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From the choice of a child's name to the widespread difficulty in understanding the laws of physics, human beings are governed, Steven Pinker says, by innate and often fallacious conceptual frameworks. Time, he tells Matthew Reisz, for us all to start 'reprogramming'.

For Stephen Pinker, we humans are "verbivores, a species that lives on words". By putting our verbal habits under the microscope, he argues in his new book, *The Stuff of Thought*, we can learn a lot about human nature and the innate conceptual frameworks whose "design quirks give rise to fallacies, follies and foibles in the way that people reason about the conundrums of modern life".

Such an analysis, he claims, "underscores the place of education in a scientifically literate democracy and even suggests a statement of purpose for it (a surprisingly elusive principle in higher education today). The goal of education is to make up for the shortcomings in our instinctive ways of thinking about the physical and social world."

Pinker has always gone for the big subject, in his celebrated accounts of *The Language Instinct* (1994) and *How the Mind Works* (1997) and his powerful contribution to the nature side of the nature-nurture debate, *The Blank Slate* (2002). He remains a staunch defender of the broad overview as the best way of tackling fundamental issues.

"I hope to bring clarification to areas that tend to be discussed piecemeal," he told me in London this week. "A typical paper in my field will devote 80 per cent of the space to describing the experiment, there will be a literature review - and only a couple of paragraphs about what it means at the end. Those couple of paragraphs are not enough to clarify what the experiment shows. In a book like this I have the luxury of going on for more than a couple of paragraphs - being rigorous enough to satisfy my academic peers without boring the general reader." His general books are now cited far more often than his scholarly papers.

Canadian-born Pinker, now Johnstone Family professor in the department of psychology at Harvard University, is one of those people who seems to know about everything, but he is extremely charming and approachable in person, only too happy to engage with my lame arguments that (contra *The Blank Slate*) parental behaviour might have a significant impact on the way children turn out. *The Stuff of Thought*, Pinker explains, continues his "attempt to get at the underlying concepts and motives out of which the complexity of human behaviour comes. What are the underlying rules, the underlying elements, the building blocks, the alphabet, that bring us closer to human nature?"

Although Pinker has had some fierce disputes with Noam Chomsky, the model of Chomsky's Universal Grammar is still at the heart of his thinking. "While particular culture, particular skills, particular bits of knowledge cannot possibly be innate any more than a particular language is, there is an abstract underlying system that could plausibly be innate - not an inventory of behaviours but rather a set of generative rules for combinatorial mechanisms. You can apply that general mindset to things other than language. What are the underlying emotions that give rise to the full palette of human emotional expression? What are the underlying social relationships that in different combinations give rise to the complexity of social life? And so on."

Pinker's book starts with some unpromising-looking linguistic minutiae - why does it sound natural to splash a wall with paint but not to coil a pole with a rope? - as a means of opening an unexpected window on human nature. Certain ways of thinking about space, time and causation, it soon emerges, seem to be built into the

way we talk and think, for example the notion that "events can be explained by the world's very nature, rather than being just one damn thing after another".

The Stuff of Thought combines Pinker's commitment to overarching theories with an infectious passion for the details of language. He delights in competitive black street insults ("Your mama's so dumb she thinks Moby Dick is a venereal disease"). He reflects on why people got so upset when Pluto was declassified as a planet and why the word "celanthropist" - for celebrity philanthropist - never caught on.

He considers the naming of children, whose fashions do not require the influence of multinationals, governments or a National Rebecca Association. He uncovers the issues of "face" and status hidden in transparent "indirect speech" such as "Would you like to come up for a coffee?" or "Nice store you got there. Would be a real shame if something happened to it."

Even more exuberant and entertaining is the chapter on swearing, a style of speech that links areas of life ranging "from mammaries to messiahs to maladies to minorities". Today's abuse, Pinker notes, can never be as vicious as a simple "Go to hell!" was at a time when "people actually feared they might be sentenced for ever to searing flames, agonising thirst, terrifying ghouls and blood-curdling shrieks and groans". "The lexical libertines" of the 1960s who believed that more openness about sex would lead to less illegitimacy and fewer sexually transmitted diseases have been proved utterly wrong. And the distinctions between words such as "hump" and "bonk" (and their even ruder equivalents), on the one hand, and phrases such as "sleep together" or "have relations", on the other, reflect "two very different mental models of sexuality".

