BOOK REVIEW

Mind, brain, law and culture

Some foolish folks believe that history matters, that human societies and human behaviours have developed over thousands of years largely because of the elaboration of an increasing complex set of social, cultural and material phenomena that need to be examined on their own terms. The wiser among us, however, understand that we are only animals, and as such are ruled by our biology, just as ineluctably as the ant or the rhesus monkey, and that if we want to understand human action in general, or more specialized realms like the human institution of the law, it is to our biology that we must turn. More specifically, it is mostly our brains that matter, and therefore it is to the elucidation and illumination provided by evolutionary psychobiology and contemporary neuroscience that we need to look for answers. Science, HARD science, will uncover the secret wellsprings of all our actions, and we can then leave behind once and for all the soft speculations of the social sciences and gratefully set aside the empty verbiage of the philosophers. Or perhaps, if we are a bit more charitable and ecumenical, we can incorporate some bits of the harder social sciences, such as economics, game theory and cognitive psychology, while abandoning the fuzzy notions foisted on us by soft-hearted and soft-headed anthropologists, sociologists and historians.

Semir Zeki, a London-based neuroscientist, and Oliver Goodenough, an American academic lawyer at the University of Vermont, have assembled a collection of papers embracing this neurobiological perspective and laying out its implications for the law. They, and their contributors, can barely contain their excitement. Technical advances in brain imaging, particularly PET and functional MRI (fMRI) have allowed us to visualize brain activity with an unprecedented level of precision. Simultaneously, at the conceptual level, we have finally grasped that subjective mental states have direct neural correlates. The implications are profound. Where once ‘the study of subjective mental states would have been considered by many to be an unscientific pastime, because it was not objectively verifiable’, now a whole new vista opens before us, one that will ‘put a biologically informed psychology front and center in jurisprudential study’ (p. xii).

Consider just the implications for the criminal law. Here, the editors anticipate, ‘brain-imaging techniques will replace finger-printing and lie detector tests as reliable indicators of identity and of the truthfulness of a witness’s statement’ (p. xiii). Even more significantly for a common-law system that relies upon the notion of mens rea as a key ingredient in the assessment of a defendant’s culpability, the fallible assessments of a lay jury can be replaced by hard scientific fact. In place of an error-prone human justice, ‘in the very near future’ we can depend upon a legal system grounded in ‘biological justice’ (pp. xiii, xiv).

But all aspects of the law will benefit from the new brain science. As we understand that human emotions and cognition are simply the product of the material operations of our brains, and are able to provide clear pictorial evidence
of how human beings make decisions and determine their preferences, all sorts of sub-branches of the legal enterprise, from contracts to marriage law, from property to estate and inheritance law, will fall under the sway of ‘objective neurobiological evidence’ (p. xiv). Once we grasp how our brains work, nothing else is material, for all human action, all human thought, all of society and social institutions, issue from those billions of cells and their interactions. And the scientific truth of the matter, as Joshua Greene and Jonathan Cohen inform us, is that ‘in a very real sense we are all puppets. The combined effects of gene and environment determine all of our actions’ (p. 217).

For too long, we have clung to magical fables about free will and human autonomy. At last, with the aid of modern neuroscience, we can appreciate ‘the mechanical nature of human action in a way that bypasses complicated arguments’ (p. 217). Who needs those? As we improve current technology, we can expect the arrival of ‘extremely high resolution scanners that can simultaneously track the neural activity and connectivity of every neuron in the human brain, along with computers and software that can analyse and organize these data’ (p. 218). And down the road a little further, ‘this sort of brainware may be very widespread, with a high-resolution scanner in every classroom. People may grow up used to the idea that every decision is a thoroughly mechanical process, the outcome of which is completely determined by the results of prior mechanical processes’ (p. 218).

