the idea that Being is represented by certain indestructible substances that form the material basis of the universe, while Becoming — change — comes about as these substances mix and separate. A further development was the notion of the atom as the smallest indivisible unit of matter. And the key point here is that the Greek atomists, led by Leucippus and Democritus, drew a sharp distinction between spirit and matter, depicting the latter as being made up purely of passive and inanimate particles moving in the void. Any spiritual element was thus effectively sucked out of the material universe and confined to a realm of its own.

In the Hellenistic age which followed the Classical period of Greece, in the fourth and third centuries B.C., opinion tended to polarize around two principal worldviews. The Epicureans favored a radical form of atomism, rejecting any need for spiritual intervention and placing the gods in the empty space between worlds where they were aloof from the affairs of man. The Stoics, on the other hand, taught that the world is governed by unbreakable natural laws that were laid down by God. Furthermore, they held that the soul is what makes a human being cohere: that it is some subtle essence

diffused throughout a person's frame, much as God, according to their belief, is diffused throughout the world. In the Epicureans view, perception, not the soul, is the source of true and indisputable information. Against this, the Stoics maintained that the soul is what both observes and reasons. These contrasting positions can be seen as an early stage in the development of the debate that continues to this day between science and religion about the fundamental nature of the world.

From the Greeks in general, then, we have inherited a deeply dualistic mind-set, an instinctive, urgent tendency to divide everything into two contrasting, often mutually exclusive, aspects: matter and mind, actual and ideal, observed and theoretical, and, more generally, this and that, and right and wrong. But the specific direction of Western thought for many centuries to come was determined largely by one man. Aristotle, tutor to Alexander the Great and founder of the Lyceum school in Athens, whose ideas inspired the Stoics, was an energetic collector and organizer of facts, especially biological facts. Much of his time was spent studying the various forms of animals and plants in minute detail with a view to classifying them, and his "scale of nature" became a standard taxonomic reference for many future generations.

Aristotle's genius and contributions were immense. But for two reasons he is judged, perhaps unfairly, to have had a disastrous effect on the progress of science. First, he believed passionately in teleology, the doctrine of final causes, which maintains that all things — people, lower forms of life, and inanimate objects alike — move unerringly toward a predetermined goal, a perfect final state (like one of Plato's Forms). With this notion in mind it would have seemed pointless to him to try to uncover relationships in nature because, as he saw it, causes and effects were inherent properties of things. Therefore, whatever conclusions he drew, whatever theories he held — and he held many — he never bothered to check them by experiment. Second, despite all the work he did in classifying the material world, he regarded this to be of far less importance than problems related to the human soul and the contemplation of God's perfection. Not surprisingly then, in constructing its own cosmology and scheme of nature, the Christian Church found Aristotle's views both appealing and appropriate. And it was through the Church's all-pervasive and intimidating power that the seriously flawed doctrines of Aristotle survived, as fossilized relics, through to the end of the Middle Ages. Effectively, the pursuit of science was put on hold for two thousand years.

Those who eventually began to challenge Aristotelianism, in Renaissance times, placed their very lives at risk. And, indeed, Giordano Bruno, a Dominican monk, was executed for daring to voice his liberal cosmological views. But in the end, despite the threats of torture and death made to other freethinkers of this time, the new spirit of inquiry proved impossible to extinguish.

Spearheading the revolution, in the early years of the seventeenth century, was the Italian Galileo Galilei, the first true scientific researcher. In fact, he was never referred to as a scientist in his day for the simple reason that the word "scientist" only entered our vocabulary in 1834, courtesy of the Cambridge University philosopher William Whewell, Galileo, like Newton and the other great investigators around this time, considered

himself to be a natural philosopher. But Galileo was a scientist in the contemporary sense in that he exposed his hypotheses to the possibility of being falsified through carefully controlled experiments. He directed his attention upon a little bit of the world that interested him — a pendulum, perhaps, or a falling object — and then strove to limit or simplify all extraneous influences on his chosen experimental setup.

Central to this methodology was Galileo's precise distinction, first made public in 1623, between "primary" and "secondary" qualities. This was a vital step in establishing a clear future direction for science, but it was based upon a reaffirmation of the old Greek way of splitting the world into two. Primary qualities were those, such as mass, distance, and time, that could be measured by some suitable instrument. Only these, Galileo maintained, were amenable to scientific study because only these could be treated as if they were independent of the observer. A primary quality can be measured and therefore described by a number in some appropriate system of units — ten grams, six thousand miles, 58.3 seconds, and so on. By contrast, secondary qualities, such as color and love, cannot be reduced to an empirical form and so were deemed to fall outside science's domain.

Galileo's cleaving of nature was manifestly Greek in origin. But he and the other new-wave Renaissance thinkers of sixteenth and seventeenth century Europe tightened the focus of science to mean the systematic study of the material universe — the universe of things presumed to exist independently of the mind. Henceforth, if science did refer to color, it would not officially be in terms of red or yellow or blue, but in terms of the wavelength of light, a measurable property. And if science did eventually attempt to analyze human emotions, then it would be in terms of quantifiable, physiological events in the brain — electrical potentials, the timings of synaptic firings, the rate of movement of chemicals, and so on. The same sharp distinction between primary (objective) and secondary (subjective) qualities that Galileo brought to science, Descartes, with his separation of matter (*res extensa*) and mind (*res cogitans*) introduced to philosophy. And so the scene was set for the emergence of the worldview commonly held in the West today.

Previously, in ancient and medieval times, the universe had seemed organic; all matter had been held to be living and interconnected. But the clear Cartesian division between subject and object allowed scientists to treat matter as dead and completely separate from themselves, and to envision the universe as a plethora of different objects assembled into a huge machine. At the same time, this was paralleled by the concept of a supervisory God who ruled the world externally and remotely. The laws of nature sought by scientists were thus seen, ultimately, as being the laws of God, eternal and inviolable, to which the world was subjected. This religious component was important because the influence of the Church, though weakened, was still far-reaching. And men such as Newton and, later, Pascal and Mendel, to name but a few, were devout Christians (as, too, are a considerable number of present-day scientists). The separation of matter and spirit allowed them to keep faith both in science and God, without the risk of compromise to either.

That the human body itself was nothing more than an object, a machine, amenable to scientific investigation was an idea promulgated by the English philosopher Thomas Hobbes, who had met Galileo in Italy in 1635. Hobbes's view was inspired to a large extent by the discovery of the circulation of blood by William Harvey, physician to Elizabeth the First. Previously, people had believed in Aristotle's and Galen's theory that the blood ebbed and flowed to and from the same vessels, giving rise to "animal spirits" that differed in different organs. But Harvey's new mechanistic portrayal of the heart as a pump, and blood vessels as a complex system of tubes and valves, had a deep effect on philosophers of the time. Hobbes simply generalized the image to the whole human being. And thus man took on a new appearance, as a complex mechanism, his behavior potentially explicable in terms of mechanical laws.

There is, undoubtedly, a cold and remote feel to the universe as cast by post-Renaissance science. Though perfect and beautiful in its way, it is an austere abstraction, devoid of "reality tone" — of the vibrant sensations and feelings that are the most immediate aspects of our concern. And this sterile scientific depiction of the cosmos has remained with us to this day. As one of the leading theoreticians of the twentieth century, the Austrian physicist Erwin Schrödinger, remarked:

[The scientific picture] gives us a lot of factual information, puts all our experience in magnificent order, but it is ghastly silent about all and sundry that is really near our heart, that really matters to us. It cannot tell us a word about red and blue, bitter and sweet, physical pain and physical delight; it knows nothing of beautiful and ugly, good or bad, God and eternity. Science sometimes pretends to answer questions in these domains, but the answers are often so silly that we are not inclined to take them seriously.

In confining its attentions exclusively to the objective world, science has become detached from the inner, experiential world of the mind. It may tell you how you see but is mute on the topic of what it is like to see. In *An Experiment with Time*, an intriguing book about dreams, time, and immortality, first published in 1927, the English writer John William Dunne imagines a situation in which a person who has been totally blind since birth is trying to learn about redness through the language of physics. As Dunne points out:

You might talk to him of particles . . . and describe these as oscillating, spinning, circling, colliding, and rebounding in any kind of complicated dance you cared to imagine. . . . You might speak of waves — big waves, little waves, long waves, and short waves. . . . You might hark back to the older physics and descant upon forces . . . magnetic, electrical, and gravitational; or you might plunge forward into the newer physics. . . . And you might hold forth upon such lines until exhaustion supervened, while the blind man nodded and smiled appreciation; but it is obvious that, at the end of it all, he would have no more suspicion of what it is that . . . you immediately experience when you look at a field poppy than he had at the outset.

Science has yielded startling insights into the mathematical infrastructure of the world — the hidden rules by which stones fall, planets orbit, electrons whirl, and stars explode. But in order to do this it has had first to expunge everything that refuses to succumb to description by formulas. From the start, then, science renounces all interest in such

matters as are essentially dependent on the presence of a human observer. It sets out to investigate what is assumed would be the case if we didn't exist. Yet the underlying weakness of this approach was exposed a long time ago. As early as 420 B.C., Democritus realized that in studying nature both reason and the senses must be brought to bear. In the case of atoms, for instance, they are assumed to have none of the sensual qualities which are the common everyday experience of human beings. Yet it is precisely because of these qualities that we are able to infer the existence of atoms. Schrödinger again:

So we are faced with the following remarkable situation. While the stuff from which our world picture is built is yielded exclusively by the sense organs as organs of the mind, so that every man's world picture is and always remains a construct of his mind and cannot be proved to have any other existence, yet the conscious mind itself remains a stranger within that construct, it has no living space in it, you can spot it nowhere in space.

Two and a half thousand years have taken us from Greek intellectualism to technological mastery over the planet. But this impressive conquest of nature has been at the cost of estranging us — our conscious selves — from the universe that is our birthplace and home. Galileo and the other early scientists portrayed the world of nature as being a realm of objects set over and against the mind. And yet it is clear that every datum used by science in formulating its supposedly objective worldview comes in through the human senses. Every attempt at making an impartial objective observation is foiled at the outset and becomes, instead, a subject of our personal attention. The human observer cannot be left out of the reckoning or be reduced to insignificance, because he or she is the very means by which science is prosecuted. Scientific experimentation and theorizing are conducted necessarily within the emotion-filled, perception-charged, conscious environment of the human mind. And this is a fact that scientists readily admit. Einstein, for instance, often acknowledged his debt to intuition, inspiration, and a sense of irrational awe in the wonder of things. "In every true search of Nature there is a kind of religious reverence," he once said. And again: "Imagination is more important than knowledge." Nevertheless, as a society, we find ourselves in a strange situation. To comprehend the nature of things, our reason has proposed a view of the world which fails to account for the sense impressions upon which its conclusions rest.

Nor is this omission of the subjective something that we can conveniently overlook. The experience of being conscious, of having perceptions and emotions, is an experience with which we are all intimately familiar. It is central and indispensable to our lives. Imagine if you could never again smell a rose, or fresh-cut grass, or newly baked bread. Would you feel adequately compensated for this loss if instead you could fully understand the chemical and physical processes taking place in the olfactory regions of your brain? Would you be willing to trade your ability to perceive sounds and enjoy music for a knowledge of what happens to your neurons when auditory signals arrive from your inner ear? The science of neurology may be fascinating. But what really matters to us (even to neurologists!) at heart is the act of being aware and perceiving — of being conscious in the universe. And it is this whole vital aspect of the world that science simply fails to address. We are cast by science as mere observing machines, convenient tools for gathering data about a universe so vast and ancient that by comparison we seem utterly insignificant.

Science seeks to uncover patterns and connections in nature by treating the world as if it had entirely distant objective and subjective components. Only the objective component, the universe presumed to exist independently of the human and senses, is considered accessible to scientific analysis. But more than this, the objective aspect of the world is taken by science to be the world as it actually is, undistorted by the act of bringing “outside” phenomena into our awareness. Small wonder, then, that we, as experiencing beings, are missing from our physical portrait of nature; we intentionally leave ourselves out from the start.