Yet if language opens a window on the rich variety of human thought processes, it also reveals some inbuilt limitations. "Our words and constructions," writes Pinker, "disclose conceptions of physical reality and human social life that are similar in all cultures but different from the products of our science and scholarship". Much that science reveals to us, in other words, will always feel profoundly "unnatural" - and that has major implications for how it should be taught.

We have an innate tendency, for example, to make a sharp distinction between animals and inanimate objects: "Our natural mindset in biology is essentialist. We think organisms have some natural elixir or essence that gives them their form and empowers their movement."

The only way around this is to get people "to set aside their essentialist thinking and apply the kind of intuitive engineering you might use in putting up a couch, cooking or repairing a sewing machine. Now apply that to organisms. It doesn't come naturally, thinking of limbs as levers or the heart as a pump. We think of them as soft squishy stuff with magic gel inside them. But if you're already capable of dismantling things and figuring out how they work as machines, you can take that approach and apply it to a rabbit."

As this example suggests, the best technique is often to drive out an unhelpful metaphor with a more illuminating one. One of the most powerful chapters in The Stuff of Thought makes the case that metaphors are not just decorative or optional extras but can be "a way of adapting language to reality, not the other way round, and (of) capturing genuine laws in the world".

Human beings also seem to have some fundamental problems with statistics: "We don't have a natural sense of two overlapping distributions." That means that statements about average differences between men and women, for example, are often interpreted as applying to all individuals unless they refer to something easily visualised, such as height.

Physics presents an even more fundamental challenge. Relativity theory and quantum physics are famously mind-bending, but Pinker stresses that "there is nothing intuitive about Newtonian physics either. The mental model of causation behind language is more like the mediaeval theory of impetus - objects are imparted with a kind of oomph, which pushes them along but gradually dissipates. A lot of the errors that students, including physics students, make come from consulting that folk theory and not realising that Newtonian physics is at odds with it."

As well as the content of much significant science, Pinker calls attention to the social structures it requires. "Authority is to be recognised and discounted," he tells me, "so that if a pipsqueak student challenges me as a big-shot professor, I can't stare them down because I have credentials and they don't. Though that is probably the default way in which humans interact, it is a way we turn off in science. If someone challenges me, I can't say: 'That's not very nice, it's rather rude of you to imply that all my work is in vain.' Such a response would be perfectly appropriate in a family or among friends - but it can lead to the polite consensus of traditional societies, as opposed to the open debate we depend on in a democracy or the scientific community. That is another example of suppressing the instinctive way of behaving."

As this comment suggests, Pinker believes that the qualities science requires are much more widely valuable and "ought to be a goal of education, particularly higher education. The definition of an educated person includes scepticism towards dogma, authority and 'common sense', the openness to investigation and fact that should also impel journalism and governance - it's about reprogramming yourself, to the extent that it's

possible, and goes with functioning in a democracy. It is unnatural - you need that in science but not only in science." When I raise my eyebrows at the sinister associations of the word "reprogramming", he suggests "debugging" instead.

Such "debugging" might involve the kind of general course in probabilistic and critical thinking that Pinker proposed at Harvard when he was on the general education committee, a course he hoped could "supply a set of cognitive tools that can be applied in many domains and are so cognitively unnatural that they deserve attention at university".

But it also requires that teachers and academics take far more direct account of the ways in which we naturally think and find ways of bypassing it: "A lot of education would be more effective if it singled out the misconceptions that students bring into the class from the way we evolved or grew up or both, and highlighted the differences between that and what we have to learn."

The Stuff of Thought: Language as a Window into Human Nature is published by Allen Lane/Penguin, Pounds 25.

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