

IDEAS IN CONTEXT

Edited by Quentin Skinner (general editor), Lorraine Daston, Wolf Lepenies, Richard Rorty and J. B. Schneewind

The books in this series will discuss the emergence of intellectual traditions and of related new disciplines. The procedures, aims and vocabularies that were generated will be set in the institutions. Through detailed studies of the evolution of such traditions, and their modification by different audiences, it is hoped that a new picture will form of the development of ideas in their concrete contexts. By this means, artificial distinctions between the history of philosophy, of the various sciences, of society and politics, and of literature, may be seen to dissolve.

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THE TAMING OF CHANCE

IAN HACKING

*Institute for the History and Philosophy of
Science and Technology, University of Toronto*

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The argument

The most decisive conceptual event of twentieth century physics has been the discovery that the world is not deterministic. Causality, long the bastion of metaphysics, was toppled, or at least tilted: the past does not determine exactly what happens next. This event was preceded by a more gradual transformation. During the nineteenth century it became possible to see that the world might be regular and yet not subject to universal laws of nature. A space was cleared for chance.

This erosion of determinism made little immediate difference to anyone. Few were aware of it. Something else was pervasive and everybody came to know about it: the enumeration of people and their habits. Society became statistical. A new type of law came into being, analogous to the laws of nature, but pertaining to people. These new laws were expressed in terms of probability. They carried with them the connotations of normalcy and of deviations from the norm. The cardinal concept of the psychology of the Enlightenment had been, simply, human nature. By the end of the nineteenth century, it was being replaced by something different: normal people.

I argue that these two transformations are connected. Most of the events to be described took place in the social arena, not that of the natural sciences, but the consequences were momentous for both.

Throughout the Age of Reason, chance had been called the superstition of the vulgar. Chance, superstition, vulgarity, unreason were of one piece. The rational man, averting his eyes from such things, could cover chaos with a veil of inexorable laws. The world, it was said, might often look haphazard, but only because we do not know the inevitable workings of its inner springs. As for probabilities – whose mathematics was called the doctrine of chances – they were merely the defective but necessary tools of people who know too little.

There were plenty of sceptics about determinism in those days: those who needed room for freedom of the will, or those who insisted on the individual character of organic and living processes. None of these thoughts for a moment that laws of chance would provide an alternative to strictly causal laws. Yet by 1900 that was a real possibility, urged as fact by an

adventurous few. The stage was set for ultimate indeterminism. How did that happen?

This is not a question about some sort of decay in knowledge or management. The erosion of determinism is not the creation of disorder and ignorance – quite the contrary. In 1889 Francis Galton, founder of the biometric school of statistical research, not to mention eugenics, wrote that the chief law of probability 'reigns with serenity and in complete effacement amidst the wildest confusion'.¹ By the end of the century chance had attained the respectability of a Victorian valet, ready to be the loyal servant of the natural, biological and social sciences.

There is a seeming paradox: the more the indeterminism, the more the control. This is obvious in the physical sciences. Quantum physics takes for granted that nature is at bottom irreducibly stochastic. Precisely that discovery has immeasurably enhanced our ability to interfere with and alter the course of nature. A moment's reflection shows that a similar statement may be attempted in connection with people. The parallel was noticed quite early. Wilhelm Wundt, one of the founding fathers of quantitative psychology, wrote as early as 1862: 'It is statistics that first demonstrated that love follows psychological laws.'²

Such social and personal laws were to be a matter of probabilities, of chances. Statistical in nature, these laws were nonetheless inexorable; they could even be self-regulating. People are normal if they conform to the central tendency of such laws, while those at the extremes are pathological. Few of us fancy being pathological, so 'most of us' try to make ourselves normal, which in turn affects what is normal. Atoms have no such inclinations. The human sciences display a feedback effect not to be found in physics.

The transformations that I shall describe are closely connected with an event so all-embracing that we seldom pause to notice it: an avalanche of printed numbers. The nation-states classified, counted and tabulated their subjects anew. Enumerations in some form have been with us always, if only for the two chief purposes of government, namely taxation and military recruitment. Before the Napoleonic era most official counting had been kept privy to administrators. After it, a vast amount was printed and published.

The enthusiasm for numerical data is reflected by the United States census. The first American census asked four questions of each household. The tenth decennial census posed 13,010 questions on various schedules addressed to people, firms, farms, hospitals, churches and so forth. This 3,000-fold increase is striking, but vastly understates the rate of growth of printed numbers: 300,000 would be a better estimate. The printing of numbers was a surface effect. Behind it lay new

technologies for classifying and enumerating, and new bureaucracies with the authority and continuity to deploy the technology. There is a sense in which many of the facts presented by the bureaucracies did not even exist ahead of time. Categories had to be invented into which people could conveniently fall in order to be counted. The systematic collection of data about people has affected not only the ways in which we conceive of a society, but also the ways in which we describe our neighbour. It has profoundly transformed what we choose to do, who we try to be, and what we think of ourselves. Marx read the minutiae of official statistics, the reports from the factory inspectorate and the like. One can ask: who had more effect on class consciousness, Marx or the authors of the official reports which created the classifications into which people came to recognize themselves? These are examples of questions about what I call 'making up people'. This book touches on them only indirectly.³

What has the avalanche of printed numbers to do with my chief topic, the erosion of determinism? One answer is immediate. Determinism was subverted by laws of chance. To believe there were such laws one needed law-like statistical regularities in large populations. How else could a civilization hooked on universal causality get the idea of some alternative kind of law of nature or social behaviour? Games of chance furnished initial illustrations of chance processes, as did birth and mortality data. Those became an object of mathematical scrutiny in the seventeenth century. Without them we would not have anything much like our modern idea of probability. But it is easy for the determinist to assume that the fall of a die or the spin of a roulette work out according to the simple and immutable laws of mechanics. Newtonian science had no need of probabilities, except as a tool for locating underlying causes. Statistical laws that look like brute, irreducible facts were first found in human affairs, but they could be noticed only after social phenomena had been enumerated, tabulated and made public. That role was well served by the avalanche of printed numbers at the start of the nineteenth century.

