BOOKS & ARTS

Science, freedom and trade

Michael Shermer enjoys two books that examine economics and politics from a scientific perspective — one explaining the experimental basis for democracy, another placing trade in an evolutionary context.

In a 1963 lecture, Nobel-prizewinning physicist Richard Feynman opined on the nature of politics, arguing that the US governmental system “is new, it’s modern, and it is scientific”. Feynman reasoned that the way in which the system had been designed from scratch in the eighteenth century made it flexible enough to evolve as ideas were “developed and tried out and thrown away”. The writers of the Constitution, he noted, knew of the value of doubt.

Two new books discuss how science underpins democracy and trade. Timothy Ferris argues in *The Science of Liberty* that the experimental nature of liberal democracies is no accident, and in *The Rational Optimist*, Matt Ridley examines economics in the light of evolution.

Most science historians attribute the rise and success of the scientific enterprise to the Enlightenment values of reason, empiricism and anti-authoritarianism. Ferris reverses the causal vector. Most of the founding fathers were serious amateur scientists who deliberately adopted methods of data gathering, hypothesis testing and theory formation. Thomas Paine, for example, was an amateur astronomer who speculated that every star is a sun like our own, with orbiting planets. Assuming that science is universal, he believed that inhabitants of other worlds would discover the same natural and social laws as ours. “All the great laws of society are laws of nature,” Paine wrote in his 1791 treatise *The Rights of Man*.

These laws are discovered through experiment. Paine protested against ridiculing unsuccessful experiments because through trial and error comes progress. Moreover, political elections are scientific experiments. “I smile to myself when I contemplate the ridiculous insignificance into which literature and all the sciences would sink, were they made hereditary,” Paine growled, “and I carry the same idea into governments.”

The 1776 US Declaration of Independence, Ferris says, is steeped in the language of science. Its opening reference to “the laws of nature and of nature’s God” echoes René Descartes’ and Isaac Newton’s laws of motion and nature. The assertion that there are “self-evident” certain truths — among them that all men are created

equal — was added to Thomas Jefferson’s original draft of the declaration by Benjamin Franklin. Both men were schooled in the axioms of Euclid’s geometry, an axiom being a statement that is self-evidently true.

Ferris’s case for freedom extends to economics. “There are no other human rights without the right to possess property — not just land and money, but intellectual property”, he writes. Trade in a free market cannot proceed without ownership; you cannot speak and write freely if the authorities own your phone, computer and website.

Ferris discusses the scientific approach taken by economist Adam Smith in his 1776 opus on political economy, *An Inquiry into the Nature and Causes of the Wealth of Nations*. Smith was practical, being more interested in understanding human affairs as they are rather than in how they ought to be; quantitative, stressing analysis whenever possible; and empirical, basing his arguments on objective observations of the real world. For instance, Smith’s book is crammed with mentions of bakers, weavers, coal miners, shipbuilders and landlords. Such an understanding of economics, Ferris asserts, has helped to bring about the great increases in wealth and reductions in poverty that we have witnessed throughout history.

The fact that this assertion remains true today, even after the financial meltdown of 2007–09, motivates Ridley to examine the role of trade across human evolution. In *The Rational Optimist*, Ridley — a science writer and former non-executive chairman of the troubled UK bank Northern Rock — explains that trade is more than the exchange of

money for goods and services: it satisfies needs. When Smith attributed the wealth of a nation to “the propensity to truck, barter, and exchange”, he was describing an evolved trait of our species. Even chimpanzees barter to ensure reciprocity: if chimp A grooms chimp B, the groomed

chimp is more likely to come to the aid of the groomer in a future conflict. But human trade incorporates individual values: “Give me that which I want, and you shall have this which you want”, Smith wrote. That aspect of exchange brings mutual prosperity. Trade is often unequal, but still benefits both sides, Ridley explains.

Ridley’s long view of trade begins more than 100,000 years ago, when human culture itself began “to replicate, mutate, compete, select and accumulate”, as genes had been doing for billions of years. Once early hominins started exchanging things, culture suddenly became cumulative, and “the great headlong experiment of human economic ‘progress’ began”. Specialization and the division of labour led to time-saving innovations that translated

to prosperity, which in turn led to more innovation and specialization that saved more time and generated more prosperity.

Such self-catalysing feedback explains the growth of civilization. Before 10,000 years ago, humans lived in small groups of hunter-gatherers, with an average annual income equivalent to about US\$100 per person and around 300 products per village. Today, the global average income is around \$6,000 per person per year (\$40,000 in Western cities) and there are about ten billion products available. Even within one generation, people today earn three times as much as their parents did in the 1950s, when adjusted for inflation.

Ridley compiles a substantial database of statistics and examples and weaves them into a compelling narrative. Critics of capitalism will undoubtedly be provoked, but they will find it hard to counter his well-crafted arguments. Ridley praises the supermarket, which lands in a town and causes a drop in its competitors’ prices, saving its customers hundreds of billions of dollars a year. He does not mourn the loss of smaller stores that are driven out of business, as this must be balanced against the benefits that customers, especially the poorest, gain in terms of cheaper, more varied and better goods. The consumer is the one who benefits, even if some producers don’t like it.

“In the long run, what counts is how consumers prosper by obtaining high-quality products at low prices.”

