The Cultured Mind

Science & the Enslavement of Nature

Fred Harrison

LIBERAL POLITICAL PHILOSOPHY is inhibited from providing principled solutions to structural problems such as poverty. The problem may reside with the *social context* within which the philosophy evolved, argues Fred Harrison. Do the seemingly intractable difficulties stem from flaws in the structure of the social system? If so, how do they inhibit philosophers and scientists from delivering the solutions that are demanded by democratic society? Diagnosis needs to interrogate both philosophical assumptions and the rules that are the foundation of modern society.

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We can safely assume that the failures will continue deep into the 21st century. This is because the philosophical discourse is conducted with primitive notions. Broadly, the Right focuses its critique on the level of the state's tax-take. The Left continues to blame something called "capitalism" for all socio-ecological problems. This banter, shielded by political complacency, offers little prospect of improving the quality of public policies.

One approach in the quest to identify the roots of tensions in modern society is to establish why science has failed to deliver prosperity for everyone. Why poverty with progress? Francis Bacon set the tone for the emerging Modernity. We witness in his lifetime's activities the intersection of corrupted statecraft, personal venality and a profound intellectual imagination which, when merged, had the power to consolidate the social conditions that would inhibit the evolution of a culture that would empower and enrich everyone.

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KNOWLEDGE is power. When knowledge can be manipulated for perverse purposes on a socially significant scale, we need to search for fatal weaknesses in rules and institutions that are supposed to protect and balance people's freedoms.

It is easy to identify and censure abuses when they are perpetrated in other people's social systems. A classic case is that of Trofim Denisovich Lysenko (1898-1976), the Russian biologist who, as director of the Institute of Genetics of the USSR Academy of Sciences, bent the theories of genetics to suit Soviet ideology. He sought favour with those in power by blending political prejudices with scientific language to develop what the state was pleased to call a progressive socialist theory of biology. In his lecture, in 1948, Lysenko denounced 12 Russian scholars on the grounds that their science was bourgeois, reactionary, idealistic and anti-nationalist. They were dismissed from their posts, and the Lysenko doctrine became mandatory for all scientists in the Soviet Union.

Similar cases closer to home are rarely censured with similar candour. A testing case for American scientists today is the claim that thousands of South American Indians were infected with measles, killing hundreds of them, so that US scientists could study the effects of natural selection. James Neel, the geneticist who directed the project to study the Yanomami in Venezuela, is alleged to have "refused to provide any medical assistance to the sick and dying Yanomami ... He insisted to his colleagues that they were only there to observe and record the epidemic, and that they must stick strictly to their roles as scientists, not provide medical help", according to *Darkness in El Dorado*, a book by investigative journalist Patrick Tierney. Neel is alleged to have undertaken the study to test eugenic theories similar to those held by Nazi scientist Josef Mengele.[1]

Rogue scientists who have been exposed in the past are treated as exceptional. In general, science is held to be neutral, its practitioners objective in the pursuit of the truth. And yet, the social problems which they might have solved persist. Why? Could there be a general tendency at work, of pressures that encourage scientists to accommodate the preferences of those in power? This claim is now being canvassed, especially by representatives of the "green" lobby, with accusations that scientists are dependent on corporate agendas for their employment; universities are increasingly reliant on corporate sponsorship; and governments fail to champion the virtues of pure science, preferring, instead, to promote the functional purposes of science in the pursuit of political objectives.

It was not supposed to be like this; and if the known cases of abuse were random exceptions of rogue behaviour, it would be unfair to level accusations at science for the failures of Modernity. The fear, however, is that the problem has systemic origins, which impose artificial limits on the

potential of the knowledge seekers. To assess the constraints on social evolution, we may learn the lessons from the life of Francis Bacon.

Moral goals & the failure of modernity

FRANCIS BACON'S mission was to change the world by challenging and taming nature. There was nothing humble about the Baconian project. He wanted nothing less than the transformation of the life of man by the use of science. He viewed himself as "the herald of a revolution in the life of humanity, which he calls a birth of time".[2]

It was as a young man that he cast himself in the heroic role as the benefactor of the human race:

> The propagator of man's empire over the universe, the champion of liberty, the conqueror and subduer of necessities.

