



LIMBERING UP

AN INTRODUCTION

If the body had been easier to understand, nobody would have thought that we had a mind.

Richard Rorty¹



Over the last century, human beings in affluent societies have become more and more sluggish. Millions of us work in offices, pushing paper, staring at screens, discussing proposals and re-arranging words and spreadsheets. For our leisure, we look at more screens, text and tweet, escape into virtual worlds, gossip and chatter. Some of us still play tennis or knit, but the drift is undeniably chair- and couch-wards. Our functional bodies have shrunk: just ears and eyes on the input side, and mouths and fingertips on the output side. Laundry now involves all the physical skill and effort of pushing clothes through a porthole and pushing a button. Cooking can be no more than ripping off a plastic film and closing the microwave door. Our real bodies get so little attention, and so little skilful use, that we have to make special arrangements to remember them: we program country walks and trips to the gym into our smartphones.





INTELLIGENCE IN THE FLESH

Inactivity and cleanliness used to be the privilege of the rich: not any more. And the machines that make all this leisure possible are opaque – most of us wouldn't know how to fix them, and wouldn't want to. We have become mind rich and body poor.²

But this is not another panicky book about obesity, heart disease or the dangers of the internet. Nor is it a hymn of nostalgia for the dying arts of quilting and whittling. At the heart of this book is an argument: that we neglect our bodies because we underestimate their intelligence. The problem is not that we have become 'lazy', or devoid of 'willpower'. It is a matter of assumptions and values. We aspire to cerebral jobs and disembodied pastimes because we have got the idea that those kinds of things require more *intelligence* than practical, physical things, and consequently they are more highly esteemed in our societies. Crudely, they make us look *smarter*, and looking smart is good, so doing mind stuff makes us feel good. (Of course, because they are more highly esteemed, they also, by and large, pay more.) Conversely (with a few possible exceptions such as some top athletes) being physically tired, dirty and smelly is associated with a lack of intelligence. So we learn to aspire to being clean and verbal.³

We still think about the relative intelligence of body and mind in an archaic and inaccurate way: so says the new science of embodied cognition. Many neuroscientists do not now think that intelligence belongs only to minds, and that the pinnacle of human intelligence is rational argument. They no longer believe that the mind is an ethereal source of control, sent to curb the body's waywardness and compensate for its stupidity. They do not think that minds and bodies are different kinds of stuff. The idea that bodies are dumb vehicles and minds are smart drivers is old hat. The new science of embodiment has important implications for how we think about ourselves and how we





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live our lives. This book is a shot at getting that knowledge out there – because I think it matters a lot.

The predominant association of intelligence with thinking and reasoning isn't fact; it is a cultural belief – a virulent meme, some would call it – that misdirects us. Young people who prefer doing intricate things with their bodies – breakdancing, skateboarding – to doing their maths homework are not lacking in intelligence. I think they are part of a growing cultural rebellion against the hegemony of the intellect (though most of them wouldn't put it quite like that). I hope this book will help their parents and teachers understand why that rebellion is itself intelligent. I hope it might contribute to a wider revaluating of the practical and physical, in education for example, so that those who are not cerebrally inclined will not be led to make the mistake of feeling stupid.

Let me, in this overture, introduce some of the main themes that will emerge as the scientific story unfolds.

The recurring motif is this: we do not *have* bodies; we *are* bodies. If my body was different, I would *be* different. If I was made of silicon or fibre optics, I would need different things, respond to different things, notice different things, and be intelligent in a different kind of way. My mind was not parachuted in to save and supervise some otherwise helpless concoction of dumb meat. No, it's just the other way round: my intelligent flesh has evolved, as part of its intelligence, strategies and capacities that I think of as my 'mind'. I am smart precisely because I am a body. I don't own it or inhabit it; from it, I arise.