Yet, oddly enough, we tend to forget this. We begin by purposely exiling ourselves, our feelings, the whole of the subjective, from the scientific cosmos, but then we wonder why science has nothing to say about us, other than that we are sophisticated, motile lumps of matter. We fail to grasp properly the fact that this is bound to happen, that once the world has been translated or reduced to pure number it will inevitably be devoid of human value and meaning. Nor is there anything wrong with this, providing we appreciate the bounds within which contemporary science operates.

Science deals with measurable quantities as if they exist independently, “out there,” irrespective of whether we choose to observe them or not. But we need to keep firmly in mind how we came to know about these quantities in the first place. Clearly, it was by experiencing them. Our ancestors didn’t build clocks on the off chance that there might be something like time which they would then be able to measure. They felt change and progression in their daily lives, they felt duration, the cycle of the seasons and of life and death; the clocks came later. And likewise, distance wasn’t discovered by chance with yardsticks. It was sensed, it came into people’s awareness as a feeling of the separation between things. Thus, that whole aspect of the world which science tries so assiduously to ignore — the subjective — is in fact the very means by which the phenomena explored by science are initially brought its attention. Viewed in this light, Galileo’s categorization seems curiously reversed: our primary and immediate experience is actually subjective, this experience being then projected outward as the expression of a mental model upon which our culture is generally agreed. The subjective cannot be dismissed as a mere derivative or aside. On the contrary, it is inextricably bound up with the world in which we find ourselves — a fact that has recently been demonstrated in the most startling and unexpected way.

10

MATTERS OF CONSCIOUSNESS

I think I can safely say that nobody understands quantum mechanics.

— Richard Feynman

A century ago, science might still have claimed confidently that, as far as the universe as a whole is concerned, consciousness appears to have no special relevance. But not any longer. By peering into the workings of nature at the very smallest of scales — at or below the dimensions of the atom — physicists have uncovered what appears to be an intimate connection between the mind of conscious observers and the bringing into being of what is real.

Around the end of the nineteenth century, it became clear that classical, Newtonian science was in serious trouble. It appeared unable to account for some of the observed properties of radiation given off when matter is heated. The only way to bring theory back into line with this aspect of the world seemed to be by making an astonishing and, at the time, seemingly ad hoc assumption: namely, that energy could only be traded back and forth in discrete packets. An electron, for instance, in the outer part of an atom, could not just gain or lose energy indiscriminately. It had to do so in definite, prescribed amounts that came to be known as “quanta.” The man who first made this bold proposal in 1900, the German physicist Max Planck, was not at all happy with the idea of quantized energy. Nor were his contemporaries, and, to begin with, Planck’s quantum theory, which was simply patched onto classical physics in an effort to repair the dangerous hole that had opened up, failed to make much of an impression. It was only in 1905, when Einstein brilliantly accounted for the so-called photoelectric effect in terms of quanta of light kicking electrons out of a metal surface, that the idea really caught hold.

Einstein showed that although light generally behaves as if it were made of waves, it can at times behave instead as if it consists of a stream of particles — quanta of light, or photons. His successful explanation of the photoelectric effect using this idea focused the attention of physicists on Planck’s quantum theory and led to its rapid development into an entirely new and revolutionary field of modern science known as quantum mechanics.

Soon, researchers found themselves staring into the maws of a monstrous paradox. For not only light, it transpired, revealed this curious wave-particle duality. So, too, did particles of matter. Electrons and every other material constituent of the subatomic world apparently exhibited a schizoid nature. Whereas on some occasions an electron would act as a tiny speck or bullet of matter, on other occasions it would just as obviously manifest itself as a wave.

At first, it was suspected that the wave associated with a subatomic particle might be a physical effect — a kind of smearing out of the particle’s substance or of the electrical charge which it carried. According to this idea, the smeared-out particle would have to condense in an instant at a single point as soon as any attempt was made to detect it. But such instantaneous shrinkage would run counter to Einstein’s special theory of relativity, which forbids matter and energy to be accelerated to a speed greater than that of light. Therefore an alternative proposal was put forward by the German physicist Max Born in

1926. Born suggested that the wave associated with a subatomic particle was not physical at all but mathematical: it was a wave of probability. It could be described by a mathematical artifact called the “wave function,” which effectively gave the odds of finding the particle at any given point in space and time should an attempt be made to look for it. Einstein railed against such a blatant probabilistic motion at the heart of nature and issued his now famous proclamation “I shall never believe that God plays dice with the world.” But most of his contemporaries disagreed with him, quantum uncertainty won the day, and mainstream science began to acquaint itself with the bizarre idea that, at its most basic level, the material universe is not concrete and well determined but, on the contrary, is curiously abstract and conditional.

It was no longer meaningful to think of an electron, for instance, as always being definitely somewhere and “somewhen” in between the times when it was being observed. Unless an attempt was made to detect it, the sum total of what was and could be known about the whereabouts of a particle was contained in its wave function — a purely statistical description.

It could not be claimed, in the new quantum picture of the world, that particles even truly exist outside of observations of them. They have no independent, enduring reality in the familiar classical sense of being like tiny beads of matter with a definite (if not necessarily known) location in space and time. The distinguished American physicist John Wheeler has expressed the central quantum mystery in these terms:

Nothing is more important about the quantum principle than this, that it destroys the concept of the world as “sitting out there,” with the observer safely separated from it by a 20-centimeter slab of plate glass. Even to observe so minuscule an object as an electron, he must shatter the glass. He must reach in. He must install his chosen measuring equipment. . . The measurement changes the state of the electron. The universe will never afterward be the same. To describe what has happened, one has to cross out that old world “observer” and put in its place the new word “participator.” In some strange sense the universe is a participatory universe.

Somehow, through the act of observation, subatomic particles are briefly summoned out of a kind of mathematical never-never land of potentiality and possibility into the solid world of tangible things and events. In quantum parlance, an observation results in the “collapse” of the wave function — an instantaneous telescoping-down of the probability spread to a localized point, a real particle. But what counts as a valid observation in this respect? Who or what qualifies as an effective quantum observer — a measuring instrument such as Geiger counter, a human being, a committee of people? No one is sure. But the most widely accepted viewpoint, first advocated by the Danish physicist Niels Bohr and referred to as the Copenhagen interpretation, is that the sudden change in character or collapse of the wave function is brought about, ultimately, by conscious observership — the registering of an event, such as the reading of an instrument, in the mind.

This is a staggering conclusion. And it appears the more so when one remembers that all of the material universe is comprised of subatomic particles. Not one of these particles,

according to modern physics, can be “actualized,” or made properly real, without an observation that collapses the wave function. Almost unbelievably, our most fundamental branch of science implies that what had previously been assumed to be a concrete, objective world cannot even be said to exist outside of the subjective act of observation. Furthermore, if the Copenhagen interpretation is correct, then it is the mind — the mirror in which the object is reflected and becomes the subject — that serves as the essential link between mathematical possibility and physical actuality.

The intervention of mind in the affairs of the subatomic world was spectacularly demonstrated a few years ago. In 1977, B. Misra and George Sudarshan at the University of Texas showed theoretically that the decay of an unstable particle — say, a radioactive nucleus — is suppressed by the act of observation. Like any quantum system, an unstable particle is described as fully as it can be by its wave function. Initially, this is concentrated around the undecayed state. But as time goes on, the wave function spreads out into the decayed state so that the probability of decay gradually increases. Misra and Sudarshan showed that every time an observation is made it causes the wave function to snap back, or collapse, to the undecayed state. The more frequent the observations, the less likely the decay. And if the observations come so close together that they are virtually continuous then, as in the case of the proverbial watched pot that never boils, the decay simply doesn’t happen. This astonishing prediction was verified by measurements carried out by David Winehead and colleagues at the National Institute of Standards and Technology, Boulder, Colorado, in 1990, using a sample of beryllium ions.

An even more remarkable insight into the strangeness of the quantum world is provided by a modified version of the famous double-slit experiment. The original, “classical” form of this experiment was first conducted in the early nineteenth century by the English physicist Thomas Young. He showed that if a beam of light is split in two by shining it onto a pair of narrow slits, an interference pattern of alternating light and dark bands is created when the beams recombine on the other side and are allowed to fall onto a screen. Interference is exclusively a wave phenomenon and so its appearance clearly reveals light to have wavelike characteristics. But the same experimental setup in a more sophisticated form can be used to show light behaving either in a wavelike or a particlelike way.

Quantum mechanics makes a remarkable prediction about the double-slit experiment. It says that even if photons are allowed to pass through the slits one at a time, an interference pattern will still gradually build up. This prediction is perhaps the outstanding quantum mystery because, no matter how we try to imagine what is going on in the interval between when a single photon leaves its source and when it arrives at the screen, we cannot make sense of the situation that reality presents us with. In our minds, a photon must be either a particle or a wave. If it leaves its source as a particle and passes through just one of the slits as a particle, then how on earth, we wonder, can it subsequently manage to interfere with itself as if it had gone through both slits as a wave? We might suppose that we could get to the bottom of the mystery by closely monitoring the progress of each photon through the apparatus — and, in particular, if we arrange to detect which of the two slits each photon passes through. But nature forbids us to peek behind the scenes in an attempt, as we see it, to find out what is “really” happening

without irreversibly changing what is happening. If we arrange to track the path of each photon, quantum theory predicts, the interference pattern will be destroyed. In other words, simply by pinning down which slit each photon passes through, we force the experimental system as a whole to make a definite decision between particlelike and wavelike behavior in favor of the former. Our intrusion causes the interference pattern to vanish and be replaced instead simply by two bright lines corresponding to the images of the slits formed by photons striking the screen as if they were particles traveling in straight lines from the source. The American physicist Richard Feynman put forward this basic rule: if the paths of photons are distinguishable, then light behaves as particles; if they are indistinguishable, then light behaves as waves. And every experiment carried out in recent years to test this fundamental prediction has upheld it beyond a shadow of a doubt.

What does this mean? Apparently, just by inquiring into the state of a system we inevitably and profoundly affect the very nature of that system. The desire to have a yes-no, either-or, particle-wave determination actually influences reality in a most fundamental way. More to the point, our intervention fragments the continuous wavelike nature of the world into separate, discrete particles. Just as with words and analysis on a macroscopic scale we break our surroundings down into isolated objects, so with our objective intrusions at the subatomic scale we force a dualistic split from the normal, ongoing state of continuity to a transient state of individualism.

Such a conclusion is far-reaching enough. But recent experiments have led to even more sensational revelations about the world in which we live, again in full accord with the expectations of quantum theory. These experiments have demonstrated that not only is observership a mandatory requirement for making reality tangible, but every component of the universe — down to the level of each individual subatomic particle — is in some peculiar sense immediately “aware” of what is going on around it. The very idea of subatomic particles having an elementary form of consciousness strains credibility to breaking point. And although there is great excitement among the physicists involved in this field, there is also profound bewilderment at the implications of the results they are uncovering.

Among the most extraordinary demonstrations of quantum weirdness to date have been a number of experiments involving what physicists have dubbed “quantum erasers.” These are extensions and elaborations of the basic double-slit apparatus, the first of which was successfully implemented at the University of California, Berkeley, by Raymond Chiao and his team in 1992.

The idea behind the quantum eraser is to make the paths of photons initially distinguishable, but then erase that “which-path” information before the light actually reaches the screen. If an interference pattern reappears then it is a clear indication that a photon approaching the slits somehow “knows” whether or not there is an eraser further down the line, so it can decide whether to pass through both slits as a wave or through only one slit as a particle. The existence of this advance knowledge or remote sensing

was precisely what the Berkeley team confirmed in its inaugural quantum eraser experiments.

