Francis Bacon and the True Ends of Skepticism

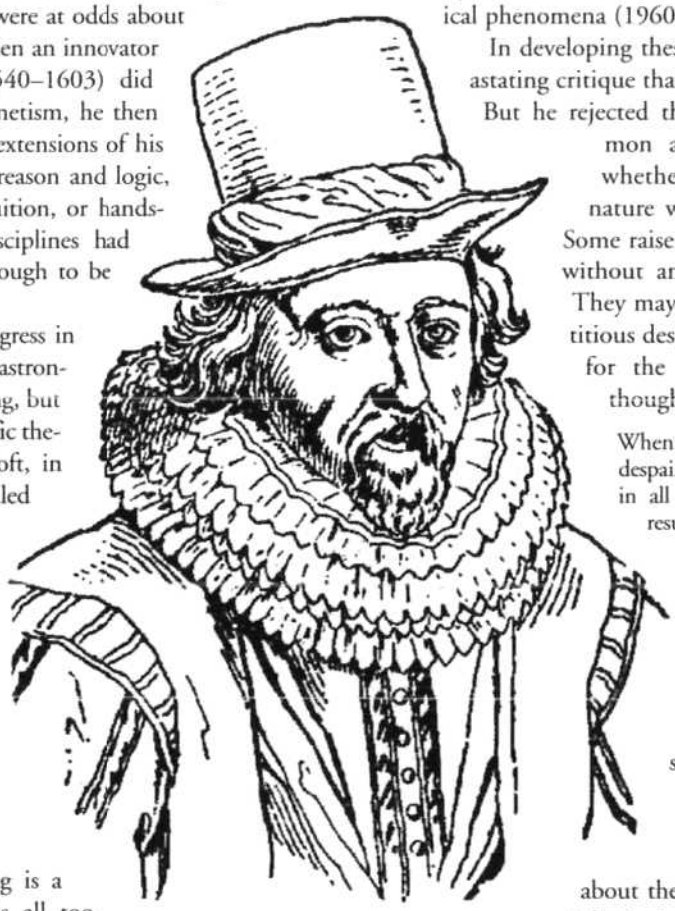
Long ago, Bacon asserted that science must begin with doubts in order to end in certainties, a paradox that stills leads to misunderstandings about Bacon and about science.

BARBARA FRIEDBERG

Detractors of modern science sometimes refer to themselves as skeptics, because they dare to question long-accepted doctrine. But skepticism as a method is not just a resolve to disagree. It is the presumption of error and fallibility on which our science is based. This paradox was first put forth by Francis Bacon in *The New Organon* (1620), building on his previous *Advancement of Learning* (1605). He announced that great things were possible in science, provided that nearly all the old methods and beliefs were cast away. What struck him was the mixture of unproductive dogma and unresolved controversy over basic theory in science despite long centuries of data-collecting and thought. He had ideas about a remedy, yet he believed no

remedy could be complete because the human mind itself had faults and limitations that made it almost incapable of seeing truly. Today, when people claim as a novel discovery that scientists are not godlike beings, that thought may be limited by emotions and culture, and that language is not the same as natural fact, they are merely reiterating Bacon's starting assumptions.

We think of the seventeenth century as a golden age of science. Yet when Bacon considered the matter, inquiry was busy but not very fruitful. Cosmology was up for grabs, the old Scholastic system of four elements offered no definite path to new discoveries, alchemists were at odds about basic laws of chemistry, and when an innovator such as William Gilbert (1540–1603) did achieve knowledge about magnetism, he then went overboard with mystical extensions of his discoveries. Whether stressing reason and logic, symbolic connections and intuition, or hands-on experiment, the active disciplines had yielded few outcomes solid enough to be built upon.