This realisation is both completely mundane – and quite extraordinary. It overturns the accepted, intuitive psychology –



academics call it the ‘folk psychology’ – of two thousand years of Western civilisation. Chapter 2 sets the scene for the new view by taking a quick scan back over the evolution of the old view. From classical Greece to the late twentieth century, it was simply inconceivable that a pillar of meat – and especially the dull-looking lump of matter inside the skull – could have been the source of Euclid’s geometrical proofs, Plato’s *Republic* or Shakespeare’s sonnets; or that acts of great selflessness and wise judgement could have arisen *sui generis* from 70 kilos or so of flesh. The smart stuff had, then, to be immaterial and come from elsewhere. The ‘mind’ was invented to fill what philosophers call ‘the explanatory gap’. Consciousness, especially rational thinking, looked to our forebears as if it had to sit in the centre of this hypothetical mind, with the Senses delivering information to it through one bodily door, and Decisions being despatched to the workhorses of the body through an opposite one. We think that we See things, then we Think about them, then we make Decisions, and finally we Act. But it’s not like that at all.

Chapters 3, 4 and 5 take us into the modern, scientific understanding of the body. When science first tried to ‘naturalise’ the mind, its most obvious physical accomplice was the brain. But, as I will show, the proper substrate of the mind is not the brain alone but the entire body. I’ll unfold a view of the human body as a massive, seething, streaming collection of interconnected communication systems that bind the muscles, the stomach, the heart, the senses and the brain so tightly together that no part – especially the brain – can be seen as functionally separate from, or senior to, any other part. Torrents of electrical and chemical messages are continually coursing throughout the entire body and its brain. In fractions of a second, the ‘decision-making’ of the brain can be influenced by



a badly behaved bacterium in the gut, and the level of sugar in the blood can be altered by a squeak or a dream. The cells and molecules of the immune system have so many receptors at all levels in the brain that the immune system now has to be thought of as an integral part of the central nervous system. In fact, it's all just one system.

I'll demonstrate that we are fundamentally built for action, not for thinking or understanding, and that, as a consequence, our intelligence is deeply orientated towards the construction of effective and appropriate behaviour. Thinking is a recently evolved tool for supporting smart action. We'll see that the brain evolved to help increasingly complicated bodies coordinate their interlocking sub-systems in the service of the whole community. Brain is servant, not master of the body. It's a chat-room, not a directorate. Seeing, Thinking, Deciding and Acting are not strung out, like different departments in a factory; they are inextricably entwined. Careful science shows that how I see is instantly imbued with what I want and how I might act. The body-brain is designed to blend all these influences together in the blink of an eye, and often issues intricate, intelligent actions without thought or premeditation.

This being so, we need to rethink the relationship between thoughts and feelings. Feelings are not a nuisance. They are not – as Plato thought, and many still do – wayward and primitive urgings that continually threaten to undermine the fragile structures built by dispassionate reason. They are, as we will see in Chapter 6, the bodily glue that sticks our reasoning and our common sense together. Feelings are somatic events that embody our values and concerns. They signal what we care about: what gives our lives meaning and direction. Our hopes and fears arise from the resonance of our organs in response to events. Without physical feelings and intuitions, abstract





intelligence sheers away from the subtleties and complexities of the real world, and people become 'clever-stupid', able to explain and comprehend but incapable of linking that understanding to the needs and pressures of everyday life. Particular emotions can get tangled and perverted by experience, and very often do. We become fearful of intimacy, or angry at our own timidity. But the solution is not for Reason to trounce Emotion. The body's signals are essentially wise, if sometimes confused. If the wisdom is ignored, it will be hard to sort out the confusion.

Language and reason themselves look different when we see that they too are rooted in the body. Chapter 7 explores the ways in which our more abstract understanding grows out of the physical and sensory concepts that the young child grasps first – giving and taking, coming and going, full and empty, warm and cool, nurturing and threatening. We come to understand what someone means when they ask if we have *grasped* the argument, by analogy with the physical act of grasping. And these primeval links back to the body are never lost. There is no separate bit of the brain where abstract ideas like Truth and Justice are stored, and where Philosophising takes place. From birth till death, the body is the moment-to-moment substrate of our thoughts and desires – however refined. Studies show that, in complicated predicaments, people make better decisions when they rely on their 'gut feelings' as well as their reason and do not see them as antagonists.