On closer inspection we find that not any numbers served the purpose. Most of the law-like regularities were first perceived in connection with deviancy: suicide, crime, vagrancy, madness, prostitution, disease. This fact is instructive. It is now common to speak of information and control as a neutral term embracing decision theory, operations research, risk analysis and the broader but less well specified domains of statistical inference. We shall find that the roots of the idea lie in the notion that one can improve – control – a deviant subpopulation by enumeration and classification.

We also find that routinely gathering numerical data was not enough to make statistical laws rise to the surface. The laws had in the beginning to be

read into the data. They were not simply read off them. Throughout this book I make a contrast of a rough and ready sort between Prussian (and other east European) attitudes to numerical data, and those that flourished in Britain, France, and other nations of western Europe. Statistical laws were found in social data in the West, where libertarian, individualistic and atomistic conceptions of the person and the state were rampant. This did not happen in the East, where collectivist and holistic attitudes were more prevalent. Thus the transformations that I describe are to be understood only within a larger context of what an individual is, and of what a society is.

I shall say very little about mathematical conceptions of probability. The events to be described are, nevertheless, ingredients for understanding probability and for grasping why it has been such an incredible success story. Success story? A quadruple success: metaphysical, epistemological, logical and ethical.

Metaphysics is the science of the ultimate states of the universe. There, the probabilities of quantum mechanics have displaced universal Cartesian causation.

Epistemology is the theory of knowledge and belief. Nowadays we use evidence, analyse data, design experiments and assess credibility in terms of probabilities.

Logic is the theory of inference and argument. For this purpose we use the deductive and often tautological unravelling of axioms provided by pure mathematics, but also, and for most practical affairs, we now employ – sometimes precisely, sometimes informally – the logic of statistical inference.

Ethics is in part the study of what to do. Probability cannot dictate values, but it now lies at the basis of all reasonable choice made by officials. No public decision, no risk analysis, no environmental impact, no military strategy can be conducted without decision theory couched in terms of probabilities. By covering opinion with a veneer of objectivity, we replace judgement by computation.

Probability is, then, *the* philosophical success story of the first half of the twentieth century. To speak of philosophical success will seem the exaggeration of a scholar. Turn then to the most worldly affairs. Probability and statistics crowd in upon us. The statistics of our pleasures and our vices are relentlessly tabulated. Sports, sex, drink, drugs, travel, sleep, friends – nothing escapes. There are more explicit statements of probability presented on American prime time television than explicit acts of violence (I'm counting the ads). Our public fears are endlessly debated in terms of probabilities: chances of meltdowns, cancers, muggings, earthquakes, nuclear winters, AIDS, global greenhouses, what next? There is

nothing to fear (it may seem) but the probabilities themselves. This session with the chances of danger, and with treatments for changing odds, descends directly from the forgotten annals of nineteenth century information and control.

This imperialism of probabilities could occur only as the world itself came numerical. We have gained a fundamentally quantitative feel for things, how it is and how it ought to be. This has happened in part for real reasons. We have trained people to use numerals. The ability to assess even quite small numbers was, until recently, the prerogative of a few.

Today we hold numeracy to be at least as important as literacy. But even compared with the numerate of old there have been remarkable changes. Galileo taught that God wrote the world in the language of mathematics. To learn to read this language we would have to measure as well as calculate. Yet measurement was long mostly confined to the social sciences of astronomy, geometry, optics, music, plus the new mechanics. T.S. Kuhn has iconoclastically claimed that measurement did play much of a role in the 'Baconian' sciences that came to be called chemistry and physics.⁴ He urged that measurement found its place in physics – the study of light, sound, heat, electricity, energy, matter – during the nineteenth century. Only around 1840 did the practice of measurement become fully established. In due course measuring became a very experimental thing to do.

Measurement and positivism are close kin. Auguste Comte coined the word 'positivism' as the name of his philosophy, holding that in all the European languages the word 'positive' had good connotations. His own philosophy did not fare especially well, but the word caught on. Positive science meant numerical science. Nothing better typified a positive science than a statistical one – an irony, for Comte himself despised merely statistical inquiries.

The avalanche of numbers, the erosion of determinism, and the erosion of normalcy are embedded in the grander topics of the Industrial Revolution. The acquisition of numbers by the populace, and the professional lust for precision in measurement, were driven by familiar themes: manufacture, mining, trade, health, railways, war, empire. Similarly the idea of a norm became codified in these domains. Just as the railways mandated timekeeping and the mass-produced pocket watch, they also mandated standards, not only of obvious things such as the gauge of the rails but also of the height of the buffers of successive cars in a train. It is a more subtle decision, in this book, to focus on the more narrow aspects that I have mentioned, a decision that is wilful but not arbitrary. My project is philosophical: to grasp the conditions that made possible our present organization of concepts in two domains. One is that of physical indeter-

minism; the other is that of statistical information developed for purposes of social control.

This study can be used to illustrate a number of more general philosophical themes. I have mentioned one above: the idea of making up people. I claim that enumeration requires categorization, and that defining new classes of people for the purposes of statistics has consequences for the ways in which we conceive of others and think of our own possibilities and potentialities.