The Science of Liberty: Democracy, Reason, and the Laws of Nature

by Timothy Ferris

HarperCollins: 2010. 384 pp.
\$26.99

The Rational Optimist: How Prosperity Evolves

by Matt Ridley

HarperCollins: 2010. 448 pp.
\$26.99

G. STUBBE/MINNEAPOLIS STAR TRIBUNE/MCT/NEWS.COM

In *The Wealth of Nations*, Smith argued that economies should be consumer-driven, not producer-controlled. He exposed the old mercantilist system — in which a nation's prosperity was assumed to depend on its assets — as mere economic tribalism and industry protectionism. “The wealth of a country consists, not of its gold and silver only, but in its lands, houses, and consumable goods of all

different kinds,” Smith wrote. Ridley agrees: in the long run, what counts is how consumers prosper by obtaining high-quality products at low prices. He notes that of the people designated as ‘poor’ who live in industrialized Western nations today, 99% have electricity, running water, a refrigerator and flushing toilets.

The Rational Optimist dovetails well with *The Wealth of Nations* and with *The Science of*

Liberty in demonstrating that where people are free to trade in the broadest sense — including the free exchange of everything from genes to ideas — prosperity ineluctably follows. ■

Michael Shermer is publisher of *Skeptic* magazine and adjunct professor of economics at Claremont Graduate University, Claremont, California 91711, USA. He is the author of *The Mind of the Market*. e-mail: mshermer@skeptic.com

A flowering of pleasure and pain

The latest collaborative artwork from neuroscientist Morten Kringelbach and artist Annie Cattrell reveals — and revels in — sensory dialogues in the brain, explains **Martin Kemp**.

Why is the neuroscientist Morten Kringelbach exhibiting in an art gallery a photograph of a dried globe amaranth (*Gomphrena globosa*) unfolding in a glass teapot on a scenic balcony? His mysterious picture accompanies a sculpture of brain connectivity made by Kringelbach's collaborator, the Scottish artist Annie Cattrell. It seems here as if the scientist is acting like an artist and the artist like a scientist. But this framing is wrong; our terms of reference are too crude.

For an explanation, we must look at the history of the developing collaboration between Kringelbach and Cattrell (see *Nature* 424, 18; 2003). During Cattrell's highly productive residency at the Royal Institution in 2002, she worked with the neuroscientist's data to model, in three dimensions, the zone of brain activity that corresponds to the stimulation of each of the five senses. She cast the shape of each sensory zone in resin and mounted them in five crystalline cubes to create the artwork *Sense*.

The intellectual and visual traffic in their collaboration was not all one-way. Cattrell's translation of data into sculptures made some of the neurological issues appear differently to Kringelbach. His involvement with the making of *Sense* confirmed to him that sensory identification precedes and is not modified by hedonic (pleasure-orientated) processing. The collaboration heightened his concern with questions about the vital contextualizing activities that occur below the threshold of brain monitoring. What determines how judgement, subjective experience and decision-making occur on the basis of sensory input?

Their new sculpture *Pleasure/Pain* — which I deliberately attribute to both of them — models the structural connections of a small region in the brainstem, the periaqueductal grey, as revealed by a method of magnetic resonance imaging called diffusion tensor imaging. The piece explores the links that might be activated during sensations of pleasure and pain. The periaqueductal grey is a pivotal and primitive

area of the brainstem that functions in ways that are incompletely understood.

Low frequencies applied to the periaqueductal grey during deep-brain stimulation relieve chronic pain; higher frequencies enhance the pain. The region works with other areas of the brain through a reciprocal call-and-response mechanism. Oscillations of neural activity bounce back and forth, moving at different frequencies, some initiating pain, others moderating it. As Kringelbach explains, “what is key is that the sender and recipient neurons — like two girls rhythmically swinging a jump rope for a third to hop over — must be in sync.”

Cattrell created the model of this oscillating connectivity using a rapid prototyping method called selective laser sintering. It is a kind of sculptural photocopying in which cross-sectional layers are fused to create a solid model. Delicate traces of the successive layers can be detected on the surface of the sculpture, like contour lines on a map. The resultant shape invites analogies — an incredibly complicated

Pleasure/Pain (left) and *Flowering* embody sensory pleasure in different ways.

vertebra perhaps, or a wondrous fungal growth, or even a blossom flowering posthumously in the scalding water of a teapot.

It is within the shared openness of the sculpture and the photo that our crude premises break down. The model of the connections of the periaqueductal grey does not record a set structure, but rather the potential pathways of a dialogue — one that may blossom to induce pleasure or surge back and forth to produce pain. There is uncertainty both in the process and in our understanding of it. The intricate, visually delicate and evanescent form of the sculpture embodies hedonic potentials and plots aspects of the fuzzily understood.

In *Flowering*, the image of brewing tea exudes a promise of sensory pleasure both in itself and in its setting. The Sun slants across a balcony set high above blue hills. The pleasure passes beyond the visual, evoking the exhilarating aroma and fragrant taste of the refreshing tea.

Cattrell and Kringelbach are telling us that art can be as rationally founded as Renaissance theorists insisted, and that science can be as suggestively open as the act of looking itself. ■

Martin Kemp is emeritus professor in the history of art at the University of Oxford, Oxford, UK.

Pleasure/Pain and *Flowering* are part of the show *Experiments*, at GV Art in London until 29 May.

P. KIDD/GV ART GALLERY; M. L. KRINGELBACH