

# MIND OVER MATTER

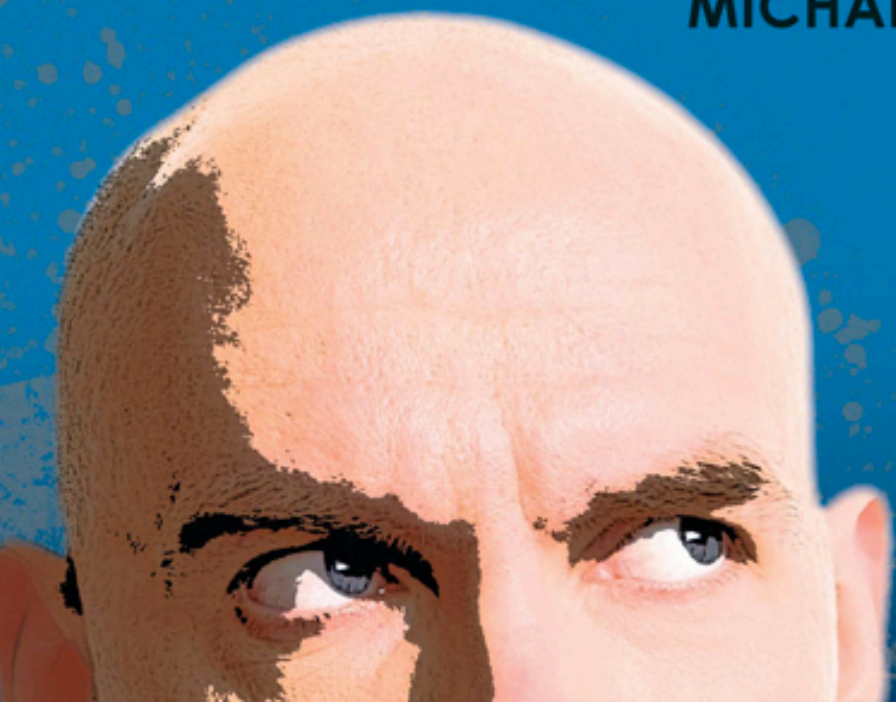
NOETIC SCIENCE & THE  
QUESTION OF CONSCIOUSNESS

MICHAEL KERRIGAN

*Can I move an  
object with my mind?*

*What is a collective  
consciousness?*

*Why does a placebo  
work like a drug?*



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# INTRODUCTION

CAN WE KNOW SOMETHING WE CAN'T DIRECTLY PERCEIVE? CAN WE COMMUNICATE THAT KNOWLEDGE TO OTHER PEOPLE WITHOUT WORDS OR GESTURES, BY A SHEER EFFORT OF THE WILL? ARE THERE THINGS WE DON'T EVEN NEED TO COMMUNICATE BECAUSE, IN SOME MYSTERIOUS WAY, WE ALL JUST KNOW? AND WHAT OF THE PHYSICAL WORLD AROUND US: CAN WE ACT UPON THAT BY THE POWER OF THE MIND ALONE? COULD A COLLECTIVE CONSCIOUSNESS BE HARNESSSED TO TRANSFORM THE WORLD?

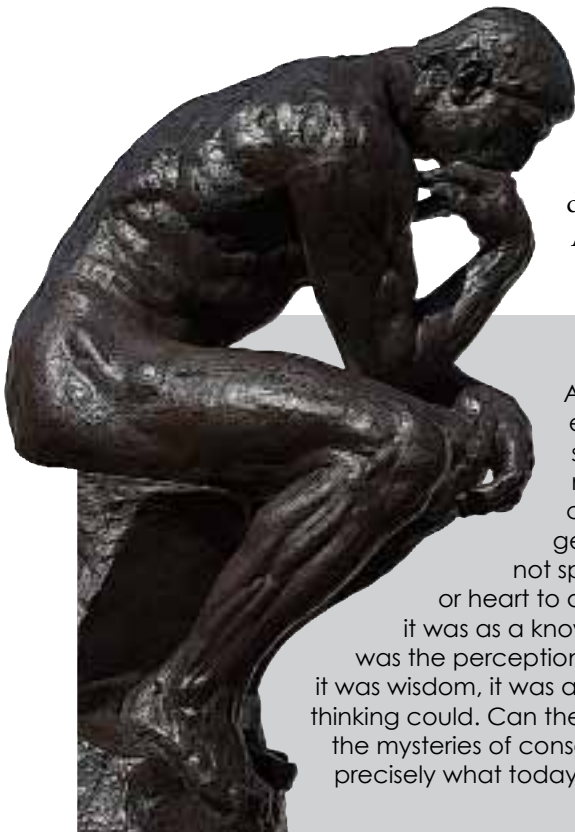
*Below: The Thinker, as imagined by Auguste Rodin—but is he thinking deeply enough? Might we all be capable of thinking our way to other dimensions, as yet unperceived, or even unimagined?*

One thing that's impinged upon all our consciousnesses in the last couple of years has been noetic science, through Dan Brown's *The Lost Symbol*, if we hadn't heard of it before. A new attempt to answer questions that in one form or another have been asked just about as long as humanity has existed, noetic science sets out to subject what are often seen as fanciful notions to rigorous examination.

Is it true? It certainly is in the sense that it's a genuinely existing (and fast-expanding) field of study. It's also an increasingly disciplined discipline. At the Institute of Noetic Sciences (IONS) in Petaluma, California, researchers work hard to maintain the sort of scientific standards that would be observed in any university faculty or research unit. But that doesn't make it all true, of course. Does noetic science deal in real phenomena? Does the emperor have any clothes? Are these "scientists" exploring something that isn't there?

## NOUS AND NOETICS

Ancient Greek in origin, the word *nous* endures in everyday English in the sense of a sort of common-sense shrewdness. Early thinkers used it very differently, not just from us but from one another: the story of its changing nuances would make a volume in itself. In general, though, it's fair to say that the *nous*, though not specifically spiritual itself, was the capacity of the mind or heart to appreciate what was. If it was viewed as knowledge, it was as a knowledge of "higher things"; if seen as perception, it was the perception of things that lay concealed from the senses; where it was wisdom, it was a wisdom that saw more deeply than conventional thinking could. Can the ancient and modern uses be brought together? Can the mysteries of consciousness be reconciled with common sense? That's precisely what today's noetic science seeks to do.





### Rainbows and Reason

Mainstream Western thought in modern times has taken pride in privileging the idea of the rational over that of the intuitive. Science and logic trump the instinct, we've been told, as they do the hunch, the premonition, or any feeling that there might be more to our world than what our senses apprehend. Have we lost something by this sort of thinking? Undoubtedly. As the English Romantic poet John Keats observed:

*There was an awful rainbow once in heaven:  
We know her woof, her texture, she is given  
In the dull catalogue of common things.  
Philosophy will clip an angel's wings,  
Conquer all mysteries by rule and line,  
Empty the haunted air, the gnomèd mine –  
Unpick a rainbow...*

And yet you might well ask whether we want our air to be haunted, our mines populated by gnomes; aren't unpicked rainbows a fair exchange for trolls and devils? When Keats asks (he seems to think rhetorically) "Do not all charms fly / At the mere touch of cold philosophy?", we might be tempted to retort: "Quite honestly, no, they don't!"

### A Middle Way?

Rainbows, it might be said, are no less awe-inspiring for the knowledge that they're produced by an interplay of light and moisture; gnomes have their place in fairy stories, angels in scripture (which plenty of people nowadays suspect are the same thing). For most of us, there's a certain amount of middle ground: we're intrigued (and awed) by the beauty of the rainbow; we wouldn't

*Above: The rainbow arches gracefully over the supposed gulf between aesthetic appreciation and scientific understanding.*

*Below: Goblins and fairies have traditionally populated the mysterious recesses of the human mind. Might there be more to the imagination than a reductive rationalism on the one hand or fairytale fantasy on the other?*





*Above: Can science claim to explain all the mysteries of the world?*

*Below: The Institute of Noetic Sciences is exploring alternative ways to health and healing.*

want to live without myths or art or other works of the human imagination; even if we're not religious as such, we feel we have a spiritual side. And even if it's not a spiritual side as such, at least a certain restless desire to engage with what we sense has been beyond our understanding. The urge to look more deeply into things has always made its presence felt, not least because logic and science have left so much unexplained.