To realise his ambitions he would have to acquire a high position in the power structure of the state.

> I hope that, if I rose to any place of honour in the state, should have a larger command of industry and ability to help me in my work ... I might get something done too for the good of men's souls.[3]

He anticipated an enormous obstacle that might prevent mastery over nature: the habits of mind of learned people. His first task, therefore, was to take control of the collective mind. If his project was to succeed, he would have to transform and polish that mind in the scientist's laboratory, to deliver a modern, a cultured, mind.

With his copious writings and aphorisms Bacon laid the foundations for the new empiricism that was to rupture the old way of knowing the world. Up to that time, people employed two ways of accumulating knowledge. One was *mythos*, the mythologies that they developed to explain the past and present. *Mythos* "provided people with a context that made sense of their day-to-day lives; it directed their attention to the eternal and the universal".[4] The other was *logos*, which enabled them to solve practical problems. Bacon rejected *mythos*, which was to impoverish understanding about the meaning of life.

His project, according to one sympathetic reading, was to locate empirical science within the context of the moral renewal of society. This interpretation is advanced by Jerome Ravetz, an American historian and philosopher of science who taught at the University of Leeds in England. He became a powerful critic of the "industrialisation" of science. His sympathetic treatment of Bacon's motivation is a helpful starting point.

The language that Bacon employed suggests that he advocated a disciplined approach to the evolution of the scientific method:

> Only let the human race recover that right over nature which belongs to it by divine bequest, and let power be given it; the exercise thereof will be governed by sound reason and true religion.[5]

The project was nothing less than the restoration or renewal of mankind via the science which he elaborated in the book of that name, *The Great Instauration*. He had the sense that mankind had fallen from an original perfection in the association of the mind with the natural world, and the Latin word *Instauratio* conveys his aspiration that we should renew that association. This cast him in the role of the saviour of fallen men.

As we now know, Bacon was to fail. Ravetz notes that "the growth of scientific knowledge and all the power of its applications neither required nor produced such a moral reform in society as he had considered essential".[6] Why has scientific progress triumphed while leaving behind our capacity to evolve institutions and behaviour based on moral precepts? The clues may be found in the social context within which the scientific project was incubated. Research needs to be devoted to the question of the funding of science, but this is part of the general issue of the way in which the power structure and culture in general are financed.

The arts, sciences and technologies that constitute culture are made possible by the deployment of the net income generated by each community. Could it be that a dysfunctional system of financing – the deviation from the morally sanctioned distribution of income between the private and public spheres of life – explains warped forms of behaviour? Might this account for the fact that the technological capacity to produce ever more income cannot, by itself, fulfil many people's basic needs? Might this issue be the source of the major failures of Modernity?

Poverty for the modern masses

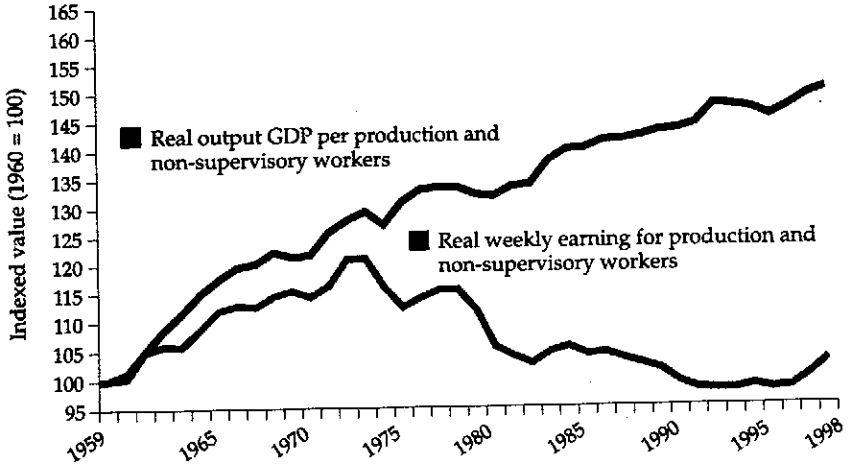
FRANCIS BACON helped to consolidate an ideology of income distribution and property rights that would undermine the vision he inspired for a new, a democratic, science of empiricism. Bacon's values included a philosophy of public finance that distracted the emerging public sector – based on professional administration – away from its role as a partner in the productive economy; fostering it as an agent hostile to the people who work and save. We can date from this period the configuration of private income distribution, property rights and public finance that originated the institutionalised poverty that became a hallmark of modernity.