More recently, a team at the University of Innsbruck, in Austria, has taken work in this direction an important step further. In particular, these researchers have shown clearly that the “which-path” information is not carried by what might be called the interfering photon itself. Rather it is carried by a second photon created, in the first stage of the apparatus, as a twin of the first and directed along a different path. The Innsbruck experiment was conducted in such a way that it elegantly demonstrated not only that the second photon somehow knew what lay ahead, but also that it had instantaneous access to information about its twin’s physical status. This latter remarkable property is known to quantum physicists as “nonlocality.”

Bluntly, nonlocality amounts to zero-delay communication between two particles no matter what their separation distance. It was first derived by Einstein as a fundamental prediction of the equations of quantum mechanics — and was used, in fact, by Einstein as an argument against the completeness of quantum theory. It was absurd, Einstein said, to imagine that one of a pair of particles, which might be light-years away from its partner, could effectively react immediately to a change in the state of its twin. This led to a statement of the so-called Einstein-Podolsky-Rosen (EPR) effect and the throwing down of a gauntlet to quantum physicists to demonstrate its reality.

Say an atom emits two photons simultaneously and in different directions. One way to define the state of these photons is by their polarization, that is, the direction in which the electric field associated with them is vibrating. Quantum theory predicts that, as soon, as an observation is made, one of the photons emitted from the atom would be found to have a definite “up” or “down” polarization. This would also fix the direction of polarization of its twin, since, for conservation reasons, this would have to be in the opposite sense. However, unless and until such a measurement is carried out, the quantum state of the photons would be undefined — not just unknown, but physically undetermined. The EPR effect is that the fixing of the state of polarization of one of the pair of photons instantaneously causes the polarization state of its partner to be decided, irrespective of the distance between the particles. Einstein argued that such an effect, implying faster than light travel, is nonsensical and would never be vindicated. But as the Innsbruck quantum eraser experiments and other recent investigations have shown it is real and inescapable. The quantum world is in practice every bit as outrageous as its mathematical formalism suggests.

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Slowly, and reluctantly, science is trying to come to terms with the truths it has found at nature’s heart. Out of matter is made mind, which sees and interprets the world and thereby makes matter real. The universe creates itself out of itself, moment by moment, through a mutual interaction between subject and object. Sir Arthur Eddington put it this way:

We have found that where science has progressed the furthest, the mind has regained from nature that which mind has put into nature. We have found a strange footprint on the shores of the unknown. We have devised profound theories, one after another, to account for its origin. At last, we have succeeded in reconstructing the creature that made the footprint. And lo! it is our own.

Incredibly, modern physics, which is the most advanced product of our dualistic way of thinking, has shown that dualism is no longer tenable. Consciousness is an inextricable and essential property of the real world. Subject and object cannot be treated apart; there is no gap, no delay, no difference in the real world between being and experiencing. There is no existence without the conscious act.

Nor, it seems, can there be existence without contingency. Everything and every event is meaningful only in how it stands in direct relationship to the rest of the cosmos. Whereas previously, under Newtonian physics, we were able to sustain a belief in the separate reality of particles and waves, rest and motion, energy and mass, time and space, now we have no such confidence. Einstein showed that rest and motion are relative concepts, while energy and mass, and space and time, are interchangeable. Quantum physicists have discovered that, at its most fundamental level, the world cannot be accurately viewed as a complex of distinct things. What we took to be sharply bounded objects — particles of matter — have turned out to be interwoven, overlapping aspects of each other. Every thing and every event in the universe seems to be attached to an all-embracing quivering web that interconnects it with every other thing and event. Nothing stands apart. The cosmos as now portrayed by relativity and quantum mechanics is less like a loose collection of jiggling billiard balls and more reminiscent of a single, giant universal field — an unbreakable unity which Alfred North Whitehead dubbed “the seamless coat of the universe.”

Physicists have caught a glimpse of the infrastructure of the real world. Yet oddly enough, they have been able to do this only through the use of advanced technology. And all of our technology — the panoply of tools and devices at our disposal — has been developed starting from the assumption that the world can be taken apart and analyzed. Our map-making, bounding, and classifying is what has given us power over nature. But now, because of the sophisticated technology that has allowed us to experimentally probe the subatomic domain, we have found that reality has no boundaries.

EAST WORLD

Anthropology has taught us that the world is differently defined in different places. . . The very metaphysical presuppositions differ: space does not conform to Euclidean geometry, time does not form a continuous unidirectional flow, causation does not conform to Aristotelian logic, man is not differentiated from non-man or life from death, as in our world. . . The central importance of entering into worlds other than our own . . . lies in the fact that the experience leads us to understand that our own world is also a cultural construct.

—Carlos Castaneda, *The Teachings of Don Juan*

The basic oneness of the universe as revealed by quantum mechanics is also the central characteristic of the mystical experience. And so, after more than two thousand years, we Westerners have come back full circle to a unified vision of the world that a holistic Greek thinker such as Heraclitus would have recognized immediately. More to the point, twentieth-century physics has finally caught up with the philosophy of the Far East — a fact not lost on some of the founding fathers of modern subatomic theory, including Bohr, Schrödinger, and the German physicist Werner Heisenberg. Bohr, for example, wrote:

For a parallel to the lesson of atomic theory . . . [we must turn] to those kinds of epistemological problems with which already thinkers like the Buddha and Lao-tzu have been confronted, when trying to harmonize our position as spectators and actors in the great drama of existence.

Similarly, Heisenberg remarked:

The great scientific contribution in theoretical physics that has come from Japan since the last war may be an indication of a certain relationship between philosophical ideas in the tradition of the Far East and the philosophical substance of quantum theory.

And the mystical roots of contemporary subatomic theory may extend even further back. In his book *The Emperor's New Mind* Oxford mathematician Roger Penrose points to the eccentric sixteenth-century mathematician Gerolamo Cardano, who discovered, almost without any help from others, the basic laws of probability and complex numbers that now underpin quantum mechanics. “Perhaps,” writes Penrose, “Cardano’s curious combination of a mystical and a scientifically rational personality allowed him to catch these first glimmerings of what developed to be one of the most powerful of mathematical conceptions.”

In a sense, quantum mechanics has brought the conscious observer — ourselves — back into the universe with an important and potentially decisive role to play. This has profound philosophical implications. At the same time, the goings-on of the subatomic world seem very far removed from everyday life. We don’t feel personally touched by them. And so, in practice, the revelations of the new physics of the ultrasmall, strange

and wonderful though they may be, have had little effect on the common psyche. Nor, as a matter of fact, have they influenced much of the way that science in general is carried out. The standard scientific approach — even in experimental particle physics — is still to proceed as if there were an objective world out there independent of our senses and experience.

From an early age, our minds are rigorously conditioned to think of the world and ourselves in a highly specific way. And at the heart of our traditional Western outlook is dualism. It seems so natural, so right to us, because of our cultural and social training, to believe that the world has both an inner, mental component and an outer, material one. So we tacitly assume that though our (mental) will we move our (material) bodies and, by means of them, other material objects in the outside world. Likewise, objects coming into contact with our bodies give rise through the nerves to the experience of touch: vibrations in the air, when they reach the ear, cause the sensation of sound; and light particles, striking the eye, lead to the sensation of sight. It appears so transparently clear to us that this must represent the true state of affairs. But we forget, or never really consider, the depth of our conditioning. Being a product of a Greek-inspired culture and upbringing, we are programmed at the very level of our neurons, in the arrangement of our dendrites and synapses, to think in a dualistic way.

Every second of our lives we are constrained in what we see and in how we interpret and react to our surroundings by the biological and cultural mind-set we have inherited. We suppose ourselves to be very advanced in thought. But our thinking has matured only in certain specific directions, notably the scientific and technical, which are concerned with manipulating aspects of the objective world. We have become masters at understanding the relationships between different things. Yet this mastery has been won only at the cost of shattering the unity of nature. A passage from Lewis Carroll describes our predicament well:

“We actually made a map of the country, on the scale of a mile to a mile!”
“Have you used it much?” I enquired.

“It has never been spread out, yet,” said Mein Herr: “the farmers objected: they said it would cover the whole country, and shut out the sunlight! So we now use the country itself, as its own map, and I assure you it does nearly as well.”

In the West, we are very keen and adept at making maps — scientific maps of the reality in which we find ourselves. Boundaries, names, and labels have assumed with us enormous power. So we find ourselves inhabiting a world of bits and pieces, a world of apparently irreconcilable differences. And one of our principal misunderstandings stems from our use of the words “you” and “I.” For what we fail to recognize, or have forgotten, is that “you” and “I” are purely constructs of our language, and of our linguistic interactions with others. “You” come about because we happen to be speaking English (or some similar tongue) and are therefore conforming to the rule that a verb must have a subject, and that processes are mysteriously initiated by pronouns. The syntax of Western language demands a clear indication of the subject-object relation. Therefore, every time

we speak we reinforce our belief that every situation can be analyzed into a subject-predicate-object form. Our language forces us to be compulsive analyzers, to break down our experience of the world into composite elements. The fact that there might be entirely different modes of thinking usually escapes our attention. And yet such modes do exist.

A language that encourages less frequent use of “I’s” and “yous” tends to downplay the role of the individual. In Japanese, for instance, the first or second person is often omitted as the subject of a sentence. Instead, it has to be inferred by context. The Japanese approach is not to point explicitly to the subject of an action, unless necessary, but rather to locate the individual in experience.

In Japanese, a single word may serve as a complete and sufficient statement. For example, a man might be walking in the quiet countryside, surrounded by tranquil autumn scenery, when a feeling comes to his mind — that of solitude. In our language, we would instinctively analyze this feeling, identify a subject and an object, and make a comment such as “I am feeling lonesome,” or perhaps “The scenery is lonesome.” Our expression of the sentiment would involve an immediate distancing of the perceiver from the perceived, or of the actor from the action. But this is not the way in Japanese. The man on his walk might simply say “samishii” (lonesome), thus projecting the experience immediately, nonjudgmentally, without analysis. Of course, in Western language, too, people sometimes speak in abbreviated form. But when they do so, they are always conscious of the fact that what is being said is a shortened version of a more detailed description. The syntax of a language like English demands a subject-object declaration, either explicit or implied. Japanese, by contrast, does not insist upon the specification of an individual or an independent performer of deeds.

Language, culture, and a people’s general mode of thought are bound up together in close, complex symbiosis. And whereas our Western upbringing teaches us to see the subject, the self, in sharp relief, the Japanese style is to give precedence to interconnectedness, to human relationships over the individual. This is reflected in the fact that personal pronouns are much more complicated in Japanese than in other languages. Special pronouns are required for superiors, equals, inferiors, intimates, and strangers, and if an improper choice is made, then confusion, difficulty, and that worst of all disasters for a Japanese, loss of face, may ensue. Therefore, every time a native speaker uses a personal pronoun, he or she must have at the forefront of their mind such relationships as rank and intimacy.

Number is not always made explicit in the grammar of Japanese sentences. Nor is distinction always made between the singular and plural forms of words. On the other hand, when a statement definitely is expressed in the plural, several kinds of plural may be used to suit different occasions. For example, domo and tachi are used for persons of equal or inferior status or for intimates, as in funo-bitto-domo (boatman), hito-tachi (people), and tomo-tachi (friends). When respect must be shown, the suffix gata is used — anatagata (you), sensei-gata (teacher), and so on. In short, the use of plural suffixes is determined by the relationship of social ranks and the feeling that the speaker entertains for the persons of whom he is speaking. Again, this reveals the Japanese trait to think in

terms of human connectivity or embeddedness rather than of separate selves in an objective world.

When this type of thinking has the upper hand, consciousness of the individual as a distinct entity becomes less clear-cut. There is a shift away from regarding each person as an objective unit and a greater tendency to emphasize the concrete immediacy of experience. The individual becomes not so much a distinct object or even a subject in the world, but rather an integral and inseparable part of life's ever-rolling stream.