Language itself teems with expressions that muddle up mind and body. I hear a side-splitting joke and laugh till I cry or hoot with glee (or the joke may be lame, toe-curlingly awful, eliciting only a weak groan and a rolling of the eyes). I read a heart-rending story and am moved to (a different kind of) tears. My eyes pop with surprise and I prick up my ears. My shoulders slump with disappointment, I have butterflies in my stomach,



and my blood runs cold. I feel gripped by an idea, or queasy at the very thought. I know things in my bones and feel them in my water. A creepy tale makes my flesh crawl, while a compliment makes me flush with pride. A memory comes and I smile quietly to myself. Informally, instinctively, we know that mental and bodily events resonate tightly with each other – but all these somatic reactions are no mere accoutrements of the mental activities they accompany; they are absolutely of the essence.

Much of our somatic intelligence operates unconsciously, without conscious supervision or even awareness. So what is consciousness for, and how does it emerge from the intrinsic activities of a complicated body? In Chapter 8 I'll suggest that conscious thoughts and images are actually the result of a progressive (though often quite rapid) process of unfurling meanings and decisions that have their origins in the darker, deeper, more visceral areas of the brain and body. Thoughts are stories the embodied brain constructs about what is going on in its own hidden depths: reports from the interior, sometimes heavily edited and censored, and sometimes arriving by pigeon post long after the action is over. Many experiments show that our conscious intellect is often a rather pale reflection, or even a crude caricature, of the sophisticated operations that are going on 'behind the scenes'. Consciousness has its own priorities – creating a semblance of order and self-esteem, for example – which lead it, often, to misrepresent the complexity and waywardness of what is going on below. We confabulate much more than we like to think.⁴

Bodies do not stop at the skin. So neither do minds. We'll see in Chapter 9 that the internal streaming of information continues through our fingertips and out into the tools we use, for example. When you pick up a familiar tool, be it a fish slice or a chisel, your brain literally incorporates it into its representation of your body;



it becomes as much a part of your body as the hand itself. It is easy to trick your body-brain into believing that a rubber arm on a table in front of you is actually your own, so that, when someone hits it with a hammer, you cannot but flinch. But it's more even than that. We are also deeply interconnected, through our bodies, largely unconsciously, with the material and social worlds around us – our bodies literally reverberate with each other at many levels. The 'intelligent agent', seen rightly, extends throughout and beyond the whole body. It is constituted by the tools and the space around us, and also by everyone with whom we are 'in touch'.

The fact that we are fundamentally doers means we are also inveterate makers. Making is doing that involves those extraordinarily sophisticated on-board tools, our hands. In Chapter 10 we will find that human intelligence lives in our hands just as much as in our tongues and our brains. Making is in our blood, it seems. We have been crafted by evolution to be natural-born engineers, compulsive sculptors of our environments. Human beings are habitat decorators, toolmakers and workshop designers par excellence; we were *Homo fabricans* long before we were *sapiens*. Or rather, the *sapiens* grew out of the *fabricans*, and still relies deeply upon it. It is in our nature to amplify our intelligence by imagining, and then making, ever more powerful tools. We are only as smart as we are because we are enmeshed in a world of our own making: a vast web of books, spectacles, notes, printers, weblinks, diaries, calendars, maps, satellite navigation gizmos, computer programs, filing systems, Skype links, mobile telephones . . . all of which I know, more or less, how to capitalise on. As Andy Clark puts it, 'we make our worlds smart so we can be dumb in peace.'⁵ My intelligence stretches way beyond what can be captured in an IQ test.

There are signs of a wider resurgence of the physical: a backlash, perhaps, against the intellectualisation of intelligence.



Optimistically, you could discern evidence of a New Materialism on the rise: one which is not about conspicuous consumption, but about the quiet, protracted hands-on pleasures of making, mending, customising and perfecting physical skills. The Maker Movement in the States gathers strength, and puts pressure on manufacturers to make things mendable again. FabLabs, ‘tinkering workshops’ and 3D printers are springing up in response to the desire to engage with solid, workable stuff. The more the digital world takes hold, the stronger, for many of us, seems the compensatory desire to get back from the virtual to the real, from the symbolic to the material. And this signals a re-esteeming of physical delicacy, sensibility and creativity (beyond those protected ‘Sites of Special Cultural Interest’ called sport and art). Craft *is* cognition, people are saying. Doing and thinking are not separate faculties; they are inextricably entwined.