Bacon was correct to be optimistic about the productive capabilities of the scientific method. He presented a theory of knowledge and a practical methodology which, in a free society, would have empowered every person to meet all material and social needs. But his political ideology, through his role in the state apparatus, would fatally wound the

expectations aroused by the new approach to knowledge. As a result, the biological limits on production and living standards were allowed to persist despite the fact that empirical science did provide the means for releasing people from these constraints. Consequently, the majority of people who lived through the Industrial Revolution suffered the costs of social change without reaping a share of the material benefits.

One outcome was that migrants to the New World, who aspired to a better life in the "land of the free", were also to suffer an ideologically-based concentration of wealth that remained almost exactly the same between the years 1798, 1860 and 1995. The growth in income inequality continued its upward trend between 1977 and 1999 (*see Figure 1*), with the incomes of those below median earnings declining while those above median earnings escalated upwards, ever faster for those at the upper reaches of the income scales. The latest scientific discoveries have *not* contributed to the empowerment of people at the bottom of society. This was not the prospectus promised by Francis Bacon.

Figure 1 US GDP and Weekly Earnings



SOURCE: Michael Zweig, *The Working Class Majority: America's Best Kept Secret*, Ithaca: Cornell University Press, 2000, p.64.

Secrets in the womb of nature

BACON was born at York House, London, in 1561, the younger son of Sir Nicholas Bacon. He studied at Cambridge and at Gray's Inn, where he was admitted as a barrister in 1582. He married late in life (1606). His biographers noted his unparalleled belief in himself, which enabled him to ignore ordinary codes of morality. He died in 1626.

Bacon formulated the rules of the induction method of acquiring knowledge – challenging the mediaeval schoolmen's deductive method of reasoning. In *Novum Organum* (1620), he advocated a patient understanding and interrogation of Nature through the accumulation and measurement of hard facts. "There is much ground for hoping that there are still laid up in the womb of Nature many secrets of excellent use, having no affinity or parallelism with anything that is now known, but lying entirely out of the beat of the imagination, which have not yet been found out."

Bacon has become one of the most contested characters of recent times. In the past quarter century he became a leading hate figure of environmental activists, but he has also had his champions.[7] The attack has focused on his scientific method, but this may be a serious misreading by his critics. The real damage was inflicted by his compact with the historical tendencies that were rationalising the privatisation of the resources of nature which John Locke (1632-1709) said were provided by God for the equal benefit of everyone.

The architecture of the scholastics' hypothetical systems was to collapse under Bacon's empiricism. Direct observation would replace contentious syllogism. But who would benefit from his project to transform the character of the mind that had been inherited from classical antiquity? Bacon was convinced that the new mindset would enrich everyone.

He knew that people of influence would resist his project. So he kept his vision a secret for most of his life, for fear of being rejected. He pitied the people who frequented the salons of London and Paris, who he regarded as prisoners of half-a-dozen ancient Greek philosophers, locked into antiquity by a philosophy that obstructed social evolution.

And so Bacon set about ingratiating himself into the power structure, suffusing himself with its values, blending into the tapestry of high society. He would have to be accepted as a respectable citizen if he was to succeed. Only as he ascended the aristocratic power structure would he become bold enough to disclose his historic mission. His was a carefully programmed plan of action. He needed help if he was to achieve his ambitions. He would need the patronage of kings.

In executing his plan, however, he was to betray the integrity that ought to constitute the ethical framework of science as a tool for the advance of humanity. The legacy, today, is a western society that is not at ease with itself; not able to solve its abiding problems for reasons that have nothing to do with science.