Another philosophical theme is reasoning. In thinking about science we have become familiar with a number of analytic concepts such as T.S. Kuhn's paradigms, Imre Lakatos's research programmes and Gerald Holton's themata. Following A.C. Crombie I have thought it useful to employ the idea of a style of reasoning.⁵ Crombie had in mind enduring ways of thinking such as (a) the simple postulation and deduction in the mathematical sciences, (b) experimental exploration, (c) hypothetical construction of models by analogy, (d) ordering of variety by comparison and taxonomy, (e) statistical analysis of regularities of populations, and (f) historical derivation of genetic development.⁶

Each of these styles has its own sources and its own pace. Those who envisage continuity in the growth of knowledge see each style evolving at its own rate. Catastrophists see sharp beginnings and radical mutations. One need not dogmatically adhere to either extreme in order to see styles of reasoning coming together. Each contributed to what Crombie calls 'the growth of a research mentality in European society'.

My topic is Crombie's style (e) which, of the six that he distinguishes, is quite the most recent. Despite various discernible precursors and anticipations, our idea of probability came into being only around 1660, and the great spur of statistical thinking did not occur until the nineteenth century. The statistical example makes plain that the growth of a style of reasoning is a matter not only of thought but of action. Take so seemingly unproblematic a topic as population. We have become used to a picture: the number of people in a city or in a nation is determinate, like the number of people in a room at noon, and not like the number of people in a riot, or the number of suicides in the world last year. But even the very notion of an exact population is one which has little sense until there are institutions for establishing and defining what 'population' means. Equally there must be ways of reasoning in order to pass from cumbersome data to sentences with a clear sense about how many were such and such. Most professionals now believe that representative sampling gives more accurate information about a population than an exhaustive census. This was unthinkable during most of the nineteenth century.⁷ The very thought of being representative has had to come into being. This has

ered techniques of thinking together with technologies of data collection. An entire style of scientific reasoning has had to evolve.

Its development was intimately connected with larger questions about a society is, and thus leads to speculation and historical study of the nature of the western concept of a community.⁸ But it also invites more secret analytical philosophy, because styles of reasoning are curiously authenticating. A proposition can be assessed as true-or-false only when there is some style of reasoning and investigation that helps to determine its truth value. What the proposition means depends upon the ways in which we might settle its truth. That innocent observation verges seriously on circularity. We cannot justify the style as the way best to cover the truth of the proposition, because the sense of the proposition itself depends upon the style of reasoning by which its truth is settled. A style of thinking, it seems, cannot be straightforwardly wrong, once it has achieved a status by which it fixes the sense of what it investigates. Such thoughts call in question the idea of an independent world-given criterion of truth. So the seemingly innocent notion of a style of reasoning can lead to deep waters, and it is wiser to enter them by wading into examples than by a high dive into abstraction. The development of statistical thinking may be our best example available – because most recent and enduring and now pervasive.

Historians will see at once that what follows is not history. One may pursue past knowledge for purposes other than history of science or history of ideas. A noncommittal account of what I am attempting might be: an epistemological study of the social and behavioural sciences, with consequences for the concept of causality in the natural sciences. I prefer a less expected description. This book is a piece of philosophical analysis. Philosophical analysis is the investigation of concepts. Concepts are words in their sites. Their sites are sentences and institutions. I regret that I have said too little about institutions, and too much about sentences and how they are arranged.

But what sentences? I use only the printed word, a minuscule fraction of what was said. The distinguished statistician I. J. Good noted in a review that 'the true history of probability or of science in general will never be written because so much depends on unrecorded oral communication, and also because writers often do not cite their sources'.⁹ The true historian of science is well able to solve the second problem, but not the first. One may nevertheless make a good stab at it by consulting the ample Victorian troves of notebooks, letters and other ephemera. I do not do so, for I am concerned with the public life of concepts and the ways in which they gain authority. My data are published sentences.

But which ones? I omit many pertinent words because one cannot do

everything. I leave out Malthus and Mendel, for example, A.A. Cournot, Gustav Fechner, Florence Nighingale and ever so many more modest participants in the taming of chance. Very well: but I say nothing of Maxwell, Boltzmann or Gibbs, although statistical mechanics is critical to the spread of chance and probability not only into physics but also into metaphysics. I say nothing of Charles Darwin, although evolutionary theorizing was to import chance into biology. I say nothing of Karl Marx fabricating an iron necessity out of the very same numerals, the identical official statistics, that I have incorporated into an account of the taming of chance.

There is an uncontroversial good reason for silence about these figures. Scholars and teams of scholars dedicate their lives to the study of one or another. It would be folly to venture a short story here, a mere chapter. But it is not only prudence and respect, but also method, that makes me hold my tongue. Transformations in concepts and in styles of reasoning are the product of countless trickles rather than the intervention of single individuals. Marx, Darwin and Maxwell worked in a space in which there was something to find out. That means: in which various possibilities for truth-or-falsehood could already be formulated. This book is about that space. So although a lot of sentences are reproduced in this book, they are the words not of heroes, but of the mildly distinguished in their day, the stuff of the more impersonal parts of our lives.

Sentences have two powers. They are eternal, and they are uttered at a moment. They are anonymous, and yet they are spoken by flesh and blood. I have tried to answer to these two facts. On the one hand, I do regard the sentences as mere material objects, inscriptions. But to do that, and only that, is to become lost in vain abstraction. As counterbalance, my epigraphs to each chapter are dated, to recall that on a real day important to the speaker, those very words were uttered, or are said to have been uttered. My footnotes (marked with asterisks) are anecdotes that would be improper in the more solemn text.* They give some tiny glimpse of who the speakers were. But there is seldom anything personal about the footnotes. They address the individual as official, as public writer, even if his behaviour may strike us, so much later, as strange.