That's in the very nature of science, though: the Latin word *scientia* means "knowledge," yet as it's developed since ancient times, true science has been about what we haven't known. It's actually dealt in doubts, not certainties, constantly questioning its conclusions, then casting doubt on them all over again as it tests, retests and re-retests them. So if science seeks to dispel doubt, it doesn't attempt to do away with it. There is no blinder faith than that in the sort of all-conquering, ever-progressing scientific comprehension that sweeps away all mystery, resolves all unknowns. As the recently beatified Catholic thinker John Henry Newman noted: "Rationalism is a sure abuse of reason."

### **Open to Question, Open to Science**

This is not to suggest that it's in any way reasonable to trade our scientific skepticism for a wide-eyed credulity that is open to whatever meretricious fad may come our way. The answer is not to cast the principles of scientific investigation aside, but honestly to acknowledge their limitations, to recognize that what we so far think we know cannot account completely for what "is." And then, to continue our investigations, taking the techniques and processes of scientific enquiry, rigorously observed, into areas so far neglected by science itself. If that means exercising the imagination, then so be it. The great scientists have been as extravagantly imaginative as any poet.





Or, for that matter, any novelist. Dan Brown's boost has certainly helped put the Institute of Noetic Sciences on everybody's mental map. That IONS owes so much of its current fame to a work of fiction is an irony its many critics will have enjoyed. Yet it's one that the Institute's researchers will have appreciated too. Precisely because they are scientists and know how many sure-fire "facts" have been swept away through centuries of scientific progress, and how fanciful so many scientific theories have seemed until they turned out to be true.

A great many didn't, of course: there's never been any shortage of absurdity abroad in the world of "science," ever since Aristotle argued that shellfish were brought into being by the interaction of moisture, mud and "vital warmth." But if great thinkers have bought into such theories, that's no reason for us to add to the sum of nonsense—and certainly not in the name of science. So this book attempts not only to survey the sort of areas in which researchers are currently at work and into which it might want to extend its investigations, but to consider the kind of challenges a credible noetic science might face as time goes on. It very definitely doesn't attempt to offer a detailed account of specific findings for, if many of the questions concerned have been of interest for many centuries, such a carefully conceived and rigorously structured way of investigation is very new.

More than anything else, this book sets out to show how central the ideas noetic scientists are engaging with are to every aspect of who we are and what we do, in our individual selves and as a species; in our physical environment and in our world. It's not all spoon bending or shamanic healing, though these may have their place. These are vital questions, however skeptical we may be.

*Above: Aristotle described theories of marine creatures that now seem nonsensical, but he also made claims that were ridiculed for two thousand years or more before gaining scientific credibility. One such example is the presence of a hectocotyl "arm" in the males of certain species, including this cephalopod, that breaks off to fertilize the female. So what's next in terms of scientific surprises?*



WHO AM I? DO I HAVE A SOUL?

AM I MORE THAN SIMPLY A BODY AND BRAIN?

ARE WE INDIVIDUAL PARTS OF ONE "SUPERORGANISM"?

## MIND AND BODY

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The history of human consciousness, as viewed in the modern Western tradition, has privileged the rational (science and logic) over the intuitive. Yet the desire to look more deeply into things has always made its presence felt. Two millennia ago, philosophers wrestled with problems that we still debate today. When natural science and, much later, psychology and artificial intelligence emerged, we had new frames of reference for these questions, and a new set of questions altogether.

Some of the enigmas explored by history's greatest philosophers and theologians are now being revisited by scientists. What is consciousness? How do we learn? Can our minds control not only our bodies, but objects or consciousnesses beyond the self?

Whether or not we believe in a higher power, we want to reassure ourselves that we control our own behavior and can take responsibility for our actions. But is "society"—or some other kind of collective entity—just as responsible for the people we have become?



## A SHORT HISTORY OF ME

**N**O SUBJECT COMES CLOSER TO HOME FOR ANY OF US THAN THAT OF OUR OWN SUBJECTIVITY: JUST WHAT IT IS THAT MAKES US WHO WE ARE. SURPRISINGLY, PERHAPS, GIVEN THAT THIS IS SOMETHING EVERY HUMAN BEING IN HISTORY HAS “KNOWN” FIRSTHAND, IT IS SOMETHING WE’RE STILL STRUGGLING TO UNDERSTAND. AND WHILE IT FEELS AS THOUGH IT SHOULD BE ONE OF THE GREAT UNIVERSALS OF OUR EXISTENCE, IT’S BEEN REGARDED—AND MAYBE EXPERIENCED—DIFFERENTLY IN EVERY AGE. THE ONE GREAT CONSTANT DOWN THE CENTURIES HAS BEEN THAT OF DISAGREEMENT: WE’VE NEVER FOUND CONSENSUS ON WHAT IT WAS TO BE OURSELVES.

*Page 10: Euclid (or, some say, Archimedes) explains the geometric workings of the world to later scientists in a scene from Raphael’s The School of Athens (c. 1510).*

*Below: Wisdom from the innards of the earth, the Delphic Oracle was notoriously cryptic. To know anything, it said, it was first necessary to know yourself.*



### Self-Knowledge

The inscription on the wall of Apollo’s Temple at Delphi, in ancient Greece, threw out a famous challenge: “Know Thyself!” That can be hard enough, even if it’s just a matter of being aware of your limitations and your prejudices, but what if “Know Thyself” means something more?

Who am I? Think about it for a moment and it becomes clear that, while this may appear to be the most absurdly obvious of questions, at the same time it is one of the most puzzling. The body I stand here in is strikingly and solidly me; I can see and feel its physicality. Yet the very statement “I see and feel it” draws a distinction between the “I” who sees and feels and the “me”—the object that is seen and felt.

The more deeply we ponder it, the less likely it seems that “I” can really just mean the physical mass of me (am I the more “me” when I have put on weight?) So it seems that, along with my body, I have another, immaterial, sort of selfhood: call it “mind,” “soul,” “spirit,” or what you will. Is this intangible essence the real me?

### Body and Soul

Many thinkers have taken the view that the body is no more than a vehicle in which the mind or “spirit” (some untouchable essence) is ferried around. For Plato, writing in the Athens of the third century BC, the soul inhabited the living body but existed independently. Aristotle disagreed: for him the soul was not a phantom self inside us but the animating energy that gave the body life and made us do the things we did. An empiricist, he believed that we could only know what we perceived through our senses, and his thinking on the self was of a piece with this. As far as Aristotle was concerned, consciousness was the running sum of our interactions with our world. There was no inner “us” existing separately.