Utopia looms, thanks to the breakthroughs brought forth by the decade of the brain. For it is not just our petty or consequential legal squabbles that will fall by the wayside once we abandon an earlier metaphysics. ‘[I]n a “millennial” future, perhaps only decades away, a good knowledge of the brain’s system of justice and of how the brain reacts to conflicts may provide critical tools in resolving international political and economic conflicts’ (Zeki and Goodenough, 2006, p. xiv). Harmony will rule, democracy will triumph, when neuroscience at last fulfils its destiny as the queen of all the sciences.

It will do so in part because ‘democratic institutions are not artificial constructs, but rather are expressions of our own evolved, and complimentary [sic], desires for freedom and social stability’ (Hoffman, p. 15). Likewise, ‘there is an inextricable evolutionary link between justice and democracy’ (Hoffman). On the mundane, daily level, even the decisions of judges, juries and legislatures depend upon preferences ‘that reflect the interaction between the case at hand and the neuroeconomically evolved, probabilistic, norms that all judges, jurors, and legislators carry inside their brains’ (Hoffman, p. 14). As for the market economy, that too derives from our biology. It is not just that ‘fundamental principles of property are encoded in the human brain’ (Stake, p. 185). Even more complex aspects of our economic behaviour may be built into us. For example, ‘we may have an innate sense of alienability; ‘instincts may tell us not only how to transfer property, but also to whom'; and ‘the property instinct connects with an instinct for equity in reciprocal exchanges’ (Stake, p. 186).

Thus, we can bask in the scientific certainty that ‘a democratic nation with a free market economy is the highest expression of the human spirit’ (Hoffman, p. 15). Truth, justice and the American way, it turns out, need no Superman to defend them, because they are hardwired into our biology. Their triumph in the not so long run is inevitable, supported as they are by psychological characteristics that are probably pancultural and likely to have been the product of natural selection’ (Hinde, p. 43).

‘[K]nowing more about the ultimate evolutionary causes of human brain design’ (Jones, p. 59) allows us to understand all manner of other social institutions and phenomena. The roles, the behaviours and the social situation of the sexes, for example, are heavily influenced by evolutionary biology. After all, ‘natural selection acts through reproductive success, and the reproductive requirements of the sexes differ . . . Men must compete for sexual partners, and protect those they have acquired. Male aggressiveness and assertiveness, machismo traditions and protective chivalry towards women are in harmony with this . . . In harmony with this, in most societies men hold the power in the social and political spheres.’ ‘Feminine dispositions’, in contrast, are, because of the same biological mechanisms, more focused on children, and on home and hearth. And ‘in harmony’ once more with built-in biological imperatives, ‘in probably all societies men are allowed more sexual license than women . . . [while] women are expected to be chaste, modest, and faithful’. All these features and more are part of the natural order of things, and ‘in keeping with evolutionary theory’ (Hinde, p. 45).

From this dream of certitude, however, we may happen to awake. If we do so, we may recall that we have been here more than once before. Many prominent Enlightenment philosophers advanced views of this sort. Cabanis (1802) famously claimed that the brain secretes thought just as the liver secretes bile, and neatly anticipated Hinde’s claims about the male/female divide: ‘Il faut que l’homme soit fort, audacieux, entreprenant; que la femme soit faible, timide, dissimule. Telle est la loi de la nature.’ As much as a half century earlier, Julien La Mettrie (1748) had announced that man was merely a machine. Nor were such views the peculiar province of the godless French: Sir William Lawrence (1816, 1823), one of the most prominent early 19th century British surgeons, was equally insistent that ‘physiologically speaking . . . the mind is the grand prerogative of the brain’, and announced that deranged thoughts ‘have the same relation to the brain as vomiting, indigestion, heartburn, to the stomach, cough, asthma to the lungs, or any other deranged functions to their corresponding organs’.