For those who profit from the persistence of poverty, there is much comfort in the myth that science (or economic growth) *per se* can improve the lot of mankind. This displaces the responsibility (and costs) on to

others. The empirical evidence falsifies this claim as vacuous – as rhetoric. Yes, science-based growth can enable us to produce goods *ad infinitum*. No, 400 years of science-based growth has not empowered every able-bodied person to enjoy the benefits of progress. The question that must be answered is, why, given the evidence, are people's minds shut to the logical solutions that stand outside empiricism? Self-delusion needs to be disentangled from political reality.

Bacon lived off people's rents

THE HISTORIC movement of Bacon's time was the Reformation. As described by historian G.M. Trevellyan, it "began as a Parliamentary attack on Church fees, and proceeded as a royal raid on Abbey lands".[8] This was a particular example of the general theme that links most periods since the beginning of civilisation – the social conflict over the control of nature, and more specifically over the net income produced by communities which is available to fund projects in the social space.

The fate of that income – which, following the classical economists, we now call the rent of land and natural resources – is determinative. The character of society is shaped by the manner in which public finance is raised, as economic historian Joseph Schumpeter has noted. Public revenue, in Bacon's time, came directly from nature as rent. Those who disposed of the rent also controlled the social *mores*, and their private interests necessarily skewed the character of "public" institutions to serve their selfish interests.

Bacon was "a conscientious and enthusiastic participant in this [Reformation] movement".[9] Might we have expected him to understand that the political and fiscal landscape was a factor that shaped knowledge in such a way as to reduce the effectiveness of public policies, which included the need to define property rights, and the boundaries between the public and private spheres?

As a civil servant at the highest levels of state power, Bacon sided with the sovereign against the sacred. His privileged position as an actor at the heart of that power structure provided him with an unparalleled opportunity to relate the material to the social world. But he did nothing to enlighten public policy, or to qualify the state's assault on the revenue received by the ecclesiastical institutions. The churches provided a spiritual and an educational service to their communities; and the appropriate support was the rents of the lands around the abbeys. Bacon did not analyse how the attack on the social functions of rent would colour public policy. How might we account for this gap in the understanding of this perspicacious observer of facts? Could it be because he relied heavily on the rents from land to maintain his lifestyle?

Religion & the privatisation of rent

BENJAMIN FARRINGTON, the scholar who is credited with rescuing Bacon's reputation,[10] noted that "the feudal landowner would look out on the world with different eyes from the merchant or the manufacturer".[11]

Bacon, who made a significant contribution to the sociology of knowledge, did not apply such an insight to his own works. This is understandable, because he was preoccupied with ways of being accepted by those who exercised power.

> So Bacon takes stock of his world, its institutions and traditions, national temper, public policies, sectional interests, and seeks again the best means of presenting his plan to those who, for one reason or another, might be expected to misunderstand and condemn.[12]

Bacon's scrutiny of the pressures that would obstruct the development of new knowledge was not extended to the way in which his empiricism would be compromised by the private interests of those who held public office. Indeed, he welcomed the opportunity to be co-opted into the privatisation of nature, without distinguishing between the epistemological and financial aspects. In the process, his work on understanding nature was biased in favour of one class of people. This was not a democratic foundation from which to launch the discovery and application of new knowledge; which meant that the benefits could not be diffused for the benefit of everyone. The medium through which the discriminatory mechanism would work was the cash value placed on nature (rent). This partisan thrust would also colour the manner in which nature herself would be treated.

Thus, the fate of society and of nature were intertwined in the process of cultivating the modern mind. The lesson for contemporary advocates of nature's rights is that the work to moderate the abuses of nature cannot be disentangled from the work to moderate the abuse of society. The philosophy that underpins the study of nature needs to be unified with a corresponding philosophy of society.

Such a holistic prospectus eluded Bacon. His character was of court conspirator, parliamentary fixer, deal broker. His family had been enriched by the confiscation of monastic lands, although, as Farrington argues, the family "did not regard itself as living on plunder. It would have felt, as many a family did, that the monks had been idle and that their lands were now under the more profitable control of improving landlords. The basis of this prosperity was the reform of religion".[13] Bacon's father, Nicholas (1510-79), had purchased the Lordship of several manors belonging to an abbey. Francis was later to be gifted a piece of land near Twickenham Park by the Earl of Essex from which he drew a rental income.