## AVICENNA AFLOAT

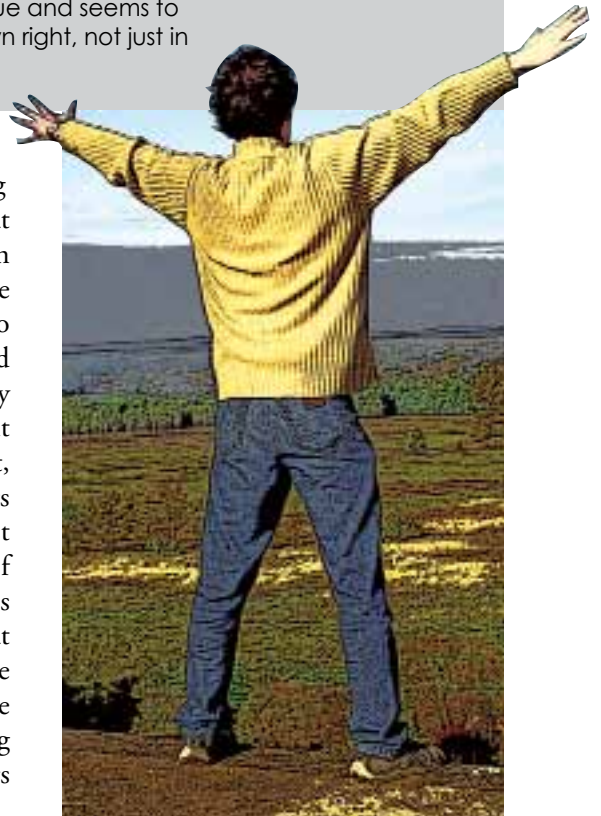
Born in Bukhara, in what is now Uzbekistan, in around AD 980, Ibn Sina was one of the most important thinkers of his day. Medieval Europe knew him as Avicenna: they valued him not only for his own ideas but for the ancient philosophy and science he channeled in his work. In the violence and anarchy of the Dark Ages, which had followed the fall of Rome in the fifth century, the rich learning and literature of classical Greece had substantially been lost. But it lived on in the Islamic world: the Arab conquerors of Egypt, Byzantium and the Middle East had been scrupulous in preserving the heritage they encountered, including the philosophy, science and medicine of ancient Greece.

Ibn Sina is most famous for his work in rehabilitating the forgotten philosophy of Aristotle: it was through his books that Aristotelean teaching reached the western world. But his thinking on the self rejects Aristotle's empiricist view. It owes more to the Platonic position that the living, physical being has a soul existing independently inside it.

Toward 1020, Ibn Sina had based himself at Hamadan, in western Iran, when he fell foul of the local ruler and was imprisoned. It may have been his own removal from the world that inspired the famous "thought experiment" in which he tried to imagine an individual consciousness held in isolation from all external stimuli of any sort. Imagine floating in the air, removed from all sensory messages; even from those originating in your own body. There would be nothing whatsoever to tell you that you existed—yet you'd know, said Ibn Sina; your innermost consciousness would always be aware.

Modern philosophers have objected that the Floating Man is no more than an analogy, but there's no doubt that it's a most persuasive one. It rings true and seems to confirm the view that our self-consciousness exists in its own right, not just in relation to our experiences and perceptions in the world.

Religious writers have often gone further, regarding the physical being as no more than a prison for a soul that by rights belongs in some other, more spiritual dimension beyond our own. The body was a spiritual "house," wrote the sixteenth-century Spanish mystic, St. John of the Cross: to achieve the blissful union with God it sought, the soul had to leave this dwelling—freeing itself completely from earthly thoughts and appetites. (A succession of theologians went further: they didn't just think the body was unimportant, but saw it as a burden, its hungers humiliating the spirit, its desires dragging us down into sin. They inveighed against "the world, the flesh and the devil" as a sort of trinity of damning forces.) Hasidic Jewish mystics hoped to suppress the body and its wants to the point of nullification so that their true selves—their spirits—might be swept up into the divine light of God. To this day, Buddhist believers see the body (and the physical dimension it inhabits) as something the purer soul should strive to escape, and which, with years of good living and meditation, it may eventually transcend.



### THE REED—AND THE REALITY

"Man is but a reed, the most feeble thing in nature," wrote the French mathematician and philosopher Blaise Pascal (1623–62); "but," he continued, "he is a thinking reed. The entire universe need not arm itself to crush him. A vapor, a drop of water suffices to kill him. But, if the universe were to crush him, man would still be more noble than that which killed him, because he knows that he dies and the advantage that the universe has over him; the universe knows nothing of this."

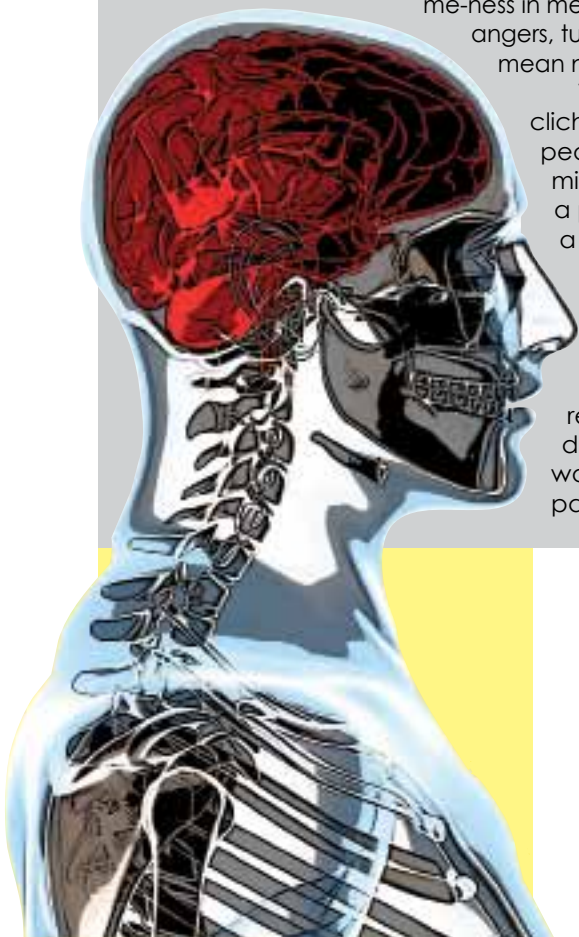
It's an inspiring, in many ways emboldening thought, intriguing in its insistence that knowledge truly is power, even when it's a knowledge of our limitations, our mortality.

As an eminent historian, New York University's Tony Judt (1948–2010) had long been aware of Pascal's thought. Then, abruptly, it became his reality. In the fall of 2008, this fit, active man was stopped in his tracks by the onset of motor neurone disease. In the space of six months, he lost virtually all control of his physical functioning. All of a sudden, he was a latter-day "floating man," a brain marooned in a body. "Pascal's 'thinking reed' really does capture it," he told an interviewer in 2009, speaking through a special microphone, "because I'm just a bunch of dead muscles thinking."

Judt had no choice but to muse on the philosophy of selfhood and on the significance of what had happened to him, body and mind. "I find myself thinking about what is the core me-ness in me. What's the core places, influences, events, pleasures or angers, turning points and so on. I'm trying to work out what it must mean now to be reduced to an essence of who I am."

That said, he firmly refused to be philosophical in the clichéd sense and was withering when well-meaning people assured him that his illness had somehow set his mind at liberty. On the contrary, he said, "It is like being in a prison that is shrinking by six inches each day." Even for a confirmed career intellectual, it seems, the freedom to roam in thought simply cannot be enough. Like it or not, we are ourselves in both mind and body.

One of the most exciting aspects of noetic science and neuroscience is the work scientists are doing on technological developments that may help rebuild the bridge between the mental and physical dimensions for thousands of quadriplegics around the world. Important advances are already being made (see page 154).



#### The Dualist: Descartes

It is no surprise, perhaps, that religious teachers should want us to think in terms of a body and a soul. The idea of transcendence is, after all, their stock in trade. But what of science and philosophy? Not until the seventeenth century, with the dawning of the Enlightenment, did it even occur to anyone that the religious and the secular might be separated. Once the idea had caught on, though, it became a cornerstone of modern thinking. It has remained an unshakeable principle of scientific and philosophical enquiry to this day.

No one did more to shape the attitudes of the Enlightenment than the French philosopher René Descartes (1596–1650). A brilliant mathematician, he it was who drew up the rigorous rules that have governed scientific thinking ever since. The “methodic doubt” he recommended amounts to a sort of systematic skepticism on the investigator’s part: we should doubt everything until we’ve proven that it’s true. And not just that, but we should break down every investigation as far as we can. That way, every problem becomes a series of subproblems, and we proceed in baby steps, testing each and every proposition as we go. Only if we subject the results of our researches to such slow and painstaking analysis, Descartes argues, can we feel confident that what we find is true.