If this crude materialism might be seen as a passing phase, nothing more than a manifestation of Enlightenment enthusiasm, subsequent attempts to reduce human nature to biology have often had more sinister overtones. For 19th century physicians, few facts were more incontestably
established than that the female of the species was ‘the product and prisoner of her reproductive system’ (Smith-Rosenberg and Rosenberg, 1973, p. 334). Woman’s place in society—her capacities, her roles, her behaviour—was ineluctably linked to and controlled by the existence and functions of her uterus and ovaries. To the crises and periodicities of her reproductive organs could be traced all the peculiarities of her nature: the predominance in her of the emotional over the rational; her capacity for affection and aptitude for child-rearing; her preference for the domestic sphere and her ‘natural’ purity and moral sensibility. Her status as ‘a moral, a sexual, a germiferous, gestative, and parturient creature’ (Meigs, 1847, p. 5 quoted in Rosenberg and Smith-Rosenberg, 1973, p. 334), thus rested firmly upon the findings of science, which repeatedly demonstrated that ‘the functions of the brain are so intimately connected with the uterine system, that the interruption of any one process which the latter has to perform in the human economy may implicate the former’ (Burrows, 1828, p. 146). Such ‘interruptions’, of course, profoundly threatened women’s health, and formed the physiological foundation of her greater delicacy and fragility. And given that the central mediating role between brain and generative organs was played by the nervous system, it was no wonder that perhaps the most fearsome threats that were thus presented were to the feminine hold on sanity.

Henry Maudsley (1867) the leading anglophone student of what he termed the physiology and pathology of the mind, uncompromisingly made clear the implications of the scientific consensus: notwithstanding the selfish protests of the few, there remained the ‘inescapable fact that the male organization is one, and the female organization another, and that, let come what may in the way of assimilation of female and male education and labour, it will not be possible to transform a woman into a man’ (Maudsley, 1874, p. 466). The destiny of the overwhelming majority of women remained marriage and childbearing, and their education and upbringing should reflect that fact. In an ‘enthusiasm which borders on or reaches fanaticism’, the advocates of higher education for women overlooked the fact that ‘the energy of the human body [was] a definite and not inexhaustible quantity’ (Maudsley, 1874, p. 466), and women who over-exercised their brains risked deadly medical consequences. When all was said and done, ‘they . . . cannot escape the fact that a woman labours under an inferiority of constitution which there is no gainsaying . . . This is not the expression of a prejudice nor of false sentiment; it is a plain statement of a physiological fact’ (Maudsley, 1874, pp. 468, 479). Race suicide loomed for societies that permitted women to substitute (indubitably second-rate) intellectual endeavours for their real task: focusing their physical and mental energies on reproduction and on the care of the male of the species (Fig. 1).

For Victorian brain scientists, the facts of physiology thus definitively proved that the existing gendered social and moral order was rooted in the stern realities of the natural world. But the findings of biological science had, it emerged, a still broader social relevance. In fin-de-siècle Western society—in France, in Germany, in Britain, in the United States—the new evolutionary biology was invoked to explain a whole host of social ills: crime, mental illness, alcoholism, epilepsy, feeble-mindedness, poverty, all were a product of inherited inferiority and physical defect. Degenerate specimens, kept alive by the misplaced kindness of civilized societies, repaid that kindness by reproducing at a fearsome rate, for as unreasoning beasts they lacked the moral restraints built into their more intelligent fellow citizens. The upshot was that ‘every year thousands of children [were] born with pedigrees that would condemn puppies to the horsepond’ (Strahan, 1890, p. 334) (Fig. 2).

Physical isolation of the unfit in state-funded institutions was one scientific solution to the problem they posed, but the very size of the problem population made it an extraordinarily expensive one. The United States pioneered an alternative approach, compulsory sterilization. State after state passed such laws, and the policy survived a constitutional challenge before the Supreme Court. Convinced by the weight of scientific opinion, Oliver Wendell Holmes wrote for the eight justices who formed the majority that ‘it is better for all the world if instead of waiting to execute degenerate offspring for crime, or to let them starve for their...
imbecility, society can prevent those who are manifestly unfit from continuing their kind. The principle that sustains compulsory vaccination is broad enough to cover cutting the Fallopian tubes. Three generations of idiots are enough' [Buck v. Bell, 247 US 200 (1927)].