With the self seen not in isolation, and individuality regarded as more of a negative than a positive trait, the character of a nation is fundamentally influenced. The Japanese have a favorite saying: "The nail that sticks up will be knocked down." Yet rather than being a sign of oppressiveness, this is intended to sum up the essential undesirability of acting in a self-willed way. Children are taught not to be different (rigorous conformity being especially obvious in the Japanese educational system) and not to express their emotions too openly or to make a fuss, even when confronted by considerable hardship or even disaster. The Japanese "poker face" is well known and the inscrutability of Orientals, in general, has become almost a caricature. But in fact, this quality of equanimity is a real and essential part of life in the Far East. The Japanese call it *gaman* and it was evident most recently in the aftermath of the Kobe earthquake. Outsiders watching the scenes of devastation on television were amazed at how calm and composed the victims of the quake remained and at how little looting took place. The behavior of the victims may have appeared unemotional and unfeeling, but it was in truth a remarkable demonstration of the inner strength and sense of quiet fatalism this people draws from its non-egocentric perspective of the world.

Death is regarded with none of the fear or despair that it often invokes in the West. Instead, the Japanese see it as a natural, integral part of life and are raised to approach death in a manner of calm, resigned dignity. This attitude has led, in the past, to some extraordinary Japanese customs including, in the most extreme case, that of *hara-kiri* (literally, "belly-cutting"), a ritual form of suicide practiced by members of the ruling class. An official or noble who had broken the law or been disloyal received a message from the emperor, couched always in sympathetic and gracious tones, courteously intimating that continued life was no longer an option. A jeweled dagger usually accompanied the message, and with this the custom was enacted with scrupulous formality. In his own baronial hall or in a temple, a dais three or four inches high was constructed. Upon this was laid a mat of red felt. The suicide, clothed in his ceremonial dress and accompanied by his second or *kaishaku*, took his place on the mat, with officials and friends arranged around him in a semicircle. After a minute's prayer the dagger was handed to him with many obeisances by the emperor's representative, and the doomed man made a public confession of his wrongdoing. He then stripped to the waist and tucked his wide sleeves under his knees to prevent him from collapsing onto his back, for it was only considered honorable for a Japanese noble to die falling forward. A moment later he plunged the dagger hard into his stomach below the waist on the left side, drew it across to the right, and, turning it, gave a slight upward cut. At the same time his faithful *kaishaku* leapt forward and brought his sword down on the outstretched

neck. Obligatory hara-kiri like this became obsolete in the middle of the nineteenth century, and was abolished in 1868. However, voluntary hara-kiri continued and occasionally is carried out today. With such stoicism and selfless bravery in the face of death a deeply ingrained national trait, it becomes easier to understand how the infamous Japanese suicide pilots were able to complete their devastating missions during the war in the Pacific. Nowhere in the world is the ego kept smaller and weaker than in Japan; nowhere, therefore, is there considered to be less to lose in death.

This makes it hard, very hard, for us to penetrate fully the Japanese mind. And, failing to understand properly a system of thought and culture that is so totally different from our own, we tend to criticize it because it doesn't measure up to our standards. To us, the Japanese seem lacking in new ideas and individualism. We characterize them as being great copiers and adapters but poor innovators. And it is often pointed out how few Nobel prize-winners Japan has produced considering its technical prowess. Indeed, the Japanese have recently begun to find fault with themselves on these accounts, but only because they are becoming increasingly Westernized in their outlook. Traditionally, Japanese language and culture are rooted in man's direct experience of the world, so it naturally leans away from theoretical or systematic thinking. Whereas we put a high value on logic, analysis, and abstraction, in Japan there is more of a tendency toward the aesthetic, the intuitive, and the concrete.

And not just in Japan. Across the East, in India, China, and other neighboring lands, a traditional way of life has evolved that is remarkably at variance with our own.

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To pick up but one strand in the labyrinthine history of Eastern thought: twenty-five hundred years ago, in China, lived Lao-tzu (pronounced "Low Dzoo"). In a sense he was the world's first dropout—an anticonventional, independent thinker. Very little is known about him, not even his proper name, since Lao-tzu means simply "old philosopher," or even "old child." He may, for all we know, have been more of a lineage, as perhaps Homer was, than a single person. What matters, though, is not his identity but the book he wrote, which for the past two millennia has been called the Tao Te Ching ("Dow They Jing") — the Tao Virtue Classic. Though only five thousand Chinese characters long, it gave birth to Taoism, shaped Buddhism, spawned Ch'an meditation, and encouraged the development of Chinese landscape painting. The fact that we know virtually nothing about its author is particularly appropriate since of the things Lao-tzu rejected, including violence, oppression, superstition, and imposed authority of any kind, he rejected none so insistently as the self.

At the heart of Lao-tzu's message is Tao, which translates as "the Way." By its nature, Tao is held to transcend description. As Lao-tzu said: "The Tao that can be expressed is not the eternal Tao." And so, if Lao-tzu's words are read with a view to logically analyzing them, the effort is bound to end in frustration. No matter how our intellect tries to sneak up on Tao we are ultimately repelled by a "not this, not that" force field. The Tao of Lao-tzu is reality as a whole — not a patchwork of diverse theories such as we

have in the West to try to explain the universe. Tao is considered to be on top of everything as well as in everything. It is the nothing as well as the something; the nothing that penetrates all reality from the space inside atoms and between stars to the inner space of the human mind. Above all, Tao is not anything that we can apprehend or appreciate by thinking about it. In fact, Lao-tzu is at pains to reject learning and intellectual effort as a waste of time. Give up learning, he urges, and you will have no anxieties — a philosophy echoed in the Bible's plea for us to be as little children.

Tao stresses “nothing-doing,” which means not projecting one’s self as the center of all that happens, not manipulating people and things, not imposing one’s will on events, not trying to control reality. And with regard to this last point, Lao-tzu counsels against naming things. Giving names is seen as an effort to subjugate reality through abstraction and analysis. To live in harmony, we shouldn’t name things but intimate with them. Reality can never be captured in words, or as Lao-tzu put it: “He who speaks does not know, and he who knows does not speak.”

Lao-tzu introduced a method of posing logical paradoxes as an antidote to naming and rational thought. Sometimes these are taken for subtle witticisms, but their purpose is not to entertain or even to state profound truths. Instead, it is effectively to bypass the intellect and illuminate by sudden flashes — to rend the veil of words.

Lao-tzu contrasts the contentment and effortlessness of moving with the flow of events in nature, with the tension of always acting on the world. He proposes an attitude toward life that is full of warmth, amusement, awe, and acceptance, and not a reaction against nature that continually strives to control, improve, and make the self the focus of attention. His philosophy, in fact, is the diametric opposite of that to which most Westerners adhere.

Even among those in the modern West who profess to be antiestablishment, who devote themselves to personal meditation, communal living, unorthodox appearance, and fighting environmental issues, the underlying ethos remains that the meaning of life is to be found through self-expression. In our culture, ego-centrism is as much a trap for the outs as for the ins. From a Taoist perspective, we are the “do something” set. We fight against each other and the elemental forces of nature; we mess up the environment and then strive to fix it; we struggle to teach our children, to make them conform, and wrestle with the problems of delinquency and drugs; we match violence against society with organized violence sanctioned by society; we praise, blame, manipulate, and restrain. We even try to do good by controlling — by seeking peace and eliminating oppression. Lao-tzu’s way, by contrast, is not to exert the will at all but to go with the flow, to simply experience reality — all of man’s being and all of nature’s working. In modern times, this approach was perhaps most conspicuously and successfully adopted by Mahatma Gandhi and his followers in their nonviolent resistance to British imperialism.

Presumably, the Way came about as a reaction to the patterns of self-willed violence, authoritarianism, and deceit that emerged as civilization took hold in ancient China. At the time of Lao-tzu there would still have been many people living under essentially

Stone Age conditions, following a simple lifestyle based on daily sustenance and intimacy with nature. And Lao-tzu would have been able to compare firsthand this unforced approach to life with the problems that arose when people adopted a more self-centered, control-over-nature attitude in the towns and cities of Bronze Age culture.

In any event, Taoism took root and evolved to become one of the two principal Chinese worldviews, alongside Confucianism. In it, the universe was seen to be organic rather than mechanistic, spontaneous rather than contrived, circular rather than linear, synthetic rather than analytic. Unlike the conventional Western conception of God as someone or something “out there,” Tao is inherent and pervasive. From a Western perspective, Tao may seem to be a negation of existence — a vacuum or void. And such an interpretation appears superficially justified by comments like those of the Taoist philosopher Chuang-tzu: “In the great beginning, there was nonbeing. It had neither being nor name.” However, we have to be careful when judging other outlooks on life with our rigid dualistic mind-set. In the Western sense, being and nonbeing are mutually exclusive and opposed, whereas in the Chinese view they are mutually inclusive and complementary. As far as Taoism is concerned, the universe was not created or ordered by some external power. There is nothing external or apart from Tao. All exists together, at once, and the universe is considered to be inherently self-generating.

Because in Taoism man is embedded in nature, traditional Chinese art, culture, and language became imbued with this sense of identity between the experiencer and the experienced. The individual saw himself, as it were, wedded to his surroundings. And Taoist poetry and painting reflected this direct perception and conscious experience of nature’s integrity. Chinese landscape painting, in its wonderful economy of brushstrokes, its subtlety, its sense of timelessness, and, above all, its use of space, portrays life as going beyond human definition and limits. Emptiness is seen to have as much importance as the scenery and the characters. As in the verses of William Wordsworth the Taoists, in their art, grasped the world as a living organism, its streams and groves infused with a mysterious spirit, its rocks and mountains possessed with a life of their own.

Chinese religion and philosophy, if these terms are not too misleading, reflect a “one-in-all” appreciation of the nature of reality and self. In Taoism this view reached its most developed form before migrating further East, to the islands of Japan. And in Japan we find at last our true antithesis to Western analytical thought — that extraordinary thing which is not a philosophy or a religion, and which is known as Zen.

There is something in Zen which we never meet anywhere else in the history of human thought and culture. It begins with rationalism since it deals with religio-philosophical concepts as being and non-being, truth and falsehood, the Buddha and nirvana; but after the beginning is once made, the matter is strangely switched off in a most unexpected direction. To judge Zen by the ordinary standard of reasoning is altogether out of place, for that standard is simply inapplicable. We must acknowledge that our Western world view is limited and that there is a much wider world beyond our mentality.

—Daisetz Teitaro Suzuki

Zen is . . . difficult to talk about. So alien, indeed, is Zen to the analytical Western mind that it is perhaps easier to say what it is not. Zen is not a faith because it doesn't urge the acceptance of any form of dogma, creed, or object of worship. Nor is it antireligious or atheistic; it simply makes no comment on the matter. Zen is not a philosophy or even, to the Western mind, a form of mysticism. As we normally understand it, mysticism starts with a separation of subject and object and has as its goal the unification or reconciliation of this antithesis. But Zen does not teach absorption, identification, or union of any kind because all of these labels are derived ultimately from a dualistic conception of life. If a label is needed that best approximates to the spirit of Zen then "dynamic intuition" is perhaps as close as we can come.

There is a saying in Zen: "The instant you speak about a thing you miss the mark." So, presumably, this saying has also missed the mark — and this one, too. Our endless analysis can lead us into all sorts of difficulties. But how can we break free of it? Living in a world of words and concepts and inherited beliefs, says Zen, we have lost the power to grasp reality directly. Our minds are permeated with notions of cause and effect, subject and object, being and nonbeing, life and death. Inevitably this leads to conflict and a feeling of personal detachment and alienation from the world. Zen's whole emphasis is on the experience of reality as it is, rather than the solution of problems that, in the end, arise merely from our mistaken beliefs.