Thus although many chapters have a central character or text, it is not because Salomon Neumann, A.-M. Guerry or John Finlaison is 'important'. They are convenient and exemplary anchors for a particular organization of sentences. I use the antistatistical method, that of Frédéric Le Play, topic of chapter 16. After having interminably trekked across the

* Notes at the end of the book provide references, and, rarely, numerical formulae. They are marked with numerals. A numeral after an asterisk (as ⁸³) indicates that note 3 at the end of the book bears on the material in the footnote marked *

written equivalent of his Hartz mountains, I take what I think is the best example of one speaker. Much like Le Play, I include a few stories, but the personages whom I use are in some ways like his household budgets, if, alas, less thorough.

There is one exception among these chapters. The final one is twice as long as the others, and is a rather full account of one side of one writer, namely C.S. Peirce. He really did believe in a universe of absolute irreducible chance. His words fittingly end this book, for as he wrote, that thought had become possible. But I argue that it became possible because Peirce now lived a life that was permeated with probability and statistics, so that his conception of chance was oddly inevitable. He had reached the twentieth century. I use Peirce as a philosophical witness in something like the way that I used Leibniz in *The Emergence of Probability*.¹⁰ But Leibniz was a witness to the transformation that I was there describing, namely the emergence of probability around 1660 and just afterwards. Here Peirce is the witness to something that had already happened by the time that he was mature. That is why he is the topic of the last chapter, whereas in *Emergence* the name of Leibniz recurred throughout.

Although other philosophers are mentioned in the two books, only Leibniz and Peirce play a significant part. The two works do, however, differ in structure in other ways. *Emergence* is about a radical mutation that took place very quickly. Doubtless, as Sandy Zabell and Daniel Garber have shown in an exemplary way, the book underestimated various kinds of precursors.¹¹ My central claim was, however, that many of our philosophical conceptions of probability were formed by the nature of the transition from immediately preceding Renaissance conceptions. Accounts of the methodology have been given elsewhere.¹² *Taming*, in contrast is about a gradual change. Hence the geological metaphors: avalanches, yes, but also erosion.

Most of my selections and omissions – such as my long treatment of Peirce and my neglect of any other philosopher – have been deliberate. But sloth and good fortune have also played their part. When I began work there was hardly any recent secondary material; now there is a great deal. I am particularly glad of new books by my friends Lorraine Daston, Ted Porter and Stephen Sigler, and of earlier ones by William Coleman and Donald Mackenzie. We all participated in a collective inspired and guided by Lorenz Krüger. The joint work of that group has also appeared. Hence there is now a number of brilliant and often definitive accounts of many matters that overlap with mine.¹³ They have made it unnecessary for me to examine a good many matters. And aside from specific histories, there are also points of great generality that I have allowed myself to gloss over in the light of that collective work. For example, another virtue of my

geological metaphor is that the erosion of determinism took place at markedly different rates on different terrains. Not uncommonly the least deterministic of disciplines most fiercely resisted indeterminism – economics is typical. This phenomenon emerges from the individual studies of the research group, and is further emphasized in a recent summing up of some of its results.¹⁴

I have mentioned a number of more specific topics on which I have only touched, or have entirely avoided: making up people; styles of reasoning; great scientists; philosophers; mathematical probability. There is a more glaring omission. I write of the taming of chance, that is, of the way in which apparently chance or irregular events have been brought under the control of natural or social law. The world became not more chancy, but far less so. Chance, which was once the superstition of the vulgar, became the centrepiece of natural and social science, or so genteel and rational people are led to believe. But how can chance ever be tamed? Parallel to the taming of chance of which I speak, there arose a self-conscious conception of pure irregularity, of something wilder than the kinds of chance that had been excluded by the Age of Reason. It harked back, in part, to something ancient or vestigial. It also looked into the future, to new, and often darker, visions of the person than any that I discuss below. Its most passionate spokesman was Nietzsche. Its most subtle and many-layered expression was Mallarmé's poem, 'Un Coup de dés'.¹⁵ That graphic work, whose words are more displayed than printed, began by stating that we 'NEVER... will annul chance'. The images are of shipwreck, of a pilot whose exact mathematical navigation comes to naught. But the final page is a picture of the heavens, with the word 'constellation' at its centre. The last words are, 'Une pensée émet un coup de dés'; words that speak of the poem itself and which, although they do not imagine taming chance, try to transcend it.

The doctrine of necessity

In 1892 the iconoclastic American philosopher C.S. Peirce proposed 'to examine the common belief that every single fact in the universe is determined by law'.¹ 'The proposition in question' – he called it the doctrine of necessity – 'is that the state of things existing at any time, together with certain immutable laws, completely determines the state of things at every other time.' His examination was venomous. At the end: 'I believe I have thus subjected to fair examination all the important reasons for adhering to the theory of universal necessity, and shown their nullity.'² That was only the negative beginning. Peirce positively asserted that the world is irreducibly chancy. The apparently universal laws that are the glory of the natural sciences are a by-product of the workings of chance.

Peirce was riding the crest of an antideterminist wave. As is so often the case with someone who is speaking for his time, he thought himself alone. 'The doctrine of necessity has never been in so great a vogue as now.' He did ~~way~~ ~~against~~ supposing 'that this is a doctrine accepted everywhere and at all times by all rational men.' Nevertheless he had to peer back into the distant past to find people with whom he agreed. The philosophy of Epicurus and the swerving atoms of Lucretius were, in his opinion, precursors of the statistical mechanics of Maxwell, Boltzmann and Gibbs. He had more allies than he imagined, but he was right in thinking that his examination of the doctrine of necessity would have been unthinkable in the eighteenth century.