Of course, some might question the wisdom of allowing those cursed with a hopelessly inferior genetic endowment to continue to exist, even as eunuchs or their female equivalents. If one set aside sentiment, surely a more efficient solution could be found. Would it not be better 'to weed out and exterminate the diseased and otherwise unfit in every grade of natural life'? (Strahan, 1890, p. 331). Regrettably, though, physical elimination seemed to have its detractors. The American scientist Charles Davenport lamented that 'it seems to be against the mores to burn [to death] any grade of natural life'? (Buck v. Bell, 247 US 200 (1927)).

But it is time to 'fess up'. This time around, things are not different. The 'findings' reported in Zeki and Goodenough are for the most part a farrago of nonsense, unsupported speculation, breathtaking chutzpah and massive exaggeration. After our entertainment by speculative evolutionary genealogies, we are treated to a host of bathetic insights: 'children have propensities for both prosocial and selfishly assertive behaviour'; 'in practice rights are not quite “inalienable”, and differ to some extent between cultures'; in potentially cooperative situations, 'the decision of whether to take action involves apparently both cognitive mechanisms and trust and reciprocity and social mechanisms'; 'because law is generally generated by a subgroup, it most probably will operate to promote that subgroup’s welfare'. No kidding! I thought it was sociologists who recycled the trite and the obvious and called it an addition to knowledge.

Elsewhere, the evolutionary biology, psychology and economics that are invoked to support democratic 'instincts', property 'instincts' and justice 'instincts' are invented whole cloth in the crudest of fashions, and used to provide a naturalistic justification for the particular social arrangements this group of scholars happens to prefer (and that, as it happens, I tend to prefer too). Over and over again in the discussions of the origins and existence of supposed instincts, we encounter the weasel words 'perhaps'; 'could have been'; 'must have'; 'may'; 'probably'; 'it is not surprising that'; 'the evidence [sic] favours the view that'; 'likely to have been'; 'in keeping with the view that'; 'it is reasonable to assume that'; 'presumably'. Instincts are postulated in a frivolous fashion to provide support for whatever social arrangement is either observed or desired, and where reality diverges from what the postulated instinct dictates, the authors simply invent another ad hoc explanation of why this might be. 'Our operative legal principles exist because they more or less capture an intuitive sense of justice' (Greene and Cohen, p. 208). I see. Then how do we account for Mao’s China, Hitler’s Germany, Castro’s Cuba,
Verwoerd’s South Africa or a whole host of patently unjust societies to which one could point? Well, those societies somehow temporarily deviated down pathways at odds with our instincts. Too bad that such deviations make up most of recorded human history.

On the basis of no evidence whatsoever, we are informed that ‘Homer Greek society and Medieval Icelandic society ... probably exemplify the environment within which human brains evolved’ (Chorvat and McCabe, p. 134). Assume for a moment that one were to accept this bizarre claim. How then are we possibly to account for the extraordinary diversity of human societies? Or for the existence of Homeric or Icelandic societies themselves, both of them complex and ‘advanced’ beyond anything our authors appear to dream. So far as I am aware, no respectable scientist argues that the human genome has evolved to any significant degree since the Stone Age. Yet human culture and human society have transformed themselves in a quite extraordinarily diverse array of ways in that period, precisely because of the plasticity of human beings, their capacity to learn and innovate, and to transmit what they have learned and invented across generations.

Perhaps the neuroscience in the Zeki and Goodenough volume fares better than the evolutionary psychology? On the whole, I think not. Only to a quite limited degree and in very restricted circumstances are neuroscientific advances likely to have relevance for such things as the current legal system. Much is made of the fact that particular regions of the brain show heightened levels of activity on fMRIs when people, for example, are making choices, or telling lies (Fig. 3). Even Bishop Berkeley would not be surprised by that. When I move, speak, think, experience an emotion, one may presume this is correlated with physical changes in my brain, but such correlations prove nothing about the causal processes involved, any more than—not well—the existence of a particular sequence of events demonstrates that some early event in the sequence ineluctably caused a later event. Post hoc ergo propter hoc is an elementary logical fallacy.