Descartes’ insistent skepticism brought him into conflict with a Catholic Church that still hoped to roll back the Reformation and reinstate the medieval Age of Faith. He had received a Jesuit education, but his intellectual explorations took him far beyond the limits of the Catholic orthodoxy of the time. Eventually, in 1663, just over a decade after his death, his works were to be placed on the Vatican’s *Index Librorum Prohibitorum* (Index of Prohibited Books). Perhaps surprisingly, though, when it came to the philosophy of consciousness, Descartes took the view held by the religious writers, that the individual comprised both body and separately existing soul.

Looking not to Aristotle’s empiricism but to Plato’s more mystical thought, Descartes articulated this position more elegantly and persuasively than anyone before. The mind was distinct from the brain, he asserted; an aspect of the soul, an immaterial essence that existed independently of the body. So convincing was Descartes that this whole idea of the mind/body dichotomy has been known as Cartesian dualism ever since.



*Above: French philosopher René Descartes summed up the way most of us see the question of our existence even now: If we think we exist, there must be an “us” to think that way.*

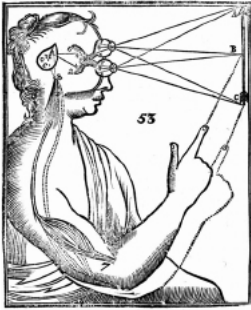
### I THINK, THEREFORE I AM. BUT WHO AM I?

It was Descartes who, in his *Principles of Philosophy* (1644), came up with the famous formulation *Cogito, ergo sum*: “I think, therefore I am.” The very fact that I am pondering the question of my existence, Descartes suggests, implies the existence of an individual consciousness — an “I”—to do the thinking.

The argument carries conviction, there’s no doubt. It’s hardly surprising that it should have provided the basis for theories of ontology (the philosophy of the nature of being or existence) ever since.

At the same time, it has its limitations, modern philosophers have warned: while it may prove the existence of an individual subject, it brings us no closer to a comprehension of what that subject is. If I think, then I must exist, for sure: but what exactly do “I” consist in? Descartes’ neat formula doesn’t actually leave us any better off...





*Above: Descartes' illustration of dualism shows signals being passed from the sensory organs to the epiphysis of the brain. From there they went on to inform the immaterial spirit.*

### Meeting Point

The idea that body and mind are separate entities is all very well, Descartes appreciated, yet at the same time the two have to connect. Otherwise, how could we “will” a movement—take a step, bend down or raise a hand? In Descartes' view, the mind controls the body as we might drive a car.

The point of application—the point at which mind meets body and directs it—had to be the pineal gland, he reasoned. Though still in its infancy, the science of anatomy was advancing rapidly: researchers had begun the investigation of the human brain. The pineal gland lies between the brain's two hemispheres, at the very top of the spine. This, Descartes decided, must be the junction of soul and body. Through here the mind's directions pass, he thought, before being circulated through the body via the nervous system.

A plausible enough scenario on the face of it, except that it happens to be wrong. The scientific means simply weren't available in Descartes' day for any of this speculation to be tested. So it was really no more than an educated guess, and, consequently, no great surprise that it should have turned out to be completely false. Modern neurological science has found that the pineal gland controls the flow of melatonin, a chemical that helps order sleeping–waking patterns through the circling seasons. It may also provide support for the immune system. Important as these functions are, they could hardly be said to give the gland special status as the meeting point of the two selves, material and immaterial; we have no scientific reason to identify it as the seat of the soul.

### The Feeling Body

Where exactly, then, can the self be said to reside? Without some animating spirit, we can see, the body is no “I” but merely an organic mass; yet the idea

that our bodies are no more than appendages does not ring true. Apart from the difficulty of defining what

a soul or spirit might be, there's the problem of the demarcation between mind and body. A shock

that “hits us in the solar plexus”; a loss that makes the “heart ache”; anxious anticipation

that causes “butterflies in the stomach”: these are figures of speech, meant metaphorically

rather than literally, but they are born out of physical fact. There is no doubt that “feel-

ings” of the mind make themselves felt in the physical body. From the giddiness

of new love to the lethargic slow-down that accompanies the slide into depression,

we see our material and immaterial selves acting in concert every day.



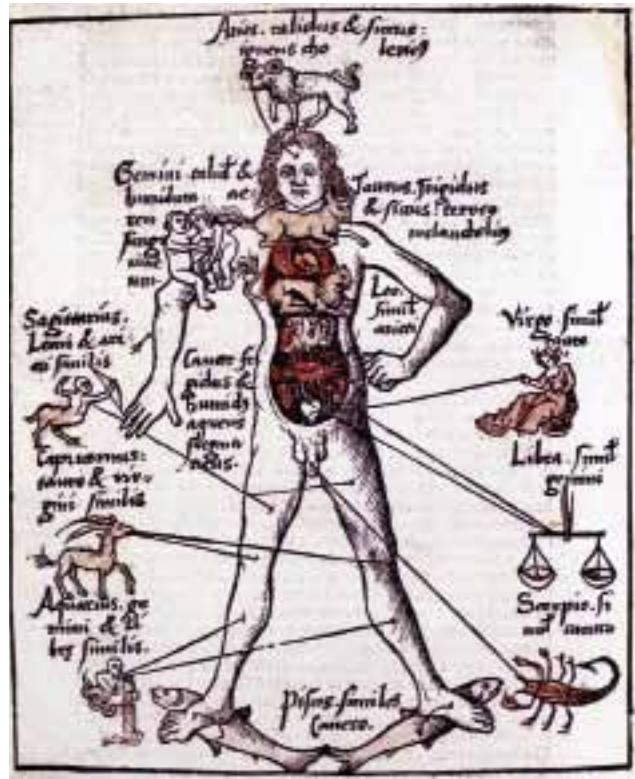
*Right: Descartes saw pain as a process. Here the warmth of the fire displaces the nearby skin. This tugged at a thread, which opened the ventricle of the heart a little. “Animal spirit” flowed from here down a hollow tube to inflate the leg muscle, which pulled the leg away.*

### Changing Selves

In the classic British TV sitcom, *Only Fools and Horses*, street-sweeper Trigger took great pride in the fact that he'd used the same broom for twenty years' work. A grateful city administration awarded him a medal to commemorate this feat. Only afterwards did Trigger let slip that, owing to "wear and tear" over the years, he had had to replace the haft fourteen times and the head no fewer than seventeen. In what sense, his friends and neighbors asked him, could this truly be described as the same broom? Americans have traditionally asked the same question with regard to a (mythic) "George Washington's Ax." Philosophers have been asking it for centuries.

The ancient Greeks posed the question in reference to the ship of the legendary hero Theseus. Its old planks, masts and ropes were all replaced as they wore out. Decades on, a dispute apparently arose as to whether this was really the same ship; others argued that it was now entirely new.

The same can be said of us, or at least of our bodies: our nails and hair grow and are trimmed; our skin dries and flakes; our blood, our tissue, every cell replaces itself many times over as we grow. By the time we reach adulthood, we retain no trace of the original "us" we were as babies; thereafter the cycle continues as we age.



Above: A diagram of 1508 maps out the main areas of the human body, linking each with the zodiac symbol which was believed to govern it.

### NOBODY AT HOME?

The Scottish philosopher David Hume (1711–76) was profoundly influenced by Locke's thinking on the subject of the self, but he carried his empiricist argument still further. For Hume, it was no use searching for an inner self; our sense that we had a continuous selfhood from childhood up was illusory, he suggested. We weren't just shaped by the things we saw, experienced and remembered as we grew: that cumulative bundle of impressions was the self; this was all we were.