Bacon would have been hard put to develop and accept Locke's doctrine of property rights, for he had a direct interest in retaining rent as a private income. He lived off rents, and was not about to advise the king that they belonged to the Treasury!

As Farrington put it: "The Bacons, it may be said, had no existence except as part of the new order of things".[14] This was the period of the first industrial revolution (*circa* 1575-1620) "when wealth, from whatever source it came – distribution of monastic lands, plunder of the treasure ships of Spain, or the new and lucrative trade in black slaves – was being invested in industry".[15] These developments illustrate the social milieu within which the rental income from the commons was appropriated for personal, rather than social, enrichment.

It cannot be argued, in Bacon's defence, that my reading of his role in cementing an exploitative character in English society is unreasonable, in that it would have required him to develop a new mentality. For his project was explicitly designed to change the mental outlook by altering the meaning of words.[16]

Bacon interpreted the first chapter of Genesis as revealing that God gave man dominion over all creatures. This dominion was necessary to improve the conditions of human life, but to achieve this it was necessary to adopt a new mentality. Progress was not possible without a clear intellectual break with the past.

> What was at issue was not his own career but the fate of mankind. He was fighting for the idea that the application of man's organised efforts to secure increased mastery over nature was a loftier purpose than that served by the philosophical schools of antiquity or the monastic life of the Middle Ages.[17]

Bacon's attitude is revealed in *The Refutation of Philosophies*. He had "pity" for people. He wished to push them in the direction of an interventionist approach to life through the domination of nature, the pre-condition of which was the reconstitution of our knowledge of nature. In this, he was of the same mind as Rene Descartes (1596-1650), the French philosopher who wished to relegate speculative philosophy to the past and develop a new epistemology that was relevant to industrial production. He, too, wished to "make ourselves, as it were, masters and possessors of nature".[18]

Bacon evolved a sociology of knowledge

BACON'S ATTACK on historic figures like Aristotle, whom he held culpable for retarding the development of practical knowledge, matured into a sociology of knowledge that ought to have inspired introspection. In *Valerius Terminus* he considers

> The impediments which have been in the nature of society and the policies of

> state. That there is no composition of estate or society, nor order or quality of persons, which have not some point of contrariety towards true knowledge.

For Bacon, the advance of learning had to be achieved by overcoming the obstacles buried in the mind. This was a constant challenge, as Farrington put it, for "The very nature of language involved each new generation in the errors of the old by the process of learning to speak".[19] Bacon analysed history to evaluate the psycho-social conditions that obstructed a genuine natural philosophy. From Greece and Rome through to the feudalism of the Middle Ages, the prejudices embedded in culture were identified as distracting people from the ability to understand and harness nature. He reviled the Aristotelian philosophers who stultified practical enquiry even as they multiplied words. Aristotle reckoned that there were no more truths to be garnered from our journey through life. Wrong, said Bacon; nature held many secrets that were as yet concealed from us; all we had to do was adopt the correct procedure, set up a laboratory, and squeeze nature until she yielded.

The new knowledge was focused on practical inventions such as the printing press, gunpowder and the compass. Farrington, in referring to the stress placed by Bacon on the importance of gunpowder, acknowledged that "though Bacon felt in the highest degree the noble ambition to serve all mankind he could not be indifferent to the destiny of his own country".[20] This was the time when the English navy began to mount heavy cannon on its ships. The broadside was a lethal instrument for dominating the sea lanes and therefore delivering dominion over nature – and, inevitably, over other peoples – in far flung places. The compass guided the ships to those lands, and the printing press would transmit the knowledge to the future generations which would pursue the territorial ambitions of England.

Go forth to the Promised Land

BRITAIN'S Royal Society institutionalised Bacon's project. He was eulogised by Abraham Cowley, a popular poet of his day, in his *Ode to the Royal Society*:

> Bacon, like Moses, led us forth at last.
> The barren wilderness he passed,
> Did on the very border stand
> Of the blessed promised land,
> And from the mountain top of his exalted wit,
> Saw it himself, and shew'd us it.