So, with all this in mind (and body), we will come back to the question: what does it really mean to be intelligent? A lot has been written in the last twenty years about different kinds of intelligence. We have had emotional intelligence, practical intelligence and ‘bodily-kinaesthetic’ intelligence, along with a host of others. But I’m not proposing another *kind* of intelligence to add to the list. My contention here is more radical than that. It is that practical, embodied intelligence is the deepest, oldest, most fundamental and most important intelligence of the lot; and the others are aspects or outgrowths of this basic, bodily capability. Emotional intelligence is an *aspect* of bodily intelligence. Mathematical intelligence is a *development* of bodily intelligence. There is a world of difference between human intelligence, properly understood, and mere cleverness.

In the real world, intelligence refers to the optimal functioning of the eco-socio-embodied systems that we are. Intelligence isn’t a faculty; it is the behaviour of an entire system



when it is able to come up with good answers to the perennial question: What's the best thing to do next? Intelligence is reconciling desires, possibilities and capabilities in real time – especially when the situation is complex, novel or unclear. The ability to figure out the next number in the sequence 1, 2, 3, 5, 8, . . . is a very poor proxy for your ability to act wisely when you lose your wallet or when you get a great job offer that would mean uprooting the family. At such times you need to be able to analyse the situation, check your values and assumptions, and figure out the consequences of various courses of action. In times of change or challenge you need your reason – but you also need your ability to sense inwardly what is truly in your own best and deepest interests. And a lot of clever people can't do that. I don't think they teach it (yet) at Harvard Business School.

Which obviously leads us on to the question of how you do 'teach' it, and that is the business of Chapter 11. For the body to be at its most intelligent, it has to be properly 'strung'. The different sub-systems need to be able to talk to each other both directly and via the chat-room of the brain. If these circuits are not able, quite literally, to pick up each other's vibes, then sympathetic resonance doesn't happen, the quality of available information is reduced, and the overall harmony of the total system that we are is degraded. This can happen through injury, illness or ageing, and can often be reversed by physical exercise. But we can also lose harmony by dampening our 'interoceptive awareness', and for this visceral intelligence to be rehabilitated, physical exercise needs to be accompanied by efforts to refocus and sharpen our attention. Dance, yoga and t'ai chi all have proven effects on cognitive functions such as decision-making and problem-solving, for example.

Finally in Chapter 12 we will round up the implications of embodiment both for individual well-being and for the nature





of the over-intellectualised, somatically impoverished institutions that surround us. The way we think about intelligence is built into the social structures we create – religion, medicine, government, as well as law and education – so a shift in our view of mind has repercussions not only for individual identity but for public life as well. We design law courts and classrooms in which physical movements and reactions are treated as disruptions, subversive of the serious work of the mind – yet some people think better when they are moving. Why do we make children sit still if intelligence benefits (as it does) from physical movements and gestures? Why do we set up adversarial, argumentative forms of governance and jurisprudence if rational sophisticated debate is not the only, or even (very often) the best, form of intelligence we possess? How can we give back to emotion and intuition their proper roles as *constituents* of human intelligence, without tipping over into a kind of New-Agey denial of rationality itself? These are questions which I will only just begin to address. Re-establishing a balanced, embodied society will be tricky, to put it mildly, and will take gradual shifts in understanding by us all. I hope *Intelligence in the Flesh* will contribute to those shifts.

In a way, this book is the third (and probably last) in a trilogy which began in 1997 with my book *Hare Brain, Tortoise Mind: Why Intelligence Increases When You Think Less*. There, I was one of the first to argue, on the basis of scientific research, that much human intelligence depends on processes of which we are not – and largely cannot be – aware. I called it ‘the undermind’. It is now also widely known as the adaptive or cognitive unconscious. Then in 2005 I wrote a sequel, *The Wayward*





Mind: An Intimate History of the Unconscious, aiming to situate this new ‘unconscious’ within a wider cultural and historical context. I brought together the kinds of stories that societies since about 4000 BC have created to try and account for mental phenomena that seem to be at odds with ‘common sense’: hypnosis, hallucination, mental illness and creative inspiration, for example. Perhaps they arise from the external influences of gods, demons and spirits. Or maybe they spring from the ‘subconscious’, a dark inner maelstrom of whimsy and wildness (as Plato thought, long before Freud). Or was the source simply activity in the matter of which we were made, that just sometimes failed to conform to normal expectations – an excess of ‘black bile’, maybe? I showed that versions of these three stories recur and compete throughout human history, right up to the present day. I argued that each has its value, and its pitfalls. Stories can be useful even if (or precisely because) they do not refer to objectively verifiable things.