But there *was* practical progress in navigation, engineering, and astronomy. Empiricism was not lacking, but it did not underlie broad scientific theories. These tended to soar aloft, in obedience to what Bacon called "Idols of the mind" because they diverted men from examining divinely created nature. What was needed was "a closer and purer league between . . . the experimental and the rational (such as has never yet been made)" (Bacon 1960, 95).[1]

Bacon's Paradox

Bacon saw that good thinking is a sort of paradox. The mind is all too effective, not only in feeling and imagining, but even in reasoning. Fastening on one idea, it traces implications, follows up parallels, leaps to conclusions, and creates a tight and persuasive system of beliefs. This power can be useful, if properly disciplined, but it tends to shrug aside direct observation of nature. Man, according to Bacon, does not have a privileged intuition into the construction of the cosmos—a direct link to the Creator's intentions—as many then believed. He must let the actions of nature in the uncontrollable future be the arbiters of his theory's soundness. Initial speculations must issue in a well-formulated experiment, and that, in turn, must yield to a sensory judgment of the experiment's result. Though Bacon didn't think of double-blind testing, he saw that these stages must be made as distinct from each other as possible (1960; 2, 50).

Bacon called endemic human limitations "Idols of the Tribe." Even the cleverest minds leap to generalizations, notice striking events more than typical ones, and seek out supportive data more than counterexamples. They fasten on apparent patterns too quickly and don't let go.

"Idols of the Cave" were the individual's limitations and enthusiasms. He may apply favorite ideas or remedies to everything, like a wonder drug.

"Idols of the Marketplace" were the limitations of common language, suitable for everyday life, but not to describe nature accurately. "Substance," "heavy," "moist," and "dense" were all vague terms. New words must refer to measurable physical phenomena (1960, 41–60).

In developing these ideas, Bacon outlined a devastating critique that might well doom any science. But he rejected the immobile skepticism, common at that time, which doubted whether any human theory about nature would ever be a clear advance. Some raise doubts, he said, as lawyers do, without any aim of settling a question. They may embrace a "deliberate and factitious despair" of learning anything new, for the sake of thinking their own thought perfect.

> When the human mind has once despaired of finding truth, its interest in all things grows fainter, and the result is that men turn aside to pleasant disputations and discourses and roam as it were from object to object . . . a wandering kind of inquiry that leads to nothing. (Bacon, 1874, III, 364; 1960, 88, 67.)

Here Bacon aptly depicts that spongy indecisiveness of mind that can masquerade as "being critical." Today many academics, having grown uneasy about the concept of seeking truth, deal mainly in ingenious detractions, aimed at proving that various forms of supposed excellence are really (but not "in truth") invidious shams (see Haack 1999). If public debate is mere entertainment and debunking is an automatic reflex with no drive to find central, usable insights, we are imitating the learned men whom Bacon criticized, whose scholarship sought just to get by according to some group's limited conventions. But Bacon wanted people to address great issues and strive to be adequate to *their* demands.

Just as analyzing government mismanagement should actually give hope (Bacon wistfully reflected) because it shows the failure was not inevitable, so he will offer "arguments of hope," by analyzing the bad habits of mind and futile methods so far

Barbara Friedberg is an independent scholar writing on issues of intellectual method. A former science major, she has a doctorate in English literature. Correspondence to 600 West 111th St., New York, N.Y. 10025-1813.

used in science (1960, 94). Both mind and senses are unreliable, yet the right method of using mind to correct mind, as we look from a different angle to correct sight, might repair our faults just enough to achieve reliable theories. And this, in essence, has proven true.

Bacon's Checks and Balances

Unlike most revolutionaries (but like the American founders), Bacon offers not a cure, but "helps": checks and balances (1960, 37). First is the thinker's deliberate attention to each pitfall. Second, his limits will be bypassed by involving diverse inquirers. And finally, the theory-making urge itself must be challenged by experimental tests of each assumption and conclusion. The inquirer's thinking will also be affected. What counts as a theory or a scientific term will be guided by his awareness that an eventual empirical test is in the offing. (And, conversely, dubious scientific thought is influenced by the knowledge that no rigorous test will be applied.)