Bacon was not wrong to engage with the world through an understanding of the laws of nature, but his momentous shift in the mind-set had practical consequences that needed an appropriate value system.

This was absent. One result was that Bacon's philosophy could be used to legitimise territorial conquests that flouted the rights of others:

> Distant voyages were means to the expansion of the greatness of England. It is not surprising that they won the encouragement and support of the Crown.[21]

By enlisting the patronage of monarchs, Bacon was the hostage to fortune. For he had to trim his counsel to suit regal interests, rather than the principles of scientific objectivity. This meant, in practice, formulating a philosophy of science that accommodated the value system of those who held power. While he claimed that his project was "designed to improve the conditions of human life",[22] the reality into which he chose to locate that project precluded such lofty ideals. As Farrington noted, "the political conditions in which governments could take into consideration the interests of all mankind still lay hundreds of years below the horizon. Such a political condition of humanity is still below our horizon even today". While mankind was obliged to wait, Bacon helped monarchs to accelerate the process of territorial conquest.

On James I's accession (1603), Bacon sought royal favour by displays of exaggerated professions of loyalty; and by planning schemes for the union of England and Scotland. He approvingly recorded the progress of the Scottish plantation in Northern Ireland. For his services he was knighted, made a commissioner for the union of Scotland and England, and received a pension of £60 a year.

In 1607 he was appointed solicitor-general, which took him close to the office he coveted – attorney-general, to which he was appointed in 1613, a post from which he could develop the law of the land. He was now able to expand the power of the state in the direction of dominion over nature. To further promote this cause he secured personal advancement by suppressing his honest opinions, by flattery of everyone who could be of use to him, and by petty tricks to wrong-foot the opposition.

He was appointed privy councillor in 1616, and was elevated to Lord Chancellor two years later. He was raised to the peerage as Lord Verulam, the Latin name for the town near his estate of Gorhambury, in Buckinghamshire.

His obsequiousness exposed him to manipulation by the courtiers. His enemies in the Commons circulated. A complaint was laid that he habitually accepted gifts – some would say bribes – from litigants in his court, both before, during and after sitting in judgement on cases that came before him. In 1621 charges were sent to the House of Lords. He did take presents from suitors. He submitted himself to his fellow-peers without offering a defence.

> Bacon knew that he was not innocent and soon admitted it. He was a judge and

> he was in the habit of accepting presents from litigants. ....[W]hen does a gift become a bribe?[23]

He was fined £40,000, briefly locked in the Tower, and banished in disgrace. The degree to which he was guilty of a heinous crime has been the subject of much scholarly controversy, but there is no escaping the conclusion that "He wanted money and he did not scrutinise too nicely the channels by which it arrived".[24]

In disgrace, with nothing to lose, he set out to complete his life's work. *The Great Instauration* remains a monumental if incomplete work. Missing from it was, among other things, "the Georgics of the mind, or the Culture of Morals".

When he died in April 1626 (after catching a cold while stuffing a fowl with snow, an exercise devised to observe the effect on the preservation of flesh), he was deep in debt.

Common-wealth & common property

HAD BACON reflected more deeply on the sociology of his times, he might have formulated a prospectus for a democratic science of nature. In the preface to *On the Interpretation of Nature* he discusses common property rights and the means by which these would be used:

> Believing that I was born for the service of mankind, and regarding the care of the commonwealth as a kind of common property which like the air and the water belongs to everybody, I set myself to consider in what way mankind might best be served...

In his writings, he adopted the fashionable literary mode of his time. He described in *New Atlantis* (published posthumously in 1627) how to escape to an island and construct the ideal society. Telephone communications were anticipated on this island – "means to convey sounds in trunks and pipes to great distance and in curved pipes". Scientific academies were the jewel in his social system. Cold reason and hard facts would prevail. But by his example, he demonstrated his integrity by the way in which, in 1615, he examined under torture an old clergyman (Edmund Peacham), who was charged with preaching treason. Not willing to allow empirical facts to intercede, he undertook to arrive at an understanding with the judge to secure a conviction. Abuse of power such as this example illustrates the manner in which the scientific method has been abused.