But with the rise of affective neuroscience and embodied cognition we are now able to offer much more robust and compelling versions of the third story. At my most radical, I would now claim that, not only are ‘the gods and spirits’ non-existent (even though they may still have their uses), but the unconscious is dead too. We may choose to continue using it as a metaphorical or poetic way of talking, but that ain’t no such animal. There are myriad processes in the body that never lead to conscious experience, but there is no real, identifiable place or agent inside us that is a separate source of impetus from consciousness and reason. Like ‘the mind’, ‘the unconscious’ is a place-saver, a dummy explanation. It is like a temporary filling in a tooth, put there till something better comes along. And now it has.





I should say a little about my style and source material. I have read hundreds of research papers, but a good deal of this primary material is quite technical and even arcane. I have tried to dig out the main points and present them in an accessible and palatable way; to walk a middle path between respecting the rigour and niceties of research and telling a good story. But this means I will inevitably have skated over many points of contention that my more learned academic colleagues rightly consider to be important. The so-called 'hard problem' of consciousness will have to wait for another day, as, very largely, will the relationship between what I have to say here and other important work on what are called Systems One and Two (or, in Daniel Kahneman's terms, fast and slow thinking). Sorry, guys.

I have also glossed over several topics you may reasonably have expected would receive better treatment in such a book. I'll say nothing about the difference between male and female bodies, or the difference between men's and women's relationship to their bodies. Issues of physical and mental health remain largely unexplored, and what used to be called 'psychosomatic' conditions have not got anything like the attention they deserve. Neither have traditional understandings of the body-mind such as those found in many indigenous cultures, notably the traditional Chinese, Indian and Native American. I now suspect that these systems of thought, and others like them, are intricate blends of real insight and hocus-pocus, but it would take a whole book to disentangle one from t'other, and there isn't room here even to begin to make a start. (Can I feel a quartet coming on?)

As well as the primary sources, I must gratefully acknowledge several overviews of the new science of embodied cognition on which I have drawn, sometimes extensively. They include Roy Porter's *Flesh in the Age of Reason*, Evan Thompson's

Mind in Life, Francisco Varela and others' *The Embodied Mind*, Mark Johnson's *The Meaning of the Body*, Andy Clark's *Being There: Putting Brain, Body and World Together Again*, Shaun Gallagher's *How the Body Shapes the Mind* and Mark Rowlands' *The New Science of the Mind*. I have pilfered part of my title from George Lakoff and Mark Johnson's *Philosophy in the Flesh*, and many ideas from Antonio Damasio's *Descartes' Error* and *Self Comes to Mind*. I am acutely aware that, in writing this book, I am standing on the shoulders of giants, and the above authors are some of them. Most of these books are quite technical, however, both scientifically and philosophically, and they often delve into academic disputes of limited interest (and accessibility) to non-specialists or people new to the field.

There are also three excellent recent books on craft and practical intelligence that I want to mention as well – Matthew Crawford's *The Case for Working with Your Hands*, Richard Sennett's *The Craftsman* and Mike Rose's *The Mind at Work*. None of these, though, situates the renewed interest in physical making within the emerging science of embodied cognition. For those who want to dig deeper, any of these books would make excellent reading. However, none of them has – for good or ill – the sweep of mine, attempting to embrace visceral physiology, brain science, the function of emotion, consciousness, craftsmanship and 'handiness', as well as the wider social and personal implications of the new science for our view of human intelligence. I hope the breadth will prove interesting, even if some of the depth has had to be sacrificed.

Well, that's quite enough throat-clearing. Let's get on with it. We'll start with a quick look at how the separation of mind and body, and the privileging of one over the other, came about.