*Above: Our life is one long transition. Beginning as a barely formed blob, we grow and change continuously over time.*

So much for the body, but what of the mind? Something of the same can be said for the self itself. The English philosopher John Locke (1632–1804) argued that the infant begins its life a *tabula rasa* (“blank slate”), which experience then proceeds to write upon. While keeping the Cartesian idea, harking back to Plato, that the soul was somehow separate from the body, Locke was strongly Aristotelean in his empiricism. Identity, in his analysis, came not from some essence inside but from the individual’s interactions with his or her world.

For what it’s worth, this theory certainly has the ring of truth. We do feel that we are in some sense the sum of our experiences, our changing perceptions, that we become different men and women as we grow. To say that a best-selling novel “changes lives” may sound like advertisers’ hype; but that we’re changed by our education over time seems too obvious to be worth stating; we feel we’re changed by life experiences—marriage; parenthood; bereavement—as well. We don’t have any difficulty recognizing that we may be influenced or shaped by such events, but should we go further? Do they change us literally?

### Psychological Explorations

Rather than resolving such questions, the new nineteenth-century science of psychology only succeeded in complicating things still further. Pioneer Pierre Cabanis (1757–1808) harked back to Aristotle’s philosophy of selfhood, seeing consciousness as a product of the activity of the nervous system. But this



### SPLIT PERSONALITY

The Gothic fantasies of the nineteenth century anticipated many modern preoccupations. Just think of the monster in Mary Shelley’s *Frankenstein* (1818). Centering upon an artificially constructed “man,” this classic story can be seen as articulating some of the same questions that were to come back to haunt us in the age of artificial intelligence (see page 118, below).

As disturbing in its different way was the nightmare vision of the Scottish writer Robert Louis Stevenson in his *Strange Case of Dr Jekyll and Mr Hyde* (1886). Here, a respectable citizen (Dr Jekyll) has an alter ego (literally, “other I”), a vicious and cruel criminal. In the story, Mr Hyde emerges to stalk the midnight streets each time the good doctor drinks a special potion. But we’re left in no doubt that, in some sense, he’s always been there; he represents another side of the man everybody loves as a pillar of the community.

Stevenson’s shocking yarn was based on the true-life story of William Brodie. He lived a double life, a deacon of his tradesman’s guild and a city councilor by day; by night he led a gang of housebreakers in the city. Deacon Brodie even had two families, each unaware that the other existed. He was caught and hanged in 1788, more than half a century before Stevenson was born, but his story still haunted the city of his birth. While it made most people in Edinburgh wonder how well they really knew their friends and neighbors, it made Stevenson question how well we know ourselves.

### COLONIALIST CONTRADICTIONS

In the eighteenth century, notoriously, the French *philosophe* Jean-Jacques Rousseau (1712–78) had proclaimed the moral superiority of the “noble savage.” The primitive hunter-gatherer, he said, was worthy of our envy rather than our pity or contempt, since he was unspoiled by a civilization that he claimed was corrupting. Unjust hierarchies kept us in our place; social conventions subjected us to artificial rules; we learned to be hypocritical, untrue to ourselves: “Man was born free, but is everywhere in chains.” Though open to all sorts of objections, Rousseau’s views struck a chord with the Romantic age that followed: the “natural” life was somehow more authentic, it was felt.

By the end of the nineteenth century, the European scramble for Africa was well advanced, while the United States was making itself master in the Philippines. Far from being an opportunistic grab for territory and power, this was a moral responsibility, many argued: heavy as it was, the “White Man’s Burden” must be shouldered.

Rousseau’s views continued to trouble intellectuals, even as the prevailing ideology hailed the altruism of the colonialist project. But even the most decent took on colonialist ways of thinking despite themselves. 1899 saw the publication of Joseph Conrad’s classic novella *The Heart of Darkness*. Ostensibly (and actually, up to a point) it deals with European excesses in central Africa, but it’s also and unmistakably about the darkness in all our hearts. As such, it buys into the myth of the “Dark Continent.” This idea that we have a sort of inner savage whose all-consuming lust and murderous fantasies needs somehow to be civilized is apparent, too, in the thinking of Sigmund Freud.

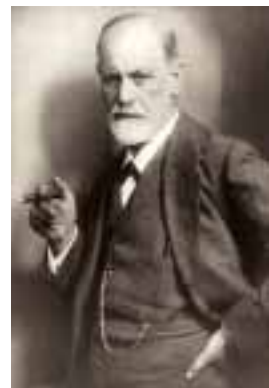


account was far too materialistic—even mechanistic—for most people to believe. American psychologist William James (1842–1910) followed Locke in seeing selfhood as being created by the continuous succession of events and experiences, though he insisted that these were held together in a single “stream of consciousness” by the influence of the soul.

The so-called father of psychoanalysis, Sigmund Freud (1856–1939), saw what amounted to a layered self in which a relatively ordered conscious self lay (more or less precariously) atop an infinitely more unruly “subconscious” mind. The *id*, as Freud called this subconscious layer, was all surging desires and seething jealousies; murderous rages and all-consuming incestuous lusts. For the most part, we were (thankfully!) unaware of the *id*’s existence—though it made its presence felt in dreams and dirty jokes. Occasionally, too, it showed itself in unwitting verbal stumblings, or “Freudian slips.”

In some unfortunate individuals, however, the conscious *ego* was not securely enough in place. Such people suffered neuroses and nervous tics. Only when the psychoanalyst had brought their buried desires or suppressed traumas to the surface could they be examined—as it were “in the light of day”—and then understood and brought to order in the conscious mind.

Below: Freud in 1921.





*Social status shapes us. Below: high-caste Hindu children in India; nineteenth-century street urchins in America; an Inuit child. Below, right: society ladies exclaim: "A mother, how odd!"*



### The Best We Can Be

Freud certainly saw himself as having embarked upon a civilizing mission. The *id* was a sort of untamed wilderness within, on which the process of psychoanalysis was intended to impose some kind of order. "Where *id* was, there shall *ego* be," he said. It is revealing that he used the impersonal word *id* (Latin for "it") for what might be regarded as the innermost core of our being, reserving the word *ego* (Latin for "I") to represent our more civilized, ordered selves. Freud believed that our "true" self was our "better self," residing in our conscious mind.

Writing in the shadow of the slaughter of World War I, and then against the backdrop of the rise of Nazism, there was never any question of a noble savagery for him. As far as Freud was concerned, indeed, the object was to establish the dominion of the "superego," the ideal self—roughly corresponding with what non-psychoanalysts might call the "conscience." This, suggested Freud, is the mechanism that gives us the drive to do the right thing, and that punishes us with guilt when we fall short.

### Culturally Constructed?

Freud went further in his later works, giving a fascinating account of something that he called the "cultural superego." This is the set of moral rules and taboos that is established by the society in which we live.



Without our even realizing it, these rules superimpose themselves upon our individual minds, shaping our behavior, our moods and our reactions to our experiences. Far-reaching in its radicalism, this idea came close to implying the existence of a sort of transindividual consciousness at work at the very center of the self.

It followed that the self would vary according to the specific cultural context in which the individual moved and by which he or she was formed, so that a middle-class Viennese matron would be very different from a tribesman in the mountains of New Guinea. More subtly, but perhaps as significantly, a middle-class Viennese housewife might well approach life's emotional challenges and moral problems in a different way than would a Viennese wife of the working class.

This idea that the self might be culturally constructed—that society as a whole might make us what we are as individuals—was in keeping with the way things were going in the modern age. Marxism had already put forward the idea that the culture of a society was shaped by underlying economic relations. It wasn't such a stretch to imagine an individual consciousness that was formed by the economic and cultural conditions prevailing all around.