Because it eschews the use of the intellect, Zen can appear nihilistic (which it is not) and elusive (which it is). Certainly, it would be hard to conceive of a system that stood in greater contrast with the logical, symbol-based formulations of contemporary science. More than any other product of the Oriental mind, Zen is convinced that no language or symbolic mapping of the world can come close to expressing the ultimate truth. As one of its famous exponents, Master Tokusan said: "All our understanding of the abstractions of philosophy is like a single hair in the vastness of space."

Zen claims no thought system of its own. Yet it is undeniably Buddhist in origin and essence. And so before trying to appreciate its final flowering, it is worthwhile digging down to examine Zen's roots — roots which are set firmly in Indian soil, in the fertile ground of Mahayana Buddhism.

The Indian mind was, and is, different in character from the Chinese or Japanese. It is more expansive, more austere intellectual, less concerned with practical, everyday affairs, and more inclined to complex exposition and exploration of ideas. Nowhere is this more evident than in the writings of the monk-philosopher Nagarjuna, a central figure in the development of Mahayana Buddhism and the founder, during the second century A.D., of the Madhyamika (“Middle Path”) school. Nagarjuna wrote two key treatises, *Madhyamika Sastra* and *The Discourse of Twelve Sections*, in which he probes the nature of reality with remarkably sophisticated dialectic and rigorous arguments. In a dazzling display of polemic against the prevailing metaphysical ideas of his time, he argued strongly that the basic quality of existence is relational. There is no soul, no thing, no concept independent of its context; all things are devoid of absolute reality and exist only relative to conditions. In Nagarjuna’s view, the universe is a true unity of interpenetrating processes: a continuous, interpenetrating flux.

Through such deep, technically brilliant philosophical inquiries, Buddhism acquired a rich intellectual base. Profound questions were asked about the nature of the body and of the mind. Possible solutions were considered from many angles, not dogmatically but critically — and they were discarded if found to be unsatisfactory. The data for these theoretical studies came from what might be called “subjective empiricism” or, alternatively, “participatory observation” — that is, a methodical, progressive, introspective inquiry into the domain of direct, nonsensory experience.

Parallels may be discerned, then, between the goals, the rigorous application of technique, and the lively skepticism of Buddhist “researchers” on the one hand and, on the other, modern scientists. Both arrive at tentative conclusions and build theories based on experience, and both reject or modify those theories as further experience demands. But we Westerners are not so inclined to give credence to the results of subjective inquiry — in fact, we instinctively react to them with downright suspicion. In the West, the emphasis is almost exclusively on objective methods, on the primacy of what is taken to be an independently existing outer world, and on the dualistic logic of Aristotle as later formalized by Descartes and Galileo. We tend to suppose that this is the best and proper way of acquiring systematic knowledge. Yet the sole reason for this is that it is the way to which we are accustomed. Our lifelong conditioning makes us balk at the very different, subjective approach that has been favored in the East and that is unique to Asian culture. Participatory observation is simply not a recognized part of the experimental model of contemporary science. However, to dismiss the Eastern approach as being either ill-founded or illogical would be a mistake equivalent, say, to rejecting non-Euclidean geometry (which provides our current relativistic description of gravity and spacetime) on the grounds that it falls outside the familiar, “common sense” axioms of Euclid. The logic and methodology of Buddhism, and other related philosophies, may appear alien, and perhaps even impenetrable, upon first contact. But a careful reading of the classic mystical literature, as well as recent studies of altered states of awareness (see Chapter 11), leads to the conclusion that the terrain of subjective phenomena is genuinely scientific. It contains within it lawful processes pertaining to a mode of consciousness that is as valid and mature as the one to which we are accustomed. If our Western logic

and system of thought is Aristotelian, then that of Buddhism is non-Aristotelian, but no less worthy of our serious attention.

Of course, the pioneers and patriarchs of Buddhism had no access to high technology. They lacked the powerful, sensitive instruments and well-equipped laboratories of modern science. Nor did they know much, by today's standards, about mathematics. However, such facilities would not have been helpful in the quest upon which they were embarked. Their monasteries were their laboratories, their own minds were the only equipment they needed for their studies. Their method of research was not to focus on some particular aspect of the outer world but to turn inward, to systematically explore states of consciousness to a depth virtually unknown in the West. And it was as a result of this intense and highly disciplined introspective investigation, carried out over a period of many centuries, that the central tenets of the Buddhist worldview, which amount to a genuine science of consciousness, came about.

Among the notable features of Buddhist cosmology is the doctrine of Dharmadhatu — the Universal Realm or Field of Reality. In this scheme there are no dividing boundaries between things, no separation between subject and object; every entity is seen to interpenetrate every other — a view strikingly in keeping with the ideas of interconnectedness that have emerged from modern quantum mechanics. Here, for example, are two descriptions, one by a Buddhist philosopher, the other by a quantum physicist:

The world thus appears as a complicated tissue of events, in which connections of different kinds alternate or overlap or combine and thereby determine the texture of the whole.

Things derive their being and nature by mutual dependence and are nothing in themselves.

But which is which? The first quote is actually from Werner Heisenberg's book Physics and Philosophy, the second, almost two thousand years earlier, from Nagarjuna. Coming from two very different directions, using very different techniques, Buddhism and quantum mechanics have converged on virtually the same underlying description of reality.

Buddhist belief is also remarkably in sympathy with our modern, macroscopic conceptions of space and time. Eastern philosophy, unlike that of the Greeks, has always maintained that space and time are constructs of the mind. A passage in the *Madhyamika Sastra*, for example, reads:

[T]he past, the future, physical space . . . and individuals are nothing but names, forms of thought, words of common usage, merely superficial realities.

The French physicist Louis de Broglie, outlining the new view of the universe as revealed by relativity theory, holds out a similar concept:

In space-time, everything which for each of us constitutes the past, the present, and the future is given en bloc . . . Each observer, as his time passes, discovers, so to speak, new slices of space-time which appear to him as successive aspects of the material world, though in reality the ensemble of events constituting space-time exists prior to his knowledge of it.

Both these commentaries point out the essential unreality of the present moment and the passage of time. There is no “now,” no real barrier between the past and the future, and no flow of time outside the observer’s ego-centered awareness. These are concepts relevant only within the context of our personal, I-focused existence. Upon this, both Buddhism and the general theory of relativity agree, and both espouse a much grander, four-dimensional scheme of the universe in which space and time, in a sense, already exist — past, present, and future laid out in complete topographical detail for anyone who can command the vantage point from which to see. Einstein himself well understood our personal limitations in coming to grips with the true nature of reality. Indeed, he might have been acting as a spokesman either for mysticism or for physics when he said:

A human being is part of the whole, called by us “Universe”; a part limited in time and space. He experiences himself, his thoughts and feelings as something separated from the rest — a kind of optical delusion of his consciousness. The delusion is a prison for us, restricting us to our personal desires and to affection for a few persons nearest to us. Our task must be to free ourselves from this prison by widening our circle of compassion to embrace all living creatures and the whole of nature in its beauty. Nobody is able to achieve this completely but the striving for such achievement is, in itself, a part of the liberation and a foundation for inner security.

Einstein grasped what other visionary minds have done before: that a principal aspiration of mankind should be to see beyond ourselves, beyond the parochial self-oriented here and now, to a wider, cosmic panorama. But how to do this? The very reason human thought has progressed as far as it has is by virtue of having access to a sophisticated language. And all of human language, Oriental and Occidental alike, hinges upon the use of words, names, labels, and symbols — the purposeful fragmentation of the whole and the substitution of tokens for the pieces into which we have broken reality. Removal of the wall between ourselves and the cosmos at large, dissolution of the subject-object barrier, can only come with the cessation of thought based on language. Yet, try as we might, we cannot stop thinking. The very act of attempting to shut out thought involves thought, so that this approach is defeated from the start. If we apply our intellect to block our intellect we only make matters worse — we simply end up distancing ourselves further from an innocent awareness of how things actually are.

All human beings the world over face this same dilemma. Evolution has made us into inherently self-centered individuals bent on survival. But our conscious experience of selfhood, of our individuality — which is ultimately the creation of language and rational thought — can lead to suffering and anxiety and, in particular, a preoccupation with death. Easterners harbor the same concerns about self, survival, and mortality as we do. Yet, in the West, our difficulty is made more acute by the belief in the supremacy of the intellect. Our immediate reaction to any problem is always to try to think or reason our way to a solution: an approach that, being predicated on the notion that the self is separate from the world, can never in itself lead to the experience of selflessness. Our

dogged objective probing of the world has finally led, it is true, to the discovery that at the subatomic level all divisions and boundaries imposed by us on the universe are in fact illusory — including the split between mind and matter. But although we have discerned this at an intellectual level, we still feel ourselves to be apart from, rather than a part of, the universe as a whole.

Philosophers everywhere have long known that the human mind is capable of two contrasting modes of consciousness, the rational and the intuitive. But whereas the West has favored the former, in the East the latter has always been given priority. Buddhism, as a case in point, reveals this bias in its distinction (made in the sacred texts known as the Upanishads) between “higher” knowledge, or prajna, also referred to as “transcendental” or “absolute” awareness, and “lower” knowledge, or vijnana, identified with analytical or scientific thought. Thus, although Buddhism has a rich intellectual base and body of philosophical teachings, it uses these not as an end in itself but as a way of pointing to the greater truth that can only be attained by a suspension of logic and symbolism.

As that branch of Buddhism known as Mahayana (Sanskrit for “Great Vehicle”) spread out of its original homeland into neighboring China, two main developments took place. On the one hand, the translation of the Buddhist sutras, or expository texts, stimulated Chinese thinkers to interpret the Indian teachings in the light of their own philosophies. On the other hand, the more pragmatic Chinese mentality fused the abstruse spiritual disciplines — the meditation techniques — of Indian Buddhism with Taoism to give birth to the system known as Ch'an. (Ch'an is the Chinese transliteration of the Sanskrit word “dhyana,” which signifies the mystical experience in which subjectivity and objectivity merge. Zen is the transliteration into Japanese of Ch'an.) This, in turn, was acquired by the Japanese around 1200 A.D. and reached its final fruition in Zen.

In a sense, what modern physics is to the history of Western thought, Zen is to the development of the Eastern worldview: the ultimate refinement of more than two thousand years of incisive debate, discussion, and critical development. Yet the difference between the two could hardly be more marked. Whereas physics is interested above all in theories, concepts, and formulas, Zen values only the concrete and the simple. Zen wants facts — not in the Western sense of things that are measurable and numerical (which are, in fact, abstractions!) but as living, immediate, and tangible. Its approach to understanding is not to theorize because it recognizes that previously accumulated ideas and knowledge — in other words, memories of all kinds — block the direct perception of reality. Therefore, Zen adopts an unusual approach. Its buildup involves language — which is unavoidable. Any method, even if it turns out to be an antimethod, has first to convey some background in order to be effective. But the way Zen uses language is always to point beyond language, beyond concepts to the concrete.

Two major schools of Zen exist in Japan: the Rinzai and the Soto. Both have the same goal, of seeing the world unmediated, but their approaches are different. In the Soto school, the emphasis is on quiet contemplation in a seated position (zazen) without a particular focus for thought. The method in the Rinzai school, however, is to put the intellect to work on problems that have no logical resolution. Such problems are known

as koans, from the Chinese kung-an meaning “public announcement.” Some are mere questions, for example: “When your mind is not dwelling on the dualism of good and evil, what is your original face before you were born?” Others are set in a question-and-answer (mondo) form, like: “What is the Buddha?” Answer: “Three pounds of flax” or “The cypress tree in the courtyard” (to name but two of the classic responses). According to tradition there are seventeen hundred such conundrums in the Zen repertoire. And their common aim is to induce a kind of intellectual catastrophe, a sudden jump which lifts the individual out of the domain of words and reason into a direct, nonmediated experience known as satori.