The first universal truths were delivered through our consciences, and they were regulators of human behaviour. They stemmed from introspection, and they became exercises in the collective exploration of the nature of humanity. As self-conscious beings developed, the idea of

laws of morality were articulated as imperative for the survival of a species that began to fashion its destiny. Those moral rules, sanctioned by appeal to an authority external to what would otherwise be a closed social system, were acknowledged as a form of knowledge that was as valid as those that were to be delivered by empirical scientists (whose phenomenological laws, we now concede, are contingent – true until proved to be false by the next hypothesis).

Bacon's version screened out alternative paradigms of truth, and delivered us to a world of test-tubes and toil. Gone was the prospect of finding our way back to the Garden of Eden, the land of plenty where, yes, we might have to continue to work for our living, but perhaps not slave for it?

Bacon's was a materialist philosophy, as Marx was to observe.[25] Materialism ultimately sacrifices both society and the soul. It does not require the noble sentiments. By contrast, the society that includes a spiritual content demands more from, and offers greater satisfaction to, individuals. Society is people-in-community living under rules and guided by the highest spiritual sentiments.

Bacon's turned out to be an impoverished paradigm of the truth, with its inability to discriminate between the value of objective facts. Truth was the technique for brutalising – not honouring – nature. His scientific method did not liberate the power of nature, it enslaved it. He wished to be the Master of Creation. The *commons* was an unfenced arena into which he would have people intrude at will, to dominate and appropriate without restraint. There was no *sacred social space* which required justification, permission and compensation before intrusion. Bacon supported the great enclosures which dispossessed peasants of their land. He did not condone the ensuing impoverishment of landless labourers. He regretted the rural decay, as he portrayed it in his history of *Henry VII*. He favoured a prosperous and free peasantry, but this was an opportunistic rather than principled position: it would enable the state to arm itself with infantry, which "requireth men bred, not in a servile or indigent fashion, but in some free and plentiful manner". This was dominion over man, to serve the interests of the state.

Fair dealing for the "social space"?

BACON'S methodology has been developed into an ideal of objectivity by natural scientists, who claim that the corresponding value system is one of "uncompromising honesty".

This honesty is not always observed even in the natural sciences, where there is reputation and profit to be made by selective presentation of the results of laboratory experiment. But the social sciences would necessarily be even more vulnerable. The originators of modern science and their sponsors (the land-owning aristocracy and the

territory-conquering state), had a vested interest in closing their minds to one enormous area of our lives: the public space. This thesis appears to offer some insights into historical puzzles.

The standards of honesty are challenged by the vital interest of land owners. For land – *nature in its entirety* – is *part of the social space*, the mediating mechanism which is *not* merely material, but embedded with spiritual values and social identity, and which therefore has a direct effect on the lives of everyone. Because it was in the process of being privatised, by Bacon's time, there was sound reason to overlook the principles of good public administration when it came to dealing with information and policies relating to the public space. As a direct result of the privatised environment within which the scientific method was developed – subordinate to the narrow interests of landowners and the regal state – science could not evolve as a holistic discipline, one with an ethical content to its methodology.

Land tenure in the Low Countries

BENJAMIN FARRINGTON, the professor of classics at University College, Swansea, did not challenge Bacon's self-image – that he was driven by ethical, humanitarian and philanthropic sentiments.[26] He insists that Bacon wanted wealth diffused to more people. Bacon cited in support of his project the wealth of citizens in the Low Countries, whose prosperity could not have been achieved "were it not also that their wealth was dispersed in many hands, and not ingrossed in few; and those hands were not so much of the nobility, but most and generally of inferior conditions," he wrote in *The True Greatness of Britain*.[27]

That evidence, far from supporting his case for scientific innovation, identified the one issue that would challenge the power of the State and the aristocracy: the tenure that determined the distribution of land and income. The diffused distribution of land in the Low Countries was the distinguishing feature that accounted for the general prosperity to which Bacon alludes.

Bacon did object to those obstacles imposed by the feudal class which he allowed himself to recognise. But Farrington could not see that, because Bacon "championed the new England which had been begun by the confiscation of monastic lands",[28] his influence on public policy would be fatally compromised. The standards and aspirations which he set for natural science were not to be applied to public administration.