For a before-and-after portrait, we inevitably contrast Peirce with the greatest of probability mathematicians, Laplace, author of the classic statement of necessity. 'All events, even those which on account of their insignificance do not seem to follow the great laws of nature, are a result of it just as necessarily as the revolutions of the sun.'³ With those words Laplace opened his *Philosophical Essay on Probabilities*, a text that goes back to his introductory lectures at the Ecole Polytechnique in 1795.⁴ It was full of memorable passages like this:

Given for one instant an intelligence which could comprehend all the forces by which nature is animated and the respective situation of the beings who compose it – an intelligence sufficiently vast to submit these data to analysis – it would

The normal state

Until Broussais, the pathological state obeyed laws completely different from those governing the normal state, so that observation of one could decide nothing for the other. Broussais established that the phenomena of disease are of essentially the same kind as those of health, from which they differed only in intensity.

The collective organism, because of its greater degree of complexity, is liable to problems more serious, varied and frequent than those of the individual organism. I do not hesitate to state that Broussais's principle must be extended in that direction, and I have often applied it there to confirm or perfect sociological laws. But those who would apply the analysis of Revolutions to the Positive study of Society must pass through the logical training given by the simpler phenomena of Biology.*¹

Normality is like determinism, both timeless and dated, an idea that in some sense has been with us always, but which can in a moment adopt completely new form of life. As a word, 'determinism' came into use in the 1780s, and assumed its present most common meaning in the 1850s. As a word, 'normal' is much older, but it acquired its present most common meaning only in the 1820s. Now although the two words are conspirators in the taming of chance, they enter in very different ways. The normal was one of a pair. Its opposite was the pathological and for a short time in domain was chiefly medical. Then it moved into the sphere of — almost everything. People, behaviour, states of affairs, diplomatic relations, molecules: all these may be normal or abnormal. The word became indispensable because it created a way to be 'objective' about human beings. The word is also like a faithful retainer, a voice from the past, uses a power as old as Aristotle to bridge the fact/value distinction, whispering in your ear that what is normal is also all right. But also, in the

* Auguste Comte, in the first volume of his *Système de politique positive* (1851). Broussais was used in chapter 10 to illustrate the first statistical tests of medical treatment. George Canguilhem, to whom the present discussion is indebted, calls Broussais's principle (as its physiological trappings) a 'thesis whose fortune certainly owed more to the personal of the author than to the coherence of his text'.

events to be described, it became a soothsayer, teller of the future, of progress and ends. Normality is a vastly more important idea than determinism, but they are not unrelated. A story of the erosion of determinism is also an account of the invention of normality.

'Normal' bears the stamp of the nineteenth century and its conception of progress, just as 'human nature' is engraved with the hallmark of the enlightenment. We no longer ask, in all seriousness, what is human nature? Instead we talk about normal people. We ask, is this behaviour normal? Is it normal for an eight-year-old girl to ...? Research foundations are awash with funds for finding out what is normal. Rare is the person who wants someone to investigate human nature. We have almost forgotten how to take human nature seriously. When a man is corrupt or careless, we say, 'Oh, that's human nature.' 'You can't go against human nature,' we mutter, indifferently.

When was the last great debate involving human nature? 1829. In those days a controversy in part about human nature could thrust a young man to prominence, create his career at a stroke, seat him in a powerful signature, and leave him in a position to be one of the handful of most widely known intellectuals for the rest of his prodigious life. I refer to Macaulay's celebrated assault on James Mill. Of course I exaggerate. Macaulay had a lot going for him, and his opinions about human nature are only one of his vehicles. My point is that they could be such a vehicle all.

Mill and Macaulay faced off, Macaulay in the pages of the *Edinburgh Review*, Mill in the *Westminster Review*.² Macaulay thundered at Mill because he ventured to speak about human nature without ever considering what people actually do. Mill's *Essay on Government* for the *Spectator* to the fifth edition of the *Encyclopaedia Britannica* was published serially in various pamphlets and books in the early 1820s.³ Thisarian tract was met by fiery eloquence:

Mill [wrote Macaulay] is an Aristotelian of the fifteenth century, born out of season. We have here an elaborate treatise on Government, from which, but two or three passing allusions, it would not appear that any governments actually existed among men. Certain propensities of Human Nature are assumed; from these premises the whole science of Politics is synthetically deduced!⁴

... [from what else [but human nature] should it be deduced?]

This debate, conducted in the great reviews of the day, was a focus of attention for a decade. It is almost inconceivable that the same thing should open today. Or is it? One thinks of E. O. Wilson *On Human Nature*,⁵ a great sociobiology debate also began in one of the great reviews.⁶ The idea of human nature is deep, not in human nature, but in our theories, a spark ready to kindle yet another new morality or meta-

physics. I cannot so blithely say that it has been smothered by the idea of normality.

