

Books & arts



A 3D magnetic resonance imaging scan of the brain.

Neuroscience needs some new ideas

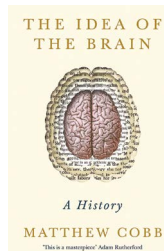
A history of the metaphors behind brain research faces a dark past and disquieting future. **By Stephen Casper**

The poet Emily Dickinson rendered the brain wider than the sky, deeper than the sea, and about the weight of God. Scientists facing the daunting task of describing this organ conventionally conjure up different kinds of metaphor – of governance; of maps, infrastructure networks and telecommunications; of machines, robots, computers and the Internet. The comparisons have been practical and abundant. Yet, perhaps because of their ubiquity, the metaphors we use to understand the brain often go unnoticed. We forget that they are descriptors, and see them instead as natural properties.

Such hidden dangers are central to biologist and historian Matthew Cobb's *The Idea of the Brain*. This ambitious intellectual history follows the changing understanding of the brain from antiquity to the present, mainly in Western thought. Cobb outlines a growing challenge to the usefulness of metaphor in directing and explaining neuroscience

research. With refreshing humility, he contends that science is nowhere near working out what brains do and how – or even if anything is like them at all.

Cobb shows how ideas about the brain have always been forged from the moral, philosophical and technological frameworks to hand for those crafting the dominant narratives of the time. In the seventeenth century, the French philosopher René Descartes imagined an animal brain acting through hydraulic mechanisms, while maintaining a view of the divine



The Idea of the Brain: A History
Matthew Cobb
Profile (2020)

nature of a mind separate from matter. Later authorities, such as the eighteenth-century physician and philosopher Julien Offray de Le Mettrie, secularized the image and compared the human to a machine. The Italian physicist Alessandro Volta rejected the idea of 'animal electricity', proposed by his rival Luigi Galvani as a vital force that animates organic matter. Volta was driven at least partly by his aversion to the mechanistic view.

New metaphors came from nineteenth-century phrenology, evolutionary theory and the doctrine of inhibition in physiology – the idea that the nervous system could repress actions and behaviours. Then came the age of communication, and with it fresh language for the brain.

Image clash

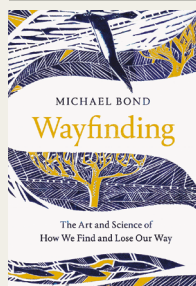
The late-nineteenth-century discovery of neurons led to a clash of rival images. Reformers imagined separate components, comparable to the wires and signals of the nascent telecommunications infrastructure. Conservatives cast the nervous system as a continuous network (or reticulum) akin to the blood circulation, feeling that this explained how volition and mind might work; to them, discrete signalling implied heterodox notions of mind, perhaps even of the soul.

The post-1940 proliferation of references to enchanted looms, ghosts in machines, logical circuits, reptile brains, parallel processors and uploaded minds grew from those foundations. Cobb notes, but only in passing, that we need new images to make sense of research developments ranging from artificial intelligence to mini-brains grown in the laboratory to brain implants. He doesn't try to invent examples.

The narrative Cobb offers is familiar. The epistemic power of metaphors in science has long been recognized by historians and philosophers of science. Yet for the popular audience he targets, Cobb's account is an important contribution: few have offered such accessible insights, with choice examples and clear explanations of the societal factors that lie beneath. Cobb also eloquently shows how figurative language does much more than simply distil or give shape to complex, intangible subjects. Metaphors change how science is done, by licensing new interpretations or inspiring new experiments.

Cobb also reminds us that metaphors conceal as much as they reveal. The ideas that they so persuasively represent often ignore key elements. Comparing the brain to a computer is beguiling, but neglects that brains are also organs, and aware ones at that. Our existing images and language are desperately limiting when it comes to imagining a situation in

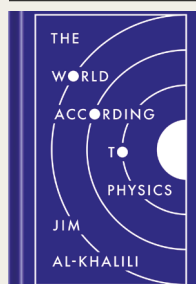
Books in brief



Wayfinding

Michael Bond Picador (2020)

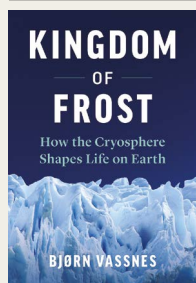
This rewarding meditation on “how we find and lose our way” might have been called “Am I here?” — the tragic refrain of science writer Michael Bond’s grandmother after she developed dementia. The book astonishes as it ranges from the neuroscience of meandering rats to the deleterious effects of satellite navigation. A desert ant, we learn, can forage at least 100 metres from its nest, then scurry back in a straight line — equivalent to a human wandering for a day and a night, then heading straight home without help from GPS.