The need to redefine power

BACON and his successors failed to locate their vision of new approaches to knowledge in the context of a comprehensive model of human nature and community. The outcome was alienation and poverty on an institutionalised scale.

With hindsight we can see where the inventors of Modernity went wrong. The point of reviewing that history is not to pour scorn but to learn the lessons. One suspects that there is now a need for a culture shift of proportions equal to those that were surfacing in the time of James I. The trick will be to synthesise the strengths of the traditional model of community with the virtues of renewed public morality, to produce a post-modern society that may deliver the prosperity which is possible for everyone.

This means that each person has to assume responsibility for his or her actions, especially where he or she affects the lives of others by intruding into the social space that we all share. In the case of Francis Bacon, the project was to consciously interfere both with people's minds and with nature, without articulating the rules that would protect (or restore) everyone's equal interest in those spaces. Bacon had carefully thought through how people's minds needed to be reshaped, and what he wanted to put into them. Likewise, with nature, he sought to alter the landscape by reconfiguring the terms on which people perceived, and interacted with, nature. Was it not incumbent on him to think through the consequences of his actions? He had a personal responsibility, since he was proposing to intervene in that social space over which he had no more personal rights than anyone else.

Bacon was not living in a democracy. He realised the rule was that "knowledge and power meet in one", and it was the obvious thing for him to tell James that science would bind nature to his service "and make her your slave". Bacon's empiricism was not going to produce knowledge that would challenge power; or, more specifically, the credentials and actions of those who held power.

But if it was not possible for him to promote the democratisation of power and knowledge, it ought not to be a problem for us in the nominal democracies of today. But democratisation entails the need to redefine the rules on which power and knowledge is deployed, for the aristocratic institutions and values inherited from the 17th century will not willingly yield.

A great deal of thought is now going into a reappraisal of the social context of science, particularly in Europe. But the researchers do not seem to appreciate the revolutionary implications of some of their conclusions. For example, in a study sponsored by the European Commission, the authors move beyond what they call the "primitive concept of the 'social shaping' of science and technology", to identify the widened agenda for the practitioners. In italics, to emphasis their point, they state that "*no area of action must be barred* a priori *to public policies in this field*".[29] In the West, at present, property rights

are a taboo subject: most certainly not deemed to be fit subjects for scientific scrutiny. The authors of the EC study *think* they are being radical; but they are still working within the social constraints that tamed Bacon.

Galileo, a contemporary of Bacon's, put his finger on the problem in 1610, when he noted that "it is impossible to obtain wages from a republic, however splendid and generous it may be, without having duties attached".[30] He who pays the piper calls the tune. Or, as Ravetz put it:

> Once ... science, or even an individual scientist, needs to justify a claim on someone else's resources, then that someone else's values inevitably enter the endeavour.[31]

What we ultimately have to question is not the social context of science; but the legitimacy of much of the income that is deployed in the pursuit of science, and the credentials of those who disburse that income. Is their personal status, as decision-makers that affect the public purse, legitimate? And what about the resources in the public purse: are they derived legitimately? Have we, in the western democracies, become the unwitting champions of a subtle system of values, inherited from a bygone era, that distorts science and its products, in the process of which we abuse the people who are the producers of those resources?

It is not too late to forego the attitude of mastership over nature, by substituting a desire to work with, and respect, nature. But this needs to be predicated on a shift in social psychology, which requires a conscious attempt to shift the parameters of culture in the direction prescribed by the principles of justice.

The democratisation of science & nature

SCIENCE has to be made accountable, but not in a way that consolidates the power of the state, or of those sectional interests that dominate through the power associated with the private control over society's net income.

We need a non-bureaucratic solution. Can we envisage a model of democratic science that can safely locate responsibility back on to the individual? Before that issue can be satisfactorily explored, the first task is to determine who created the value system that we have inherited, that formed the scientific ethos and the institutions within which science is currently pursued.

Then we can ask: What would happen if a community were to re-democratise the social space? Would this nurture a new self-discipline, backed by the strengthening of our obligations on the basis of a renewed public ethic? Would this be sufficient to democratise the laboratory and the products of science?

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