But despite Wilson's ironic title, the phrase 'human nature' was not integral to the sociology debate, whereas normal behaviour regularly appeared as a key concept. It was quite the opposite in 1829-30. Macaulay observed that 'it is the grossest ignorance of human nature to suppose that another man calculates the chances differently from us, merely because he does what, in his place, we should not do'.⁸ He then recited the most extravagant choices. Mill responded by quoting Macaulay in full. He urged that strange tastes may be corrected by education. 'A given Greenlander may not be persuaded out of his train oil; but it might be possible to lay the foundations for persuading some future Greenlander that claret is the better of the two.'⁹ We have no difficulty understanding the issues, nor in recognizing Mill's bland utilitarian self-confidence in his own values, but something was absent. Today someone would at once start talking about normal tastes and deviant excesses, a conception that simply did not occur in this debate, filled as it was with monsters such as Caligula rather than deviations from the mean. That was hardly possible then, for the word 'normal' had not yet acquired its present sense. It did that exactly when these final fireworks of 'human nature' splashed across the sky. The first meaning of 'normal' given in any current English dictionary is something like 'usual, regular, common, typical'. The *OED* says that this usage became current after 1840, and gives 1828 for its first citation of 'normal or typical'. That was in a work of natural history alluding to French writers.¹⁰

It is indeed to the French that we must look. Americans know the odd expression 'normal school' for a teachers' college. The first *Ecole normale* was established by a decree of 7 brumaire, year III of the Revolution. The neologism was explained in a speech 5 days before, on 28 October 1794: such schools should be 'le type et règle de toutes les autres'. The speaker was Joseph Lakanal, the man who, between 1793 and 1795, had the power to enact many of the plans for education conceived by Condorcet. It was not education, however, that furnished the modern sense of the word 'normal', but the study of life, as the *OED* citation suggests. Biology and medicine did the trick, abetted by Auguste Comte's radical extension of the idea, and Balzac's popularization of the word in satirizing the doctors. The original site of the modern sense of the word 'normal' was, as in my epigraph, the phrase 'normal state' (of an organism, paired with 'pathological state').

But let us start with older senses of 'normal'. The word entered modern European languages as soon as geometry was expressed in the vernacular. It meant perpendicular, at right angles, orthogonal. *Norma* is Latin,

meaning a T-square. Normal and orthogonal are synonyms in geometry; normal and ortho-go together as Latin to Greek. Norm/ortho has thereby a great power. On the one hand the words are descriptive. A line may be orthogonal or normal (at right angles to the tangent of a circle, say) or not. That is a description of the line. But the evaluative 'right' lurks in the background of right angles. It is just a fact that an angle is a right angle, but it is also a 'right' angle, a good one. Orthodontists straighten the teeth of children; they make the crooked straight. But they also put the teeth right, make them better. Orthopaedic surgeons straighten bones. Orthopsychiatry is the study of mental disorders chiefly in children. It aims at making the child - normal. The orthodox conform to certain standards, which used to be a good thing.

One can, then, use the word 'normal' to say how things are, but also to say how they ought to be. The magic of the word is that we can use it to do both things at once. The norm may be what is usual or typical, yet our most powerful ethical constraints are also called norms. According to the *Dictionary*, the word 'norm' in this sense of the stern moralists is even more recent than the use of 'normal' to mean usual or typical.

Nothing is more commonplace than the distinction between fact and value. From the beginning of our language the word 'normal' has been dancing and prancing all over it. Moralists seldom notice that. The word 'normal' is like that baneful Californian shrub, poison oak, which assumes whatever form resembles the environment. Now it is a creeper, crawling close to the earth, now a pleasant round bush five metres high, now a vine encircling a madrone and then trailing from a branch 40 metres above the ground; now it is red, now it is green, now it is leafless but the sap is running and itching to attack. It has been said of Emile Durkheim, whose idea of normal and pathological societies is the topic of my next chapter, that he tried to achieve 'the closure between the "is" and the "ought" ... in terms of his distinction between the "normal" and the "pathological"'. No aspect of Durkheim's writings has been more universally rejected than his notion of normality and pathology, and rightly so.¹¹ Rejected in specifics, yes. But for much of the century before Durkheim, and ever since, we have regularly used 'normal' to close the gap between 'is' and 'ought'. Wrongly so, perhaps, but that is what the concept of normality was for us.

The normal is average. We also use the word 'mean' for the average of a normal distribution. What in English became the average man is in French *l'homme moyen*, institutionalized by Quetelet. Doesn't this idea of the mean go back to Aristotle? Yes, but beware. The mean is almost as playful as the normal. The idea of a mean or intermediate (that's a description) which is excellent (an evaluation) is one of the most familiar of Aristotle's

teachings. He did not have the is/ought hangups inculcated by Hume. The golden mean (as the phrase is commonly understood) is golden (good) and lies (as a matter of fact) between extremes. Aristotle was subtle and careful. He wrote, 'Virtue is a mean between two vices, one of excess and one of deficiency.'¹² Then something less easy to construe: 'As far as its substance and the account stating its essence are concerned, virtue is a mean; but as far as the best and the good are concerned, it is an extremity.'

Aristotle explicitly restricted the application of the concept of a mean because it is an excellence that contrasts with excess or deficiency. Not all mid-points are means. Spite and adultery, he taught, are in themselves base, and not base because of excess or deficiency. Hence they admit of no mean. The same is true for excellences such as temperance and courage. As I read Aristotle, intellectual powers such as intelligence cannot be characterized by a mean, precisely because they are virtues. His conception of the mean is thus radically different from that of a century that defined degree of intelligence by a Normal distribution with a mean scaled at 100.

That does not imply that Greek notions have had no effect on the idea of medicine. It is an old idea that health is a mean between excesses and deficiencies, between heat and cold, for example. Health as the mean – no mere average, but not unconnected to the modes and medians distinguished by later statisticians – was part of the old medicine. On it was superimposed the idea of pathological organs. The concept of the pathological sounds, at first hearing, as old as illness itself, but it underwent a substantial mutation a little before 1800. Disease became an attribute not of the whole body but of individual organs. Pathology became the study of unhealthy organs rather than sick people. One could investigate them in part by the chemistry of the secretions of living beings – urine, for example. For the pathologist the normal came into being as the inverse of this concept. Something was normal when it was not associated with a pathological organ. Thus far the normal would be secondary, defined as the opposite of the primary notion, the pathological. But then what Comte called the great 'principle' of Broussais turned this around. The pathological was defined as deviation from the normal. All variation was characterized in terms of variation from the normal state. In Comte's opinion, Broussais's principle was the completion of a principle of continuity that Comte attributed to d'Alembert (he might better have chosen Leibniz). Note the two parts of this 'principle': (a) pathology is not different in kind from the normal; 'nature makes no jumps' but passes from the normal to the pathological continuously. (b) The normal is the centre from which deviation departs.