### Linguistic Limitations

Language came into the intellectual spotlight in the second half of the twentieth century—though the insights that placed it there had been arrived at some time before. Philosophers like Friedrich Nietzsche (1844–99) had started to sense that language was as limiting as it was liberating, since it allowed us to enquire and discover only on its own terms. Proving something through the medium of language, Nietzsche said, was like hiding something in a bush, then searching for it and finding it: language railroaded us; we could never use it to find out something new. Where language didn't take us, we couldn't go; where the words didn't exist, we simply could not venture. The linguistic philosopher Ludwig Wittgenstein (1899–1951) was to put it still more starkly: “Whereof one cannot speak, thereof one must be silent.”

Meanwhile, Swiss researcher Ferdinand de Saussure (1857–1913) had been reinventing the study of linguistics—until then the excavation of the origins and histories of particular languages, and the relationships between them. Saussure was more interested in the underlying structures that made the different languages what they were. His work made little impact in his lifetime, but was rediscovered in the final decades of the twentieth century when scholars realized just how far-reaching the implications of “structuralism” were. Different languages—Mandarin and English, say—didn't just express things differently; they ordered reality in different ways. And if that went for the world around us, it went for ourselves as well, structuring the different ways available to us to think, and even feel.



*Above, top to bottom:  
Friedrich Nietzsche, Ludwig  
Wittgenstein and Ferdinand  
de Saussure.*

### A Postmodern Me

Increasingly, since the 1970s, philosophers and cultural critics have been thinking in terms of a “decentered” self. This has been the crucial insight of what is called the postmodern period. Once we would have assumed an “I” that existed entirely in its own right, then found expression for itself in language. Now we’re calling into question the whole idea of a pre-existing “I”—an indwelling soul or essence—and instead thinking in terms of an “I” that is actually constructed by the language that it speaks.

The “I” we think is thinking is actually the product of its cultural context. The stories and songs that surrounded us in childhood; the games we played; the history and civics we learned at school: such things really do help to “make us what we are.” But written and spoken language is only the most obvious formative factor: movies and video games; the news media; advertising imagery; product design ... a wide variety of cultural influences help shape our selves.

The prevailing culture affects us even in our most intimate desires, structuring what we think of as very basic needs like sex and hunger. These may indeed be deep, instinctual needs that we share with other animals, but the ways they articulate themselves in us are culturally determined. What makes that super-model so desirable? Why does that movie star make us go weak at the knees? Why do we thirst for this or that drink, or aspire to a particular restaurant meal or fashionable image? We’re very much the creations of our culture.

*Below: The advertising and media that surround us every waking moment of our lives today play a crucial part in constructing us as thinking, feeling individuals.*

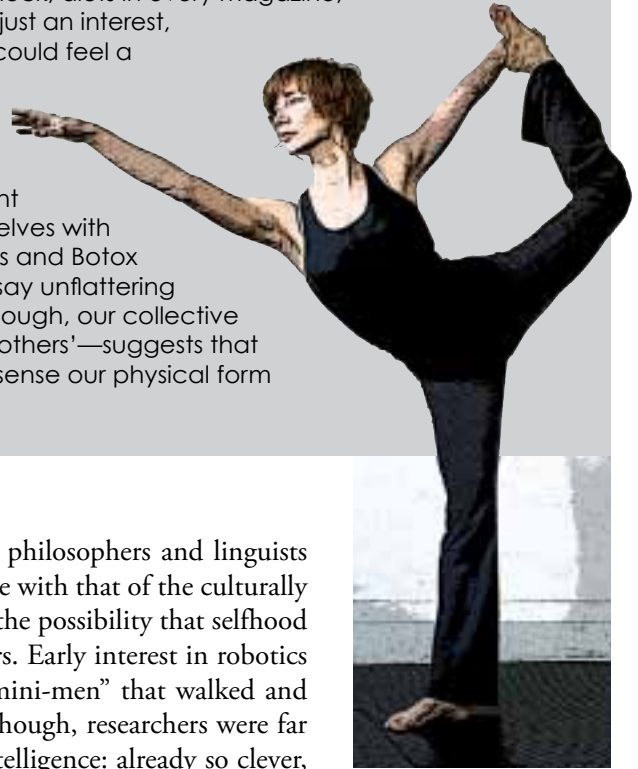


### SCI-FI SELVES?

In the developed economies of the modern world, few of us have to perform the kind of back-breaking physical labor our ancestors had to; medical science has relegated sickness to the margins of experience for most of us, for most of our lives. With healthcare and high-technology advancing by the year, it's no longer impossible to imagine a situation in which the body really might come to seem irrelevant. Those of us who aren't actually sick or injured—which, thankfully, is most of us, most of the time—could almost forget about our bodies, it might be thought.

An entertaining fantasy, that's for sure, but all the indications are at present that an entertaining fantasy is all it is. The reality is that the body has never commanded more attention. We have gyms on every other city block; diets in every magazine; and makeover programs nightly on TV. It's not just an interest, but an obsession, almost: no medieval mystic could feel a stronger revulsion for the flesh than today's teenage anorexic; most of us feel more or less anxious about our size or shape.

These are trivial preoccupations born of vanity, moralists would say, and to an extent they are right. We should be concerning ourselves with higher things. That celebrity cellulite, nose jobs and Botox are so high up the news agenda surely does say unflattering things about our society. At the same time, though, our collective preoccupation with the body—our own and others'—suggests that we believe it really matters and that in some sense our physical form is “who we are.”



### The IT “I”

Cometh the hour, cometh the computer: just as philosophers and linguists were replacing the idea of the “I” as soul or essence with that of the culturally constructed self, technological advances held out the possibility that selfhood might literally be constructed by human engineers. Early interest in robotics had been focused on the challenge of making “mini-men” that walked and moved their arms as humans do. By the 1980s, though, researchers were far more concerned with the question of artificial intelligence: already so clever, apparently, could computers be made to think, and even feel?

In some ways, computers quickly outstripped us. But could they do more than just crunch numbers at staggering speeds? Just how sophisticated did a system have to be before you could say it was reasoning as we might do ourselves? Along with obvious technical challenges, important philosophical questions were at stake. What is selfhood? In what does my personal identity consist? We had been asking these things for centuries, but the issues had now been problematized in a new and very different way. Above all, we faced the humbling question: what makes our human consciousness so special when so much of what it involves can be artificially reproduced?

*Above: While most of us like to think we're something “more than” our physical forms, we take seriously the need to have mens sana in corpore sano – “a healthy mind in a healthy body.”*

## THE UNIVERSE WITHIN

THE DRAMATIC EXPANSION IN OUR COSMIC HORIZONS THAT MODERN ASTRONOMY HAS BROUGHT IS NOW BEGINNING TO BE MATCHED BY INWARD EXPLORATIONS BY NEUROLOGISTS INTO THE HUMAN BRAIN. A RELATIVELY RECENT VENTURE, THE SINGLE MOST STRIKING INSIGHT IT HAS BROUGHT US HAS BEEN AN AWED APPRECIATION OF THE BRAIN'S INCREDIBLE CAPACITY AND COMPLEXITY. ESSENTIALLY, THOUGH, THE BRAIN REMAINS MUCH THE SAME SOGGY GRAY MASS IT WAS BEFORE: IT IS NOT MECHANICAL, BUT APPARENTLY SOFT AND FLUID IN ITS WORKINGS. INTUITIVE AND EMOTIONAL IMPULSES ARE AT LEAST AS IMPORTANT AS IMPERSONAL DATA-CRUNCHING; IN POLKINGHORNE'S TERMS (SEE PAGE 28), IT IS NOT SO MUCH A CLOCK AS A WISPY CLOUD.

### **The Brain for Beginners**

The brain is an extraordinarily powerful and complex organ: what we call “thinking” is only one of the things it does. A sort of command-and-control center for the nervous system, it is busy 24/7 throughout our lives—yet most of its work is done without our ever being aware of it. Regulating body temperature, breathing and blood pressure; keeping the other internal organs working at the right rates; monitoring and interpreting sensory perception; registering and managing pain; co-ordinating movement; ensuring physical balance: all these are indispensable, if not apparently exciting, functions.