Zen differs from other meditative forms, including other schools of Buddhism, in that it does not start from where we are and gradually lead us to a clear view of the true way of the world. The sole purpose of studying Zen is to have Zen experiences — sudden moments, like flashes of lightning, when the intellect is short-circuited and there is no longer a barrier between the experiencer and reality. Sometimes its methods can seem bizarre and even startling. To catch the flavor, if a Zen master found you reading this book he might grab it from you and hit you over the head with it, saying: “Here’s something else for you to think about!” Such shock tactics, however, are intended not to offend but rather to wake us up from our normal symbol-bound frame of mind.

Zen may seem chaotic and irrational (often unfuriously so!). Yet traditionally it is pursued and imparted in a highly formal, doctrinal way. Students at a Japanese Rinzai monastery must abide by strict rules and follow a precisely prescribed path of development, involving regular periods of meditation and private interviews with the Zen master (roshi), in which koans are given and discussed. When the student attains, in the master’s judgment, the correct insight into a koan, he or she will be given a new koan designed to open up a further appreciation of the true nature of reality. In this sense, enlightenment comes as a result of a succession of satoris, some more profound than others.

Zen uses language to point beyond language, which is what poets and playwrights and musicians do. But, less obviously, it is also what modern science does if the intuitive leap is taken beyond its abstract formalism. The deep, latent message of quantum mechanics, for instance, codified in the language of mathematics, is that there is a reality beyond our senses which eludes verbal comprehension or logical analysis. And this is best exemplified in the central idea of “complementarity” — an idea introduced by Niels Bohr to account for the fact that two different conditions of observations could lead to conclusions that were conceptually incompatible. In one experiment, for example, light might behave as if it were made of particles, in another as if it were made of waves. Bohr proposed, however, there is no intrinsic incompatibility between these results because they are functions of different conditions of observation; no experiment could be devised that would demonstrate both aspects of a single condition. The wave and particle natures of light and matter are not mutually exclusive; they are mutually inclusive — necessary, complementary aspects of reality. Bohr gained his inspiration for this concept from Eastern philosophy, in particular from the Taoist concept of the dynamic interplay of opposites, yin and yang. And so, one of the central principles of modern physics is

coincident with, and actually derived from, one of the most basic doctrines of the Eastern worldview.

Intuition has ever been the handmaiden of science. And although science represents its theories and conclusions in a “respectable” symbolic form, its greatest advances have always come initially not from the application of reason but from intuitive leaps — sudden flashes of inspiration very much akin to Zen experiences.

Zen and physics, then, seemingly so different, are not so different after all. They are themselves complementary — the waves of Zen to the particles of physics. And the truth of this symbiosis is further revealed by the fact that the branch of physics that is closest to the bedrock of reality, quantum mechanics, now appears to be as profoundly paradoxical and enigmatic as Zen. Physics even poses riddles that, like koans, make a mockery of our logic: “Does a particle that is not watched exist?” Trees, like everything else, are made of subatomic particles. So, does an unwatched tree exist? If it falls in a forest, when no one is around to “observe it into being,” can it meaningful be said to make a sound? Physics and Zen, pragmatism and poetry, conceptualization and creativity, meet at such points — and become one.

But what does this mean for the ordinary man and woman? We cannot all sit cross-legged in Japanese monasteries, hour after hour, day after day, year after year, preparing our mind for the flash of Zen lightning that will hopefully show us the meaning of life, the universe, and everything. Nor can we all immerse ourselves for a similar lengthy period in the complexities of higher mathematics and quantum field theory so that we might someday fully appreciate the new scientific vision of a unified cosmos. We have children to raise, jobs to go to, mortgages to pay. How can we, in our everyday lives, discover our true place in the universe? How can we see beyond the narrow confines of our individual existence to the timeless, deathless, frontierless place that, the sages of both the East and the West now tell us, is the one true reality?

TRANSCENDENCE

Our normal waking consciousness, rational consciousness as we call it, is but one special type of consciousness, whilst all about it, parted from it by the filmiest of screens, there lie potential forms of consciousness entirely different.

—William James

Through out history, and in many different situations, people of all backgrounds and beliefs have enjoyed spontaneous mystical experiences. Suddenly the individual feels, beyond any shadow of doubt, that she is fundamentally one with the universe. Her sense of identity expands to embrace the cosmos as a whole.

Following the publication of an earlier book, *Soul Search*, I received many letters from individuals telling me of extraordinary and unprecedented experiences that had left them with a radically changed view of the world. One particularly fascinating account came from a young woman, Tina W., in Portsmouth, England. She wrote:

What happened could be explained as an hallucination or a dream, but in all my life I have never had an experience remotely like this one. Since it happened ... I have found it difficult to concentrate on anything else.

It was around 10 P.M. in my bedroom in Portsmouth on my first day home after a long holiday. I had spent the previous month in the USA with my partner who lives there. I had the most wonderful, relaxing time living in a trailer in the countryside of West Virginia. . . . Holiday over, I flew out of Washington, DC, on the evening of the 17th of September. The flight was awful. I didn't sleep, and though I had flown several times before with no concerns at all, on this occasion my mortality came very clearly into focus. Anyway, we landed safely at 7 A.M. and I went straight to bed, where I stayed all day. At 9 P.M. I went to bed with a book — M. Scott Peck's *Further Along the Road Less Traveled*. At this time, I had been awake for over thirty hours. About halfway through the book Mr. Peck relates an anecdote of a dinner companion asking him to explain his latest book in a sentence; he failed — but then went on to relate how Jesus encapsulated the Christian message: "Love the Lord thy God with all thy heart, with all thy soul and with all thy might and love thy neighbor as thyself." Although these words were familiar, the depth of their meaning hit me then for the first time. It was as though something clicked in my brain . . . I felt unbounded love for everyone and every living thing — just an immensity of love, so that it was almost unbearable — I totally abandoned myself to that feeling. What happened next is difficult to describe because words become inadequate. . . . I felt overwhelmed by something, some pure clear clean cool essence . . . pouring into me . . . then somewhere around this point the experience occurred. All I can do is list impressions, thoughts, and feelings I was able to store. The real thing is way beyond description or even logical recall. . . . Joy, ecstasy, love, I was immersed in it and saturated with it. Understanding of what was going on came intuitively . . . we are all in but not aware of this dimension all the time. We are all one light but separate also. This doesn't make sense in our regular consciousness but did in that state. . . . I identified my boyfriend's essence . . . [and] remember thinking, "It doesn't matter if I never see him again in the physical earthly sense because at this level we are always together. Material things and our desire for them seemed totally idiotic and unimportant. . . . All the human defenses and facades we create to hide from each other are nonsense because we are all one. All the things we do to sustain our self-image are

redundant here. Death is a release. Our body is anchoring us in space and time. . . . Life as we know it is only the tiniest bit of what comes after. . . .

I consciously decided to leave that mode (I thought I could get back again). . . . Afterwards, I cried a little, a combination of joy and shock, I think. . . . It totally changed the way I feel about a lot of things — faith, death, life.

The pivotal moment in Tina's adventure was when "something clicked in my brain, because this was clearly the point of switchover from the normal dualistic mode of thinking to the selfless experience of transcendence. To a Zen practitioner it would be satori, the flash of lightning. A Muslim might have recognized it as "the Supreme Identity." And there are other names: nirvana, Tao, enlightenment, zoning, bliss. So widespread is this fundamental mystical feeling that it has, along with the doctrines that purport to explain it, been called "The Perennial Philosophy." For some, it comes only after years of asceticism, study, and devotion to some particular religious or meditation system. But for most ordinary folk, like Tina, it arrives out of the blue, unbidden and unsought. In fact, the very act of seeking may block or hinder the experience of enlightenment. As Tina mentions later in her letter, "I haven't yet been able to get into that mode again." The problem is that she is now trying to rekindle the feeling through an effort of intellect and of self-will, whereas the original experience arose spontaneously as a result of a freak series of events — a long period of relaxation, followed by complete exhaustion and, finally, an enigmatic biblical quotation (like a koan) — which caught her reasoning mind off guard.

Tina comments that her experience was "way beyond description." And this sums up the difficulty people have always faced in trying to convey to others this ultimate state of selfless being: by its nature it is ineffable. The whole point about transcendence is that it is the experience of reality, pure and simple, without any of the symbolic interpretation normally placed upon it by the rationalizing human mind. It is not something amenable to linguistic or logical analysis. This impossibility of putting the transcendent into language is why the different forms of religious instruction that have sprung up around the world vary so much. It is also why so much superfluous dogma has become attached to what is basically a very straightforward message: stop thinking and start experiencing.

All the most prominent sages throughout human history, including Buddha, Lao-tzu, Jesus, Muhammad, and Isaiah, apparently saw through the artificiality of the world of symbols to the true ground of existence. And subsequently, they each strove to put their experience and their method of achieving it into words that others might understand. The feeling of transcendent unity is the same for everyone when it happens, since there is only one reality. However, problems ensue in translating this feeling into words. Even greater difficulties arise when others, who have not had the experience themselves, try to convey secondhand or thirdhand what the fundamental teaching consisted of. And so, for instance, from the reasonably clear and simple message of Gautama Buddha, the vast and intricate system of religious philosophy that is Buddhism has sprung. Thousands of books and many millions of words have been set down on the subject, often in a style that only a lifetime devotee or learned academic could penetrate. But the irony is that language and

symbolism are anathema to the basic message of Buddha, which is all about direct experience, unadulterated being. And the same is true of Christianity. The central teaching of Jesus — who, if he was any one man, was surely a flesh-and-blood human being like you and me — is to forget yourself and get in touch with the real world.

Every principal religion and moral code from around the world has this notion at its core: that we should aspire to be selfless. The admonition to “do as you would be done by” or “love thy neighbor as thy self” or “be as little children” is universal. To achieve the best, most natural, most worthwhile, state of existence we are urged to lose ourselves and merge with the whole. As the Christian mystic Meister Eckehart said:

As long as I am this or that, or have this or that, I am not all things and I have not all things. Become pure till you neither are nor have either this or that; then you are omnipresent and, being neither this nor that, are all things.

Another great mystic put it this way:

Still there are moments when one feels free from one’s own identification with human limitations and inadequacies. At such moments, one imagines that one stands on some spot of a small planet, gazing in amazement at the cold yet profoundly moving beauty of the eternal, the unfathomable: life and death flow into one, and there is neither evolution nor destiny; only being.

His name was Albert Einstein.

The true and sole aim of all deep religion and of all deep science is the same — to point past the personal, survival-oriented self to the boundless reality that has always been there. Jesus said, “The Kingdom of Heaven is within you.” Buddha said, “Look within, thou art the Buddha.” And what they meant was the same.

When the brain is relaxed enough to take time out from projecting the self, we become, in those brief mystical interludes, aware suddenly of a greater world stretching away on all sides beyond our small, personal, finite lives. The writer Aldous Huxley frequently expressed his view that the function of the human nervous system is to filter and limit the amount and intensity of the experience that our minds have to deal with. To him the brain was actually an impediment, a “reducing valve,” that restricted what we would otherwise be able to see. And in *The Doors of Perception*, published in 1954, he described his personal attempts to open up the reducing valve in his head using the hallucinogen mescaline.

Psychedelic drugs, most notably LSD, have been regarded by some as shortcuts to higher states of consciousness, as have the extreme states of exhaustion induced, for instance, by repetitive, anaerobic forms of dance. Nor is this a recent trend. Whether it be through eating magic mushrooms, licking the psychoactive secretions of certain types of toad, walking on red-hot coals, whirling like dervishes, or simply imbibing alcohol, people have been seeking artificially induced transcendent experiences for thousands of years. For others, music, poetry, prayer, quiet contemplation, or a walk in the woods or the hills can trigger the same effect. In a remarkable variety of ways, it seems that we all at times try to break free from our normal mode of self-centered awareness.