The World According to Physics

Jim Al-Khalili Princeton Univ. Press (2020)

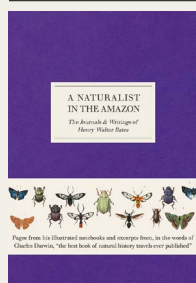
Quantum physicist, historian and science broadcaster, Jim Al-Khalili is well placed to summarize the past, present and future of physics for a lay audience, without using mathematics. After a tantalizing chapter on scale, he analyses space, time, energy, matter, quanta, thermodynamics and various attempts to unify the general theory of relativity with quantum field theory — although he never defines a black hole. On the debate between Niels Bohr and Albert Einstein, Al-Khalili sides with Einstein, who believed in an objective reality.



Kingdom of Frost

Bjørn Vassnes (transl. Lucy Moffatt) Greystone (2020)

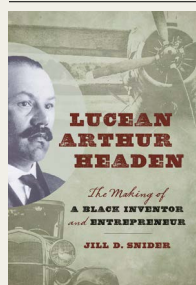
Science journalist Bjørn Vassnes’s brief book demonstrates how “life’s different revolutions have been intertwined with the history of the cryosphere”. He includes memories of digging tunnels to his house in the Norwegian Arctic during snowy 1970s winters, and experience of Bangladesh, which never sees snow yet survives on river water from threatened Himalayan glaciers. Vassnes discusses how reindeer grazing eradicates vegetation that reduces the Arctic’s heat-deflecting albedo effect; perhaps it could aid the fight against global warming?



A Naturalist in the Amazon

Henry Walter Bates Natural History Museum (2020)

“The best book of Natural History Travels ever published in England,” said Charles Darwin of entomologist Henry Walter Bates’s 1863 *The Naturalist on the River Amazons*, an 11-year journal inspired partly by Darwin’s diary of his 1831–36 journey on the HMS *Beagle*. This enchanting part-facsimile justifies his words. Bates writes grippingly on anacondas, bird-killing spiders and blowpipes. Although little-known now, his name endures in ‘Batesian mimicry’: a survival strategy based on apeing harmful species, which he observed in butterflies.



Lucean Arthur Headen

Jill D. Snider Univ. North Carolina Press (2020)

There are no references to Lucean Arthur Headen on Wikipedia; nor did he leave behind significant personal papers. Yet this black inventor and entrepreneur, born in racially segregated North Carolina in 1879 among formerly enslaved artisans, deserves study. Local historian Jill Snyder’s biography reconstructs him. By his death in 1957, 26 years after moving to Britain, Headen had spent almost 4 decades running US and UK companies making cars and products based on his patents — some of which are still cited. **Andrew Robinson**

which the mental, physical and embodied are so tightly enmeshed.

Thus, despite their power, our metaphors have done little to bridge the divisions that emerge as scientists seek to understand what brains are. After centuries of research, including recent advances in exploring consciousness through imaging techniques such as functional magnetic resonance imaging, there’s still no answer to Shakespeare’s question in *The Merchant of Venice* — “Tell me where is fancy bred, Or in the heart or in the head?”

We can’t stop using metaphors. Scientists depend on figurative language to organize and communicate thoughts and ideas. But whether the neurosciences can get closer to a compelling idea of the brain in the decades ahead might depend on a full reckoning of the role of metaphors. Top of the list: researchers should acknowledge that although certain word choices seem innocent, many carry malign overtones. Ideas of the brain have often embedded inequities and prejudices about race, class, gender, sexuality and agency.

On these matters, Cobb should have said more. The word ‘racist’ appears only a few times in his book, and then only in footnotes. But a little thought makes clear that seemingly innocent metaphors like ‘higher’ and ‘lower’ functions, or descriptions of specific anatomical structures as ‘primitive’, carry racialized baggage. When originally characterized, they spoke to the ghastly view that the nervous systems of white, upper-class men made them evolutionarily superior to those they subordinated at home and abroad. Similarly, it is discomfiting to realize that Broca’s area, linked to language processing, is named for the French physician Paul Broca, who believed in a hierarchy of peoples. That, in 2020, there are scientists who still talk about ‘female brains’, an idea Cobb rightly derides, is evidence that gender (a word that appears only in the bibliography) remains central to too many people’s ideas of how the brain is constructed. And he makes no mention of what neurodiversity advocacy might mean for figurative language. Whatever new metaphors are to come, ones that embrace differences inclusively will be more insightful and more profound.

The Idea of the Brain puts our current predicament in context and synthesizes much that needs attention. It is a very good book. It could have done more in a time when science is coming to terms with the limitations of the straight, white, wealthy, Western, non-disabled, male perspective. But I hope it provokes contemplation about why certain metaphors linger, where they come from, how they persist, and in what ways they burden us with the invisible assumptions of past cultures.

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