Of course there were ever so many nonmedical routes to the normal.

The industrializing world demanded standardization. We recall Babbage and the constraints of nature and art, as enumerated in chapter 7. He hardly distinguished standards of art that are imposed by engineers from constraints and norms that are to be recorded from nature. Nor is the role of quartermasters during the Napoleonic campaigns to be forgotten. They ordered and moved vast quantities of stores in order to feed and equip prodigious numbers of men and animals. They needed standardized units of everything to run their shows efficiently. Modules had not yet been invented, but were a twinkle in the eye of every keen staff officer. Nor need one wait for revolution or Napoleon. Canguilhem remarks that 'The article on "gun-carriage" in the *Encyclopédie* of Diderot and d'Alembert, revised by the Royal Artillery Corps, admirably sets forth the motifs of normalization of work in arsenals ... Here we have the thing without the word.'¹³

The new martial arts and crafts made warfare increasingly a matter of machines that cried out for standards. Finlaison, the National Actuary of chapter 6 who doubted that there was a quantum of sickness, made his mark running naval dockyards. He turned them from financial catastrophes into cost-efficient enterprises. He imposed standardization, normalization – and wrongly thought that you could not do that with sickness. He failed to see what the next generation, that of William Farr and the like, would do with disease. Do I seem to be hopping haphazardly from ships of the line to the sickness of labourers? It was Finlaison himself who changed jobs by way of promotion from manager of HM Dockyards to directing the national health and its correlate, the national debt acquired by providently selling annuities.

The idea of norms and standards must have been irresistible, but our modern usage of the very word 'normal' evolved in a medical context. This mattered. Standards are standards, and are met or not met. There is no continuous passage away from the norm – or if there is, it is to be corrected, the contractor reprimanded, the workman dismissed. The idea of continuous deviation from the normal came from pathology, as interpreted by Auguste Comte. His biomedical hero was F.-J.-V. Broussais, to whom he attributed what he called 'the law of variability'.¹⁴ He made it a basis for social science and it became part of his political agenda. As we have seen in chapter 10, Broussais was the 'physiologist', the radical proponent of the new organic theory of disease. The task of physiological medicine is to determine how 'excitation can deviate from the normal state and constitute an abnormal or diseased state'.¹⁵ But a diseased state simply is an irritated tissue or organ, which is nothing other than 'a normal excitation that has been transformed by an excess.'¹⁶ When one is sick, some irritant has made natural phenomena more or less

pronounced than they are in the normal state'.¹⁷ Broussais's sentences here sound ordinary enough (unlike some strange ones I quoted in chapter 10). We do not notice that the word 'normal' is being used here, in this way, for pretty well the first time.

Balzac often made fun of Broussais.¹⁸ I believe that it may be through Balzac that Broussais's technical term 'normal state' – denoting the noninflamed, nonirritated state of an organ or a tissue – entered common language. Historical dictionaries of the French language commonly attribute the first general usage of 'normal' meaning 'typical' to Balzac or to Comte, always embedded in the phrase 'normal state'. Thus, in *Eugénie Grandet* of 1833, Mlle d'Aubrión had a nose that was too long, big at the end, and which was 'yellowish in the normal state, but completely red after dinner, a sort of plant-like phenomenon'.¹⁹ A nose, an organ, was *flavescent* (the medical-sounding adjective that Balzac appears to have invented for just this sentence). The symptoms are precisely of the sort studied by Broussais. In due course, for example in *La Cousine Bette* of 1847, the 'normal state' would be given a more general usage, as when laziness is called the normal state of artists.²⁰

Broussais's 'normal state' might have made its way into language unattended, but it was the enthusiasm of Comte that gave it elevation and status. The idea that the pathological is not radically different from the normal, but only an extension of the variation proper to a 'normal organism', was, he wrote, an 'eminently philosophical principle whose definitive establishment we owe to the bold and persevering genius of our illustrious fellow citizen, Broussais'.²¹ The important point was that all the characteristics of a thing were defined relative to the normal state. Explicitly: 'The law of Broussais subordinates all modifications to the normal state.'²² Broussais wrote of physiology, but his principle must be extended to 'intellectual and moral functions' – and then, as my epigraph continues, to the whole study of society.

Those sentences, with their rapt admiration for Broussais, were published in 1851, by which time, if the doctor was remembered at all by the public, it was as a conceited curmudgeon. Comte did not know Broussais specially well; his good friend in the physiological school of medicine was the much more reputable and far less mercurial Blainville, protégé of Cuvier and successor to Lamarck.²³ (We need hardly mention that the Lamarckian model of evolution by continuous variation also hovers in the background of Broussais's principle.)

Why was Comte so loyal to Broussais? It is well known how on 2 April 1826 he commenced, with some fanfare, the course of lectures intended to be the exposition of all knowledge preparatory to the new positive age: the lectures that became the *Cours de philosophie positive*. He broke down.