One of the most interestingly consistent times at which a very profound transcendent experience is reported to occur is when people come near to death. Studies and surveys reveal that the so-called near-death experience (NDE) is surprisingly common and, in its essential elements, is remarkably consistent. Many millions of individuals around the world claim to have had NDEs and, although interest in the phenomenon is greater today than it has ever been before, descriptions of such experiences are to be found in diverse records going back hundreds and even thousands of years.

Among the most common elements of NDEs are the sensation of leaving and floating away from the body, traveling down a tunnel toward an intensely bright light, an all-pervasive feeling of rapture and love, and seeing one's life recapitulated in vivid detail. Most significantly, NDEers often relate having had a most extraordinary feeling of unity, an acute awareness of everything being there all at once, with a concomitant loss of self-boundaries. Subjects sometimes recall having felt as if they were really alive for the first time. And this, remember, during a period when, objectively, their bodies and brains were totally inert. Indeed, in some cases, profound transcendent experiences apparently took place after the person had been pronounced clinically dead.

It is possible to explain some aspects of the NDE, including the tunnel and the light, in terms of hallucinatory-type events taking place in the distressed brain (though other explanations cannot yet be discounted). But conventional neurological wisdom is at a loss to account for the astonishing broadening and deepening of consciousness reported by people who have, albeit temporarily, crossed over the threshold from life into death. Some of these individuals went through all of the stages of dying up to and including cardiac arrest and the cessation of breathing for several minutes or more. They entered briefly into that uncharted region where all of us are destined eventually to go — but then, thanks in the main to modern resuscitation procedures, came back to tell their tale. Except that there should not have been any tale to tell. How can a brain in which virtually all neurological activity has ground to a halt be capable of giving rise to an awareness of unprecedented depth and acuity?

The most reasonable explanation is that the unity feeling which is the central mystery of the NDE is not a product of brain activity at all. It results instead from the removal of the brain's restricting influence. For the first time in a person's life, at the moment of death the selecting and limiting effect of the brain is eliminated, the psychological walls of the self are broken down, and the individual is set free to meld again with the whole unbroken field of reality.

If it were but one aspect of experience that pointed to a cosmic dimension of consciousness then we might easily choose to ignore it. But there is now compelling evidence from physics, psychology, Eastern philosophies, and numerous reported episodes of transcendental awareness in ordinary people for us to take this matter very seriously indeed. What is being suggested is not a new scientific paradigm, but a revolution in the metaphysical underpinnings of our worldview. The simple materialistic notion that consciousness can continue only as long as there is a brain to support it is

becoming increasingly untenable. Quantum mechanics and our modern conception of space-time has made nonsense of the Newtonian mechanistic cosmos in which man was effectively divorced from the processes going on around him. We now know — and every experiment quantum physicists carry out further bolsters our knowledge — that we are deeply, intrinsically bound up with reality as a whole. Subject and object are one. The only reason we see it differently is that the self puts up artificial barriers, and creates the feeling of difference and distance between itself and the rest of the nature.

This same core truth was appreciated directly by those mystic-philosophers, principally in the East, who, through circumventing the self, saw directly the way things really are. And this same truth, it is clear, does not even require special training or effort for it to be grasped. At any moment, for one reason or another, a person can suddenly come into direct, unmediated contact with the cosmos — can, to all intents, become the cosmos.

14

I, UNIVERSE

Like the waters of a river
That in the swift flow of the stream
A great rock divides,
Though our ways seem to have parted
I know that in the end we shall meet.
—Twelfth-century Japanese verse

One simple change in our worldview would have the most profound and dramatic effect on our lives. And it is this: to see, as Eastern philosophies have long seen, that the brain does not give rise to consciousness.

The brain is an organ of thought and memory, and has evolved as such for a variety of reasons. It pays for an animal to be able to remember what has happened to it so that it has a better chance of repeating its successes and avoiding its failures. It pays to know how to respond most appropriately to fellow members of your species or clan, especially if you have to fit in with a social structure in which complex interrelationships play a central role. It pays to be able to speculate about the future, analyze situations, and work out novel strategies. It pays — if you are to stay alive and prosper in a niche as incredibly intricate as that of *Homo sapiens* — to have inside your skull a two-hundred-billion-unit neural net of unprecedented power for processing and storing information. You have to be able to think and remember extraordinarily well. But the point so often overlooked is that there is absolutely no reason why you should have to be conscious.

Consciousness, in survival terms, is an irrelevancy. It is perfectly possible to conceive of a world inhabited by all sorts of life-forms, from the simplest bacteria to the most spectacularly cerebral of creatures, in which there never stirred a single conscious feeling or experience. In fact, such a world could be imagined that was outwardly indistinguishable from our own. It might appear to be full of diversity, sophisticated behavior, intelligence, and even wit and charm, and yet involve no subjective experience, no inner feeling of being, whatsoever.

Many attempts have been made by evolutionary biologists to explain why consciousness should have come about and what possible advantage it might have bestowed on its owners. For example, it has been suggested that being conscious allows us to understand how other members of our social group feel so that we can better interact and communicate with them. Consciousness, it is sometimes said, helps us to see the world from each other's point of view. But the circularity of this argument is readily apparent. It might indeed be a survival advantage to appreciate how the other fellow feels if conscious feelings and experiences are already a fact of the world, but this offers no explanation of why consciousness should have come about in the first place. Exasperated by their failure to discern an obvious purpose for consciousness, some researchers have dismissed it as peripheral and almost accidental — an inconsequential spinoff of the brain's other activities.

The same problem that evolutionary biologists invent for themselves in trying to find a credible survival function for consciousness, neurologists face in their attempts to explain how consciousness stems from the workings of the brain. Consciousness-explainers are currently going to all sorts of lengths to weave a viable theory — studying the development of neurons, tracing the precise pathways and stages of visual processing, drawing inspiration from artificial intelligence research, and, in the case of Roger Penrose and his followers, proposing that quantum effects inside the microtubules of cells will somehow do the trick. How long this tilting at windmills will go on before the necessary basic paradigm shift renders it all unnecessary is anyone's guess. But old habits die hard. And, meanwhile, the present crop of brain researchers continue to be encouraged in their ultimately futile quest by the numerous successes they are achieving along the way in understanding the true workings of the brain.

Viewed superficially, the explaining of consciousness as a derivative of the physical workings of the brain has a ring of plausibility about it. After all, the history of science is replete with examples of large conceptual gaps being bridged by new developments and sudden flashes of insight. Life and nonlife, for instance, once considered fundamentally irreconcilable, were eventually seen to have a common basis thanks to the advent of molecular biology. In physics, magnetism and electricity were unified by Maxwell's field equations; mass and energy, and space and time, were linked through Einstein's monumental work. But the divide between neural events and consciousness, brain and mind, is of a different order entirely. As Konrad Lorenz described in *Behind the Mirror*:

The “hiatus” between soul and body . . . is indeed unbridgeable. . . . I do not believe that this is a limitation imposed just by the present state of our knowledge, or that even a

utopian advance of this knowledge would bring us closer to a solution. . . . It is not a matter of a horizontal split between subjective experience and physiological events, nor a matter of dividing the higher from the lower, the more complex from the more elementary, but a kind of vertical dividing line through our whole nature.

There is an interesting parallel — and it may be more than a parallel — between the attempts of neurologists to explain how consciousness is produced by the brain and the efforts of cosmologists to show how the material universe was created or why it should even exist at all. At first sight, these programs seem poles apart. But in both cases, there is a persistent failure on the part of the investigators to recognize one simple truth beyond the complexity and ingenuity of their theories. And this simple truth is that what they are trying to do is not just difficult but fundamentally, categorically impossible. Even if physicists eventually discover their Holy Grail — the long sought after Theory of Everything — it will not be possible to deduce from this why there should be an actual, material universe instead of the potential, abstract universe described by mathematical equations. Why should there be actuality instead of mere potentiality? Why should the equations have come to life? Why should there be both a script and a play? There is no way — and there never will be a way — to breathe fire into the formalism, to understand the existence of reality from theory alone. And, in exactly the same way, it will never be possible, even in principle, to explain why physical activity in a brain — however intricate, however well-integrated — should give rise to the subjective experience of consciousness. If, in the next ten thousand years, we discover how the brain is organized and functions on every level from the individual cell to the entire central nervous system, we shall not be a scintilla closer to comprehending why a person should feel and be aware and experience a whole fantastic inner world instead of being just a complex, unconscious automaton. To try to explain consciousness in terms of the mechanisms of thought, the activities of neurons, is to miss the whole point about consciousness. As Milan Kundera wrote in his novel *Immortality*: “I think, therefore I am, is the statement of an intellectual who underrates toothaches.”

For the past several hundred years, Western humanity has embraced the view that to be real is to be material. Matter’s what matters. And mind? Never mind. Science has upheld this position for so long now that it has become an axiom of our culture. We take it as given that matter exists “out there” whether or not there is a mind present to experience it. And we take it as given that the cosmos has always had an objective aspect and that only later, as conditions allowed, did the raw, nonconscious building blocks of the universe come together in such a way as to allow the emergence of subjective experience. This makes it easy and natural for us to believe that if only data is handled by a system (like a brain) in a sufficiently and suitably complex way, consciousness will arise, like steam over a hot stew. So deeply embedded is this notion in our collective psyche that to challenge it may seem outrageous, contemptuous, and just plain wrong. Yet the moment we stand back, shake off our conditioning, and look at the issue anew, we can begin to appreciate that the scientific tenet that matter — the entire objective world — is primary is an arbitrary and totally unsubstantiated claim. There is no *prima facie* reason at all to go along with the assertion that mind is an emergent property of matter — that, at some point, mind came into being when matter, in the form of brains, acquired some critical level of complexity. On the contrary, it is the material world which is very evidently

conditional, for it is just one among many objects of our experience, and an object, moreover, that is not strictly given but known only through interpretation.

In time, no doubt, we shall come to understand the brain very well in computational or mechanistic terms. And there is no compelling reason to suppose that we shouldn't eventually be able to duplicate or even exceed all of its capabilities using artificial neural networks. But we shall never, in a billion years, be able to explain how the brain gives rise to consciousness. Because consciousness is not a product of the brain, nor did it come about at some point during the development of life. The time is ripe for us to reexamine the metaphysical foundations of our worldview.

Out of the heart of quantum mechanics, that most basic branch of science, has come the realization that consciousness can never be divorced from matter, that every aspect of the universe — and indeed the universe as a whole — has both an objective and a subjective nature. “Things” have no reality independent of their location in experience; they require the intimate involvement of mind to be given substance. And so, quantum physics insists, consciousness has to be seen in a radically new light, not as some quirky, local by-product of matter but as the very groundswell of creation. Only our stubborn, out-moded attachment to Newtonian reductionism and Cartesian dualism — an attachment that, not surprisingly, remains strongest among many scientists, despite recent developments — is blocking the acceptance of this fundamental truth.

Consciousness is not new, isolated, and relatively unimportant; it is ubiquitous and essential. It is a permanent, inherent property of the universe, a fact that becomes most immediately obvious to us when we escape temporarily from our normal, egocentric state of mind during mystical or transcendental interludes. At such times, “we” vanish altogether and in our place is simply consciousness. As soon as the analytical activity of the brain is suppressed or circumvented, pure consciousness — the background consciousness of the universe — floods in. The barrier is removed, the partition between subject and object dissolved. And of all the occasions when this happens none is more profound or revealing than at the point of death when, with the brain almost totally disabled, a condition of the most indescribably profound and expansive awareness takes hold.

Without the brain, it is true, there cannot be selves. And our preoccupation with the self is perhaps the main reason for our longstanding confusion. In the West, we have tended to equate having thoughts and memories and, above all, selves, with being conscious. But this is a serious mistake. As long as the self is in residence we can never truly be conscious, for while “we” exist we are trapped in a kind of fantasy — Einstein’s “optical delusion” — in which memories and conditioning cause us to put a private and false interpretation on the world. Only when thought and self come to an end, when symbolizing, analyzing, boundary-defining, and ego-building cease, can genuine, unfettered consciousness begin.

