BOOKS Nature versus Nurture: the state of play Susan Greenfield THE BLANK SLATE By Steven Pinker Penguin, £25, pp.561, ISBN:0713992565

The Blank Slate, more readily recognised in its original Latin as tabula rasa, is the soubriquet for the view that in the eternal Nature-Nurture debate the scales tip heavily in favour of the environment: when it comes to the human mind, nothing is left to the caprice of genes. Steven Pinker, well known for The Language Instinct and to a lesser extent How the Mind Works, devotes some 500 pages to refuting this stance. Effectively, then, this book is all about human nature - its validation, characterisation, and neurological basis, along with all its wider moral, political and social baggage.

Given the ambitious theme, and indeed the admirably detailed though sometimes long-winded narrative, it is surprising to find no mention of Sigmund Freud, who might justifiably have claimed to have started this particular ball rolling. After all, Freud renounced the primitive neurology of his day, to use psychoanalysis as a tool for understanding human nature: he earned his place in history by analysing behaviour in the now familiar terms of the atavistic Id, the enabling Ego, and the moralistic Super-ego. Surely consideration of these classical concepts would have been relevant to Pinker's thesis?

Nonetheless, the uninitiated and specialist alike will enjoy the subsequent defence of that thesis against various potential counter-arguments. Pinker cautions quite correctly that behaviours are not entirely 'genetic' or 'environmental' in their cause, but rather that there is a probability of varying degrees, that some trait will surface in our psychological repertoire. Yet Pinker emphasises 'Nature', and a recent finding, not mentioned in his book, should stand as a salutary reminder of the persistent influence of 'Nurture'. In mice with the gene 'for' the movement disorder Huntington's Chorea, where the probability of occurrence in identical twins is 100 per cent, the degree of impairment and age of onset can still be reduced and delayed respectively by placing the mice in a stimulating environment. Clearly other unidentified factors within the brain are playing some part, even as here, when the influence of the gene should be paramount.

One very important complication is that there is no clear divide between how a gene is switched on by an immediate factor, a chemical within the brain that might be dubbed 'innate', and a similar chemical indirectly triggered by some remote feature or factor in the 'environment'. As Pinker himself accurately describes, genes direct the manufacture of proteins, the building blocks of all brain operations: in one sense, then, it would be hard to see how any mental trait was not always 'genetic'. Yet this making of particular proteins is constantly being stopped and started in different genes as a result of their interaction with a host of different influences, be they molecular time-switches during development, or the indirect input of the uterine environment, or chemicals feeding back from the rest of the body, or ultimately changes triggered by signals coming in from the outside world through our senses. Genes are not tiny tyrants that set the agenda for brain function and dysfunction - rather they are integral components in a highly complex two-way street between the brain and the world in which it lives. Although Pinker touches on this issue, he goes no further into exploring how we might ever unravel these sophisticated interactions, nor does he assess the value of the notion of the 'new sciences of human nature' in the light of this daunting challenge.

Predictably, twin studies form a central plank of support for the central thesis. Identical twins reared apart are more similar than non-identical twins; whereas non-genetically related children reared as siblings are as different from each other as individuals plucked randomly from the general population. Pinker, however, points out that even when factoring out the common feature of middle-class homes within a national culture, eerie parallels still persist between identical twins.

But surely the case for 'human nature' would better be argued by a similarity in identical twins in vastly different inter-continental cultures, and indeed for similarities that are generic traits, not ones of individual quirkiness. Pinker tells of anthropological studies demonstrating just this point - the universality of human emotions. Then again, few would deny, ever since Darwin's famous treatise on this theme, that the repertoire of basic feelings is uniform for all of us: more relevant surely for the identification of the physical basis of 'human nature' is the what, when, where and how such emotions are realised by the chemicals in the physical brain. Pinker does not explore this issue. When it comes to the counter-arguments of computer science, however, a sound and

persuasive case is put that artificial neural networks cannot replace mental structure and function, though the subsequent proposition that computer modelling might still act as a link between 'biology and culture' is not sufficiently developed to be convincing.

The third and final argument is the issue of brain plasticity. The reader is treated to a balanced review of data showing how stimulation of the environment can influence the connections between brain cells, or not. The conclusion is that although fine-tuning of connectivity can indeed occur as a result of what happens to an individual brain, the 'basic architecture develops under genetic control'.

No one would dispute that all brains are grossly the same, but the whole point is how these gross similarities might then account for our innate mental make-up. At this point, another startling omission is that of Paul MacLean: back in the middle of the last century MacLean attempted a stunning synthesis of how macro brain structures related to 'human nature' - such as the collective 'reptilian' hysteria of crowds. Although now regarded as naïve and simplistic, it was at least a stab at understanding how chilling phenomena such as the Nuremberg rallies could ever happen, and how they were reflected in the intertwining configuration of brain regions. Pinker does not offer anything comparable. The 'innate specialisation' of brain systems he mentions isnot very illuminating as an abstract notion, not least because it suggests, erroneously, that brain systems function almost as autonomous mini-brains. Perhaps after all we should be looking at the more fine-grained networking between neurons to find how 'innate' traits might arise, but then we are back again at the level where the subtle iterations of genes-proteins-and environment play out.

Because of this blurred boundary between genes and environment, Pinker is unable to root 'human nature' anywhere, at any level. Instead, he opts for a modular overview of brain operations, arguing that a natural tendency to murder is usually overridden by a moral inhibition against doing so. This line of thought is very like that of Freud, or indeed MacLean, but is neither as precise psychologically as the former, nor as anatomically rigorous as the latter.

Nonetheless, a 'combinatorial' mode of brain functioning would account for our diversity, using the same basic innate building blocks of our generic brain structures. Pinker clearly likes combinatorial ways of looking at the brain because this more macro level echoes how genes could work on a much smaller scale, achieving diversity through many different combinations of relatively few components. Yet the combinatorial/modular model of the brain raises more questions than it answers. There are the uneasy questions again, of what, why and how, that need more neurobiological spelling out, if they are to be in any way useful.

The Blank Slate offers an eloquent attack on an old idea, rather than any novel insight into the functioning of the physical brain. However, it still makes for an absorbing read and an excellent introduction to the state of play of the Nature- Nurture debate at the start of the 21st century. Return to top of page