And further problems immediately loom. As Zak wistfully but honestly acknowledges, different observers report different results—different locations for the thoughts in question. ‘There is’, for example, ‘no consistency between the findings of Rustichini et al. and Smith et al. about the neural substrates associated with ambiguity during choice’ (Zak, p. 144). Likewise, we have no way to translate ‘heightened activity’ into the contents of people’s thoughts, and no prospect of making such translations. Nor, as Spence et al. acknowledge in one of the few careful and balanced papers in the Zeki and Goodenough volume, do we possess any way of moving from weak inferences based upon statistical averages of the gross changes in brain function in large experimental groups to the level of the individual subject. Moreover, just as economists traditionally rely upon absurdly oversimplified portraits of human motivation to construct their models, so all the neuroscientific findings that are so proudly proffered reflect simple simulated experiments that in no way capture the intricacies of everyday social situations, let alone the complex interactions over time that make up human history.

One can grant that people who have suffered massive damage to their prefrontal cortex may reason differently from the rest of us, and perhaps be so lacking in inhibition as to find it difficult to exercise the forward planning, the emotional self-control and the tact that is required to be a fully functioning member of society. (One can grant, indeed, that dead people do not seem to think at all.) We had a naturalistic experiment of just this sort back in the 1940s, when neurosurgeons and psychiatrists used their primitive understanding of human brains to justify damaging the frontal lobes of mental patients to ‘cure’ them—and the lobotomized did indeed exhibit such symptoms and deficits. Were contemporary neuroscience to demonstrate the existence of similar physical malfunction in some people who have not had lobotomies that might very well bear on the issue of holding such people legally responsible. But knowledge of this sort would require no more than a
marginal adjustment of existing legal practice, not a wholesale rethinking of our entire judicial system.

One final point: many of the contributors to the Zeki and Goodenough volume seem to subscribe (if readers will forgive the awful pun) to a sort of mindless biological determinism. For them, what occurs in the world is simply the predetermined product of our evolutionary psychology and the physical construction of our brains, which respond as they must to the environment that contains them. We are, as Greene and Cohen would have it, mere puppets, helplessly acting out in a purely mechanical way our preprogrammed pathways. If so, I am at a loss to understand what these folks are doing when they publish books like this one. They seem to be trying to persuade us of something, to convince us to amend our ways and to acknowledge their superior wisdom. But that would necessitate our ability to assess arguments, to reason, to choose. And those, of course, are capacities for which their world has no place. Too bad. And not good (enough).

Much better is Bruce Wexler’s extended essay on the links between Brain and culture. Rather than positing a rigid separation between the biological and the social, Wexler insists that the two interact and mutually influence each other in powerful ways. It makes no sense, in his view, to regard the brain as an asocial or a presocial organ, because in important respects, its very structure and functioning is a product of the social environment. For the most remarkable feature of the human brain is ‘its deep and extended sensitivity …to shaping by psychosocial and other sensory inputs’ (Wexler, p. 3). What this means, he contends, is that ‘our biology is social in such a fundamental and thorough manner that to speak of a relation between the two suggests an unwarranted distinction’ (p. 13).

To an extent unprecedented in any other part of the animal kingdom, humans’ brains continue to develop postnattally, and the environmental elements that most powerfully affect the structure and functioning of these brains are themselves a human creation. As one would expect of a psychiatrist and neuroscientist, Wexler’s ‘conceptual starting point and foundation are…biological’ (p. 8). What he emphasizes, however, is the remarkable neuroplasticity of human beings, at least through adolescence, and the critical importance of non-biological factors in transforming the neural structures we are born with, thereby creating the mature brain. The very shape of the brain, the neural connections that develop and that constitute the physical underpinnings of our emotions and cognition, are profoundly influenced by social stimulation, and by the cultural and especially the familial environment within which these developments take place. It is in these settings that ‘the fine-grained shaping of the structural and functional organization of the human brain takes place’ (p. 16). Quite simply, ‘human nature…allows and requires environmental input for normal development’ (p. 16). And that development continues for a very long time, with increases in connectivity and changes in brain organization, especially in the parietal and frontal lobes taking place well into the third decade of life, whereas ‘corresponding changes in the brains of chimpanzees and other higher primates reach comparable levels of maturity during the second and third years of life’ (p. 32).