It is one of our greatest misconceptions to suppose that somehow the brain produces consciousness by integrating all of the perceptions and information that come in from the

outside world. But the world is already integrated. It is already as perfect, whole, and well conceived, throughout all of space and time, as it will ever be. What the brain really does is to sample extremely narrow aspects of reality through the senses and then subject these to further drastic and highly selective reinterpretation.

To grasp the truth about the universe we need to adopt a new, broader perspective. We have to see that reality is an unbroken unity, and that within this unity are aspects of the whole that think of themselves as being separate. Despite how it may seem, there is no paradox or inconsistency here: the development of living organisms has necessarily involved the development of selves — the feeling (albeit, in most cases, only at a very primitive level) of being those organisms. And all of this has taken place within the undivided totality of what is real. It seems unusual and puzzling. But nothing is contradictory in the “feeling of being apart” existing within an overall system that actually has no parts. This, at it happens, is the situation in which we find ourselves.

Human beings have reached what may well be a pivotal stage in their evolution. They have been created by the universe, in the universe, as an integral part of the universe. They have passed through a difficult period when their strong day-to-day experience of selfhood and their cultural conditioning have made them feel detached from the reality in which they are permanently embedded. And now they are beginning to see beyond the self again to the truth of their condition. They are beginning, on a planet-wide, intercultural scale, to appreciate that, as Freud put it:

Our present I-feeling is . . . only a shrunken residue of a much more inclusive — indeed, all-embracing — feeling which corresponded to a more intimate bond between the I and the world about it.

We are coming back, experientially, into the universe again — slowly, nonuniformly, slightly uncomprehendingly, and, in some cases, begrudgingly. The signs of emergence of a new, as-yet-uncertain cosmic perspective are evident in a number of seemingly diverse areas: in the esoteric philosophy of quantum physics, in the study of NDEs and other altered and transcendent conscious states, in the work of poets like Whitman and Eliot, in the ecology movement, in various aspects of youth culture and counterculture, and in the growing appreciation of the timeless truths of the world’s major religions.

It is likely to be a testing time for us, not least because we are beginning to discover that the universe is entirely natural. The only reality that exists, it is becoming clear, is right in front of us; nothing is hidden, nothing is beyond our ken. As Ralph Waldo Emerson wrote: “Other world! There is no other world! Here or nowhere is the whole fact.”

Perhaps it is one of the definitive signs of a sentient species reaching maturity when it finally manages to let go of the security blanket of the supernatural. This we are gradually starting to do. We have peered inside ourselves, into the depths of the human brain, in search of a soul and have found . . . nothing. We don’t have souls. There is no deeper, further fact to being a person than being a thinking brain — a small, temporary whirlpool of memories and thoughts in the larger river of life. And science and religion, despite

superficial appearances, actually agree on this point: science quite clearly, but religion, too, quietly and insistently. No major religion, from Christianity to Buddhism, professes in its core a belief in the existence of personal souls. On the contrary, the aim of all sincere religion is, and always has been, to go beyond the self and its putative spiritual counterpart — both of which are seen as illusory — to the boundless consciousness of reality. The core message of the world's great religio-philosophical systems, Eastern and Western, is to forget about yourself, lose yourself, and so, in the process, make contact with the much more important truth of the timeless awareness of the universe.

If this sounds more than a little mystical and starry-eyed, then I make no apologies. The universe is one and to see it is as such is the goal of mysticism, as well as of science. And our eyes are indeed starry, being composed of atoms whose nuclei were manufactured inside the intensely hot cores of giant stars that exploded in the remote past. Waxing lyrical about our relationship with the cosmos is entirely appropriate at a time when science, religion, and mysticism are finally converging on a unified worldview, by contrast with which our old anthropocentric perspectives are going to seem extraordinarily parochial. We are nothing less than the universe in dialogue with itself and our words do sometimes need to rise above the prosaic, the practical, and the scientifically correct to catch a hint of the drama of our situation. This is why music and poetry so often touch us more deeply than the anodyne pronouncements of reductionist science, why so often we choose to rely upon intuition and unspoken feelings above intellect. We know inside what the truth is, without being told. Even a hardened pragmatist like J. B. S. Haldane felt moved to write that

If death will probably be the end of me as a finite individual mind, that does not mean that it will be the end of me altogether. It seems to me immensely unlikely that mind is a mere by-product of matter. . . .

But as regards my own very finite and imperfect mind, I can see, by studying the effects on it of drugs, alcohol, disease, and so on, that its limitations are largely at least due to my body.

Without that body it may perish altogether, but it seems to me quite as probable that it will lose its limitations and be merged into an infinite mind or something analogous to a mind which I have reason to suspect probably exists behind nature. How this might be accomplished I have no idea.

But I notice that when I think logically and scientifically or act morally my thoughts and actions become those of any intelligent or moral being in the same position; in fact, I am already identifying my mind with an absolute or unconditioned mind.

Only in so far as I do this can I see any probability of my survival, and the more I do so the less I am interested in my private affairs and the less desire do I feel for personal immortality. The belief in my own eternity seems to me indeed a piece of unwarranted self-glorification, and the desire for it gives concession to selfishness.

In so far as I set my heart on things that will not perish with me, I automatically remove the sting from my death.

It may seem as if I have reached two very different and incompatible conclusions in this book. Earlier, I reasoned that after death the feeling of being a self continues. I argued that this can be thought of as a form of reincarnation: the death of one brain followed by the birth of another being functionally and experientially equivalent to a person in life forgetting who they are and subsequently remembering they are someone else. How can this conclusion be squared with the idea that at death we effectively rejoin the unbroken sea of consciousness that lies outside us? Surely, when we die, there can be only one outcome.

But, in fact, there is no incompatibility. We simply need to appreciate that we are dealing with two complementary aspects of the universe. And I use the word “complementary” here advisedly to highlight a comparison with the wave-particle complementarity of modern physics and the subject-object complementarity of Eastern philosophies. The cosmos exists en bloc and yet within it individual selves have evolved. The one does not preclude the other; in fact, the two appear to be in some kind of extraordinary, intimate symbiosis, the significance of which will doubtless become clearer as our species further matures.

New selves emerge as new brains emerge, because what a brain does is to act as a funnel, a filter, a limiter of consciousness, and therefore a shaper of self — a separator of subject and object. The brain effectively pinches off a little bubble of introverted awareness and stores and manipulates information relevant exclusively to the survival needs of the individual so created. Using its archived memories, the brain builds and subtends the myth of personality and self, its onboard programming working ceaselessly to substantiate and immortalize this phantasmic inner being. And such a fine job does it do that the projected self not only feels itself to be tangible, but it fails to appreciate, or even suspect, that it is never the same from one moment to the next.

Selves come and go, as brains come and go. And at the subjective, human level what this amounts to is a continuous state of “being you.” “You” don’t have to worry about dying, because the moment you stop being associated with a particular brain and a particular narrative, the feeling of being you reemerges in a new guise. It has happened before and it will happen again. And it is not a case of you becoming someone else in the traditional sense of transmigrating souls. We have to see that “being you” is just a general phenomenon. There is no actual, objective link that determines who you will become. You will not become anyone. There is just a continuously experienced condition of you-ness.

Through such ongoing reincarnation — if we choose to use this term — the human race evolves, the efforts and achievements of individuals being stored both extrasomatically and in the living memories of others so that in every life we each contribute, to a greater or lesser extent, to humanity’s overall progress. Viewed in this way, it is true that we appear to be far from masters of our situation. Our brains are in thrall to the automatically

encoded programs in our genes, and “we” are shaped not by our own efforts but by the influence of our brains and our environments. It is a sobering realization that, in an important sense, we don’t really own or exert will over our bodies and minds: we are simply part of an endlessly unfolding process. It is sobering, and yet it is also strangely exhilarating and liberating to think that there is more to us than brief, solitary lives. Each of us, in the broader scheme of nature, is the latest representative of a lineage of individuals that stretches back to the dawn of mankind and before, and will continue, indefinitely, into the future. Moreover, if we can embrace a still wider panorama, we can begin to see that the differences between us are so slight and the similarities so great that all of us alive today are really just minor variations on the same person. The fragmentation or plurality of consciousness is only an appearance, like the hundreds of little pictures that a multifaceted crystal reflects without multiplying the object in reality. The physicist Erwin Schrödinger understood this well when he wrote:

Thus you can throw yourself flat on the ground, stretched out upon Mother Earth with the certain conviction that you are one with her and she with you. You are as firmly established, as invulnerable as she — and more so. As surely as she will engulf you tomorrow, so surely she will bring you forth, just as every day she engulfs you a thousand times over.

We have a future, then, beyond death, as new individuals — as participants in “I-mode” continuity, or what amounts to secular reincarnation. However, standing behind this is the unfragmented consciousness of the universe. And, in some ways, this is the ideal and only genuine state in which to exist. It is that to which we ultimately aspire — the timeless, all-knowing condition in which subject and object, life and death, you and I, God and man, are one.

In his novel *Childhood’s End*, Arthur C. Clarke referred enigmatically to the “overmind” — a higher entity with which, he speculated, the individual minds of many advanced species, at some crucial, metamorphic point in their development, begin spontaneously to merge. And it is at least interesting to speculate that, in this particular instance, fact may be on an intercept course with fiction.

Death of the self is seen as the gateway to what Buddhism calls nirvana and Christianity refers to as heaven. Buddhism urges us to escape the Wheel of Life, the cycle of death and rebirth, by achieving enlightenment through meditation — by becoming a new Buddha. Zen goes a step further and tells us, effectively, not to even bother trying to escape; we should simply stop thinking about it, because there has never been a time when we haven’t been free. In Christianity, the same message is couched in different terms. All we need do, it says, is become like little children (whose selves are not yet well defined) in order to enter God’s kingdom.

Every deep moral and religious system around the world has intuitively grasped this truth — that we must endeavor to transcend the self. Death of the self, either through the physical death of the brain or the bypassing of its analytical mode during life, breaks down the psychological walls that contain us, leaving us free to meld again with the whole unbroken field of consciousness.

We may not think we want this to happen. The idea of being, at one moment, a small speck of humanity in the vastness of space and, at the next, becoming one with the universe may seem terrifying. But this is only because we are compelled to try to understand everything from our limited personal perspective. The plain fact is we are already one with the universe; we have never really been apart from it. And only the presence of the self prevents us from seeing this. Through techniques such as Zen, which bring a temporary halt to thought, we can directly experience the consciousness of the cosmos — have a taste, as it were, of death during life. Or a transcendent awareness may, for one reason or another, simply happen. Or, without having any dramatic experiences, we may simply, through quiet contemplation, become accustomed to the idea of who we really are. As Bertrand Russell wrote:

The best way to overcome [the fear of death] — so it seems to me — is to make your interests gradually wider and more impersonal, until bit by bit the walls of the ego recede, and your life becomes increasingly merged in the universal life. An individual human existence should be like a river — small at first, narrowly contained within its banks, and rushing passionately past boulders and over waterfalls. Gradually the river grows wider, the banks recede, the water flows more quietly, and in the end, without any visible break, they become merged in the sea, and painlessly lose their individual being. The man who, in old age, can see his life in this way, will not suffer from the fear of death, since the things he cares for will continue. And if, with the decay of vitality, weariness increases, the thought of rest will not be unwelcome.

Death is not the end. In the truest sense, it is the essential prelude to change and new life. Death is the point where the individual and the cosmos meet, where differences are reconciled, and where physics and Zen, so long held apart in uneasy tension, merge effortlessly in a realm beyond words and thought.

Our revels are now ended. These our actors,
As I foretold you, were all spirits and
Are melted into air . . .
. . . We are such stuff
As dreams are made on, and our little life
I rounded with a sleep.

—Shakespeare, *The Tempest*

To die will be an awfully big adventure.

—James Barrie, *Peter Pan*