*Right: We're all beginners when it comes to the brain. Modern imaging techniques have revealed a miraculously complex realm that scientists themselves are only really starting to understand.*





The brain holds information in special cells known as neurons. These in turn are protected and maintained by glial cells. Also called neuraglia, these cells surround the neurons (which they far outnumber), insulating them from one another. Neurons respond to electrochemical stimuli, switching on and off sensory or motor functions as required, or altering the chemical balance in the body through the glands. Synapses act as junctions between each neuron and its neighbors, and to the wider nervous system, making sure that signals can flow freely either way.

Each neuron is in contact—and acts in concert—with a thousand or so other neurons. Typically, the human brain has up to 200 billion neurons in all. It is the collective work of all these neurons that is really stupendous: each has only its own simple task to perform; taken together, though, they can do just about anything. Like the human-made computer that works such wonders by endlessly manipulating the crudest of binary relations, 1:0, the brain replicates the most basic of on-off signals innumerable times to miraculous effect. The same sort of electrochemical impulses make possible every imaginable human function, from breathing and bowel movements to writing complex equations and the creation of great art.

*Above, left: This detail from a DTI (Diffusion Tensor Imaging) representation of a brain shows reconstructed fiber tracts running through the midsagittal plane.*

*Fanning out toward the top are the fibers connecting the two hemispheres; down the center, fiber tracts descend toward the spine.*

*Above, right: The structure of the brain cell is clearly visible here.*



*Above: The medulla, in the lower brain stem, controls a great many unconscious functions.*

### Top and Bottom

The brain communicates with the rest of the body via the central nervous system, which is secreted in the spine for protection; peripheral nerves radiate outward to the various organs, limbs and extremities. Instructions are sent and sensory signals recorded by a constant back-and-forth of electrochemical impulses, which speed up and down the central nervous system between the body and the brain.

These signals are managed by the medulla, which also has charge of the breathing, heartbeat and blood circulation; it is situated toward the bottom of the brain stem, at its junction with the spine. Other tasks like digestion and the reflexes are also organized in this lower section of the brain stem.

Generally speaking, indeed, it appears that the evolving brain has “expanded upward”: the more basic, animal functions are associated with the area nearest the bottom of the brain, around the stem. What we would see as “higher” functions—reasoning; feeling emotion; archiving and accessing memory—are literally located higher up in the human brain, in what is known as the cerebrum.



### HOMO SAPIENS

“Wise (or Knowing) Man,” our Latin species title means. There’s no doubt that our brains are our best attribute; the secret to our survival—and, so far, at any rate, success. Bulk may not be everything, but our brains are big: the adult brain typically weighs in at around 3 lb (1.36 kg), which is getting on for three times the average for a mammal of our size.

There must be some good reason for this, because we’ve paid a high evolutionary price. We’re too big-headed for our mothers’ birth canals. In consequence, we’ve come to be born far earlier on in our development than other mammals: strictly speaking, we’re premature even when we come to term. The result is that, whereas so many other infant mammals can clamber to their feet and walk within days (or even minutes) of birth, we spend helpless months in drooling, dribbling babyhood.

Not only does this make us vulnerable ourselves, but it burdens our parents; a baby must have been a serious liability for a stone age hunter-gatherer group. His or her mother would have had to provide constant care, carrying the baby wherever she went; its cries would have alerted predators to their presence, endangering everyone. On the other hand, down the centuries, the problem-solving skills the brain endows has enabled us to find new and safer ways to live.

FOOD FOR THOUGHT

Harvard University primatologist Richard Wrangham has proposed that it was our hominid ancestors' acquisition of cooking skills 1.8 million years ago that prepared the way for the evolution of the human brain. By making a wider range of foods accessible, and allowing what was eaten to be digested much more efficiently, they were effectively able to turbocharge their diet. The raw foods of before simply could not have supported such a rapid and sustained expansion of the brain.



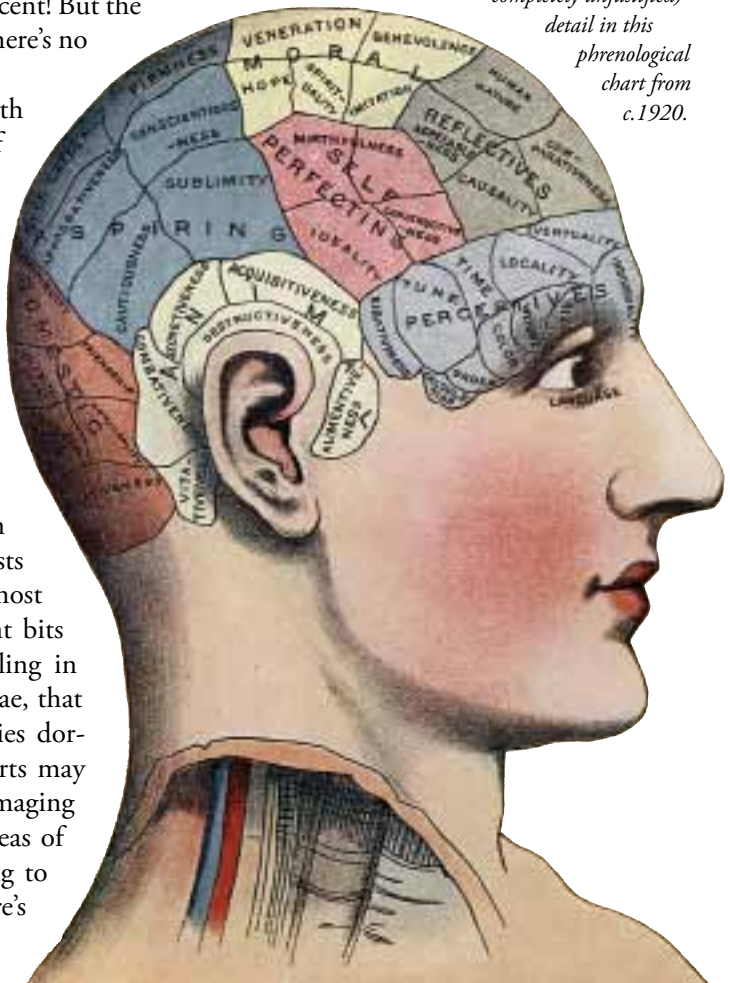
Playing the Percentages

It's often said that we only use 10 percent of our brains. If only we could avail ourselves of the other 90 percent! But the 10-percent claim is, in fact, plain wrong; there's no neurological basis for it.

Yet it's easy enough to see why such a myth might have arisen: it helps make sense of the enormous discrepancies between people with substantially the same brains. As seen on the slab post-mortem, there's little obvious difference in capacity between the brain of a brilliant professor and that of a lowly laborer. How are we to explain the difference, then: did the genius find a way of drawing on more of his brain's resources than his less stellar contemporaries managed?

This too would appear to be at best an oversimplification. The evidence suggests that most of us use most of our brains most of the time. While we might use different bits of the brain for playing football, for falling in love and for working out algebraic formulae, that doesn't mean that the rest of the brain lies dormant while we do these things. Some parts may not be working as hard, however: new imaging technologies have shown that different areas of the brain are busier or less busy according to the activities we're engaged in; even so, there's no indication that any part of the brain is idle for any length of time.