Wexler stresses that rather than being localized in particular regions of the brain or being the properties of individual neurons, thinking, feeling and remembering are the product of complex networks and interconnections that form as we mature. These in turn depend upon the selective survival and growth of cells and the pruning of connections among cells—processes that are heavily dependent upon the interactional environment in which the human infant is raised; and that are particularly important for the development of the cerebral cortex, whose size ‘relative to the rest of the brain is greater in humans than in any other species’ (p. 82). That environment, of course, is to an unprecedented extent a human-made environment, much of it taking effect through the medium of language. And crucially, ‘it is this ability to shape the environment that in turn shapes our brains that has allowed human adaptability and capability to develop at a much faster rate than is possible through alterations of the genetic code itself’ (pp. 3–4).

In support of these propositions, Wexler deploys evidence from a wide variety of human and animal studies on the effects of the social environment and sensory deprivation on mental functioning and neural development, attempting to bolster his arguments by drawing upon a variety of disciplines, ranging from neuroscience to linguistics to academic psychology to psychoanalysis. He argues that, though these bodies of knowledge have developed independently and separately, their findings on these fronts largely complement one another, a convergence reflecting the fact that ‘neurological and psychological function are two sides of a coin, and different aspects of each are joined in the organic wholeness of the individual’ (p. 1).

Wexler writes gracefully and clearly, and in the first two-thirds of his book makes a powerful case for his point of view. Some might argue that he underestimates the degree to which intelligence, temperament and individuality are dependent upon inherited, presocial characteristics of the person, and there is weight to this criticism. And yet to acknowledge that he may on occasion slight nature in favour of nurture does not, in my view, invalidate the fundamental thrust of Wexler’s argument.

That said, the final portions of Brain and culture struck me as far more speculative and vulnerable to criticism than these earlier chapters. Wexler’s claim that by early adulthood, the neuroplasticity of humans has sharply declined seems consonant with much of the available evidence. This remains true whether one focuses on such things as the increased difficulty in learning new languages or on the evidence about the growing stability of brain structure. But in his last chapters, the extrapolations that he makes from this state of affairs struck me as strained and selective. The greater rigidity of adult brains leads, he
suggests, to such phenomena as a ‘neurobiological antagonism to difference’ (p. 212), a resistance to novelty and change, a state of misery and illness in the face of altered worlds, even a propensity ‘to eliminate strange and foreign people’ (p. 212). Where earlier in life, we changed our brains to match our circumstances, now we try to change the world to match our newly static internal dispositions.

Significantly, these generalizations are supported, not by the sorts of evidence that are invoked earlier in the book, but by selective snippets from history and anthropology, allied to anecdotes about the effects of losing a spouse, the dread of seeing one’s children marrying those from another ethnic group or culture, or the dislocations attendant upon immigration to another country as an adult. We are invited to view the conflicts between Hutu and Tutsi and the genocide in Rwanda, the Crusades against the Moslems and against the Albigensian heretics in Languedoc, the Inquisition and a variety of other lethal encounters between disparate people and cultures, as in substantial part the product of a biologically rooted conservatism and ethnocentrism. To be sure, Wexler acknowledges ‘data to support [these] assertion[s] are not as clear-cut as the data . . . that support the arguments for environmental shaping of brain development’ (p. 212). But it does not stop him speculating along these lines, ignoring all the counter-examples that history and our own daily experience can just as easily offer: of adults embracing and seeking out novelty; of cultures comfortably co-existing; of delight in difference. The fact that even someone with generally so subtle a perspective on the interactions between brain and culture feels impelled to advance simplistic notions of this sort is a pity. It would seem that the siren song of biological reductionism is not easily resisted, even by those who ordinarily know better.

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