The lecture for 12 April was cancelled. In uncontrollable depression, he consigned himself to the care of Esquirol, who released him on 2 December with a docket, 'Not cured'. He got better, despite concerted attempts by his family and friends.²⁴ The lectures resumed on 4 January 1829, and the learned world did not spite him. In attendance were Broussais, Blainville, Fourier, Navier and Poinsoir, not to mention his alienist, Esquirol.²⁵

The one intellectual achievement of his convalescence was a short review of Broussais's *De l'irritation et de la folie*, published in mid-August 1828.²⁶ When Comte reprinted it in 1853, he noted that it had been written while recovering from his 'cerebral attack' (an attack on an organ, not the mind), saying that 'the insight gained through my personal experience was utilized in this review of the memorable work in which Broussais worthily combated the metaphysical influence'.²⁷

Comte valued Broussais for several reasons. One was as ally against the 'metaphysical influence', i.e. Germanic importations with claims to a spiritual psychology. A powerful force for evil (as seen by Comte) was Victor Cousin, neo-Kantian, neo-Platonist, neo-royalist, a man all in favour of things spiritual. In May 1828 Cousin had completed a threateningly successful course of lectures on the new philosophy, and Broussais's book was in part an onslaught upon it.

The opposition to Cousin was a curious alliance of materialists who might, in 1828, have been characterized by their enemies as the mad Comte, the sadistic Broussais and the last of the doddering *idéologues* – none other than Daunou, who began my chapter 5 inaugurating moral science, who had preached the sermon for those who died attacking the Bastille. In 1828 he was denouncing Cousin as a theosophical gnostic, who would corrupt the republic into reaction and would 'plunge the human race into darkness'.²⁸ After the Revolution of 1830, he was, with that same splendid oratory, denouncing the young professors who had 'seconded the violence' of 'despotic governments'.²⁹

A more personal element in Comte's lifelong dedication to Broussais was the explanation of his own breakdown in material terms. He had been sometimes violent, sometimes silent in the slough of despond, but all that

Once again, a standard tale may be repeated on grounds of verisimilitude rather than proven truth. The populist theocratic priest Félicité de Lamennais convinced Comte's mother that her son should endure a religious marriage ceremony to his wretched first wife. This farce was duly performed, although the groom was 'raving mad' at the time. Not that Esquirol's asylum was better: Comte wrote that had Broussais studied asylums himself, he would have been convinced that, despite the promises of their directors, the entire intellectual and moral portion of the treatment is in fact abandoned to the arbitrary action of subordinates and rough agents, whose conduct almost always aggravates the malady that they should be trying to cure.

was just variation from his normal state produced by irritation and inflammation of the tissues. It was not his *fault*. We use variation from the normal today in order to relieve a sense of responsibility. Comte seized upon normality because it possessed that saving virtue.

Cured, he translated normality to the social sphere. Hitherto pathology had persisted in representing the majority of important diseases independent of any change in the normal state of the organs'. Broussais made it a matter of degree. What was true of Comte's depression - it was deviation from the norm caused by perturbation - would henceforth be true of social illness too. But when Comte moved normality to the political sphere, he effected another twist. The normal ceased to be the ordinary healthy state; it became the purified state to which we should strive, and to which our energies are tending. In short, progress and the normal state became inextricably linked. Consider that eminently political science biology. Impressed by Bichat's physiology, and deploring recent trends, Comte wrote around 1850 that 'Biology is now less close to its normal state than it was at the beginning of the century.'³⁰ The normal state of biology was what it ought to be, and what with enough progress it would achieve. 'Progress is nothing but the development of order: it is an analysis of the normal state.'

Positivism did not, in Comte's late years, direct us to an existing norm and certainly not to an average. It was the only politically viable road to the 'true normal state'. 'The positive spirit [is] the only possible basis for a resolution of the intellectual and moral anarchy that above all characterizes the great crisis of our time... The positive school was gradually prepared during the revolutionary struggle of the past three centuries, to constitute as much as is possible the true normal state of all the classes and elements of knowledge and of society.'³¹

Comte thus expressed and to some extent invented a fundamental tension in the idea of the normal - the normal as existing average, and the normal as figure of perfection to which we may progress. This is an even richer source of hidden power than the fact/value ambiguity that had always been present in the idea of the normal. The tension makes itself felt in different ways. If we think ahead to sociology and to statistics, in the modern comprehension of those terms - that is, if we think ahead to the work encrusted around names such as Durkheim and Galton - we feel the tension acutely.

On the one hand there is the thought that the normal is what is right, so that talk of the normal is a splendid way of preserving or returning to the status quo. That's 'Durkheim'. On the other hand is the idea that the normal is only average, and so is something to be improved upon. That's

'Galton'. Durkheim called deviation from the norm pathology, while Galton saw excellence at one extreme of the Normal distribution.

'Galton' stands for improving averages, by whatever standards of value can be taken for granted. When it is a matter of living beings, that translates into eugenics. There we first focus on the Queteletian mean and then surpass it. 'Durkheim' harks back to the Aristotelian mean, for it is the ideal state of good health. For the conservative Durkheim, writing of normal and pathological states of society, the normal tends to be something from which we have fallen. For Comte's revolutionary positivism, it was something for which we should strive.

The tension in these aspects of the normal will not dissolve just by noting that there are two ideas, one of preservation, one of amelioration. The former carries within it fondness for origins, youthful good health, an ideal condition to which we should be restored. The latter lusts after teleology, of ends that we may choose for the perfection of ourselves or of the race. Two kinds of progress. Words have profound memories that oil our shrill and squeaky rhetoric. The normal stands indifferently for what is typical, the unenthusiastic objective average, but it also stands for what has been, good health, and for what shall be, our chosen destiny. That is why the benign and sterile-sounding word 'normal' has become one of the most powerful ideological tools of the twentieth century.