*Below: The brain is mapped with complete (and completely unjustified) detail in this phrenological chart from c.1920.*





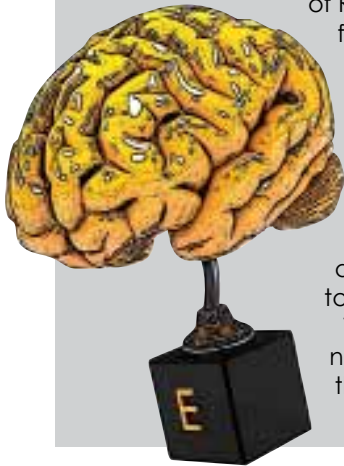
## EINSTEIN'S BRAIN

What Leonardo da Vinci was to the Renaissance, Einstein has become for the modern age: the iconic intellect, with the brain to end all brains. Legendary even in his lifetime, his brain was not to be allowed to rest in peace: it was removed, weighed and dissected within hours of his death in 1955.

It was all a bit anticlimactic, however: the brain that had propounded the Theory of Relativity and helped design the atom bomb did not look much different from anyone else's. A study by researchers from McMaster University, Ontario, in 1999 found no significant difference in weight between the great man's brain and those of thirty-five men and fifty-six women of average intelligence.

By this time, however, half a century on from Einstein's death, neurologists had made more progress in the mapping of the brain. The McMaster researchers were able to identify the area believed to be most involved in mathematical speculation and spatial relations, and this did seem to be significantly better developed in Einstein's case, to the extent that his brain was 15 percent greater in its total width.

The brilliant scientist also stood out from the crowd in that a groove that normally runs through this zone was absent in his case: this may have enabled the neurons here to interact more easily, the researchers speculated.



*Below: Recent advances in neuroimaging have given us a much better understanding of which bit of the brain does what, blurring the once-sacrosanct boundary between mental "will" and physical action.*

### Mapping the Brain

In recent decades, techniques of neuroimaging have been developed that have allowed the workings of the brain to be charted in unprecedented accuracy and depth. Functional magnetic resonance imaging (fMRI) provides a way of representing fluctuations in the blood flow in the brain, showing where hotspots of abnormal activity may have arisen owing to damage by injury or disease. Electroencephalography (EEG) and magnetoencephalography (MEG) offer different ways of identifying areas of electrical activity, or the changes in magnetic fields this activity causes.

The metabolic (or chemical) mapping of the brain has been transformed by the introduction of positron emission tomography (PET) and single photon emission computed tomography (SPECT) scanning. Radioactive isotopes injected into the bloodstream and then tracked into the brain allow a detailed three-dimensional picture to be built up.

### A Collective Consciousness

Exploration of the brain has proceeded apace in recent years, assisted by these advances in technology. Neurologists have been able to identify those zones associated with particular activities and skills. Researchers have even succeeded in pinpointing those neuron clusters responsible for such specific tasks as moving a certain finger or blinking a given eye.



But the boundaries of these areas have tended not to be clear-cut. Once again, it's become clear that the brain is better described as a cloud than a clock, its organization "softer," yet at the same time more flexible, more resilient, than might be thought. Brain damage is rightly feared: often fatal, it can shut down important functions even when it is survived, yet even now it is unpredictable in its effects. Up to a point, the brain has an ability to restore itself: where a given zone has sustained damage through accident or illness, it has frequently managed to find "workarounds," the neurons of neighboring zones apparently stepping in to take the strain.



*Above: Electrical impulses are transmitted down a nerve in this artist's impression.*

This cooperative capacity perhaps helps explain what the researchers have so far signally failed to find: any sign of a zone in which the consciousness resides. Selfhood, it seems, is a collective function produced by the activity of all our billions of neurons working side by side.

### A Learning Brain?

The ability of the injured brain to restore itself in some cases raises other intriguing possibilities: if it can find ways of working around such injuries, what else might it learn to do? We are accustomed to the idea that as conscious beings we might use our brains for learning, but what if the brain itself were to learn—to be trained to develop new faculties, new skills?

*Below: Twins are popularly believed to be able to intuit one another's thoughts. They have been studied extensively by scientists seeking a better understanding of consciousness.*

### AN INTELLECTUAL INTERNET?

The fact that consciousness appears to have no "home," but to be produced by the activity of the brain as a whole, raises fascinating questions—and not just for the study of the self. It opens the door to the idea that, potentially, at least, there might be a collective consciousness that transcends the individual mind. Just as the Internet links up the world's computers and enables them to work in concert, could a shared intelligence someday unite humanity? Or is this already happening?



### A Tale of Two Hemispheres

The cerebrum, the upper part of our brain, is naturally split in two by what anatomists call the “medial longitudinal fissure.” This has been clear for centuries: more recently, however, it has become clear that the left and right hemispheres do slightly different jobs. To some extent they mirror each other’s functions, the left hemisphere controlling the right-hand side of the body while the right hemisphere controls the left-hand side.

But their roles are more specialized still: there is evidence that in most people important skills of reasoning and language acquisition are located in the left hemisphere, while those of spatial awareness are to be encountered in the right, along with other nonverbal and intuitive insights.

These well-documented distinctions have in the last few decades given rise to a veritable industry of oversimplifying pop-psychology. This divides the world into coldly logical “left-brained” people and warm, artistic, sensitive “right-brainers.” The latter supposedly see existence in spatial, pictorial terms, relying on intuition and imagination rather than reductive, rule-bound reasoning. They, the cliché has it, are fated to be misunderstood by literal-minded, left-brained teachers and employers. Some writers have even suggested that we have a left-hemisphere-dominated history, in which the abstract and analytic have held undisputed sway.



### PHINEAS THE FREAK

Phineas Gage was born in 1823 and died in 1860, twelve years after the dreadful accident that should have killed him. The foreman of a railroad gang working with explosives as they dug a cut south of Cavendish, Vermont, he was standing close by when a charge went off. An iron spike weighing over 13 lb (6 kg) was sent flying by the blast: it caught him in the cheek, went clear through the frontal lobe of his brain, exited the top of his head and flew on before falling to earth some 80 feet (25 m) away.

Incredibly, Gage didn't die. Within minutes, indeed, he was sitting up and talking cheerfully. Not long after, he coughed and a bit of his brain fell out. He did suffer in the weeks that followed: he had a series of infections, and he was never to recover the vision in his left eye. But otherwise he made a full recovery.

So, at least, it seemed. But there were reports that his personality had changed: his former workmates found him different—and difficult: short-tempered and given to outbursts of bad language.



*Left: The respective roles of the brain's two hemispheres are not yet fully understood.*

*Below: Mozart wrote sublime music; below him, John Frederick Daniell did pioneering work in chemistry: did these two great minds think more alike than we've previously assumed?*

These arguments may have the ring of truth—it's never hard to see more scope for the lyrical and intuitive—but that doesn't mean that they actually *are* true. The reality in the brain is much more complex. The different functions may be unevenly distributed between the two hemispheres, but that does not necessarily amount to such a bald division between left and right.

The reality in human activities is more complex too: our intellectual activities don't cleave so neatly between cold, hard analysis and warm, soft intuition. A Mozart piano concerto may be beautifully expressive, but it is also highly regimented (music in general was at first assumed to be a left-brain art). And, even if such linguistic skills as grammar and vocabulary are seen as belonging to the left hemisphere, others like the sense of intonation and rhythm are concentrated on the right.

We should resist being bamboozled, then: the importance of the left-brain / right-brain divide is much exaggerated. What it means for individual minds, their talents and their skill sets tends to be very difficult to read: most of us are drawing on both hemispheres all the time. Research involving talented young musicians, for example, has shown intense activity in both hemispheres, with enhanced communication between the two sides, and resulting improvement to the memory. But then such surprises are par for the course: research into the brain is still at a comparatively early stage, and its findings are not necessarily those we might expect. We could be forgiven indeed for wondering whether we know anything much at all. The work of John Horgan questions most of the claims made by what might be called "mind sciences" in recent years—not just neurological studies but psychology and psychiatry as well. Such is the "explanatory gap" between what is observed and the ways it has been accounted for, he says, that these studies barely warrant the name of "science" at all. Whether he is right or wrong, the one thing we know for sure is that there's a great deal more to be discovered.