Bacon's paradoxical message—the mind is faulty, the mind can achieve wonders—is usually misunderstood, ignored, or quoted misleadingly.[2] Yet it is at the heart of the mission of SKEPTICAL INQUIRER. For Bacon grasped that scientific method must be intimately linked with a critique of pseudoscience, and that such a critique was not to be just a start-up routine for modern science, but would be of continuing, even increasing, importance. The more that inquiry prospered, the more its intellectual, semantic, and institutional offshoots would be vulnerable to the Idols of the mind.[3]

Bacon saw that the three Idols might generate whole systems of belief, tightly inwoven, fiercely defended, securely institutionalized, and thus hard to dislodge. His fourth category, "Idols of the Theatre," referring to the "vain show" of such a system, incorporates all the others. Though familiar mainly with the Scholastic system, he expected that as freer thought was permitted, many new, specious systems would arise (1960, 61–66, 44). The fame of his initiating role for modern science has obscured his concern with the perennial. Even Stephen J. Gould, in a recent article, mentions only "outmoded," or "older, traditional" systems as Bacon's target, rather than the system-making propensity of the human mind.[4]

Bacon did not envisage the mathematical physics to come; indeed, he could hardly know what a powerful theory would look like. Thus he thought more generally about the search for meaningful patterns in the confusion of phenomena, making his ideas particularly relevant to fledgling and would-be sciences. He hoped that ethics and politics would also yield to his ideas. But the notion of creating a science of society tends to make people aim for universal laws, exact measurements (of something), and the prestige of a system. Soon after Bacon's death, Thomas Hobbes attempted such a science, with simple mechanical principles in the style of physics. But such efforts ought to be "scientific" first in heeding Bacon's warnings about straying from the facts and clinging to assumptions or terminology that cannot lead to new, testable insight. Bacon would have us spend more time with tentative "middle principles." Pioneers such as Freud, eager to make their ideas science, are in danger of taking any plausible mechanism to be a universal principle. Bacon's reluctance to assume uniformity, though misplaced in physics, is more pertinent in studying human nature.

Bacon's list of features in Scholasticism that held back inquiry is surprisingly up-to-date. For example, he includes worship of antiquity; worship of the new; picking on points for argument rather than new discovery; didactic presentation of what is not yet understood; premature formalizing of dubious beliefs; reverence toward an oft-quoted founder; and eloquent elaboration of trivial ideas (1874, III, 289–295).

We still rush to call things knowledge and teach formally what we cannot yet be sure of. In alternative medicine the ancient and the brand-new are equally valued for that trait alone. Excessive quoting of a founder (whether Lenin or Freud) whom experience has superseded suggests that one is not trying to move on. Bacon thought Aristotle and others should be treated as "counselors" to give advice, not "dictators" to enforce belief. Thus he himself offered "not an opinion to be held, but a work to be done" (1874, 289; 1960, 16).

What Bacon called "contentious" learning originated in the twelfth century as a laudable attempt to consider more than one view. But the formal debate had become a mere contest in which flooring an opponent took precedence over gaining new insight. Similarly, modern talk shows, debates, and documentaries may virtuously state contrasting views without working them over to reach new insight.

Bacon's value is in pressing us to question the systems or rhetorical habits of many modern gurus, from Hegel, Marx, and Freud to Derrida, Foucault, and Lacan. Posing questions of pertinent concreteness is, to be sure, a central intellectual skill. Mastering it may require a long struggle with one or more slippery systems finally abandoned. Alexander Herzen, in nineteenth-century Russia, discovered in Bacon's *New Organon* a radicalism more exact than the left-wing Hegelianism of his time. This quintessential liberal critic of right and left extremes felt surprising affinity with Bacon's thought, as we may also.[5]

Dilution and Misunderstanding of Bacon's Method

Bacon's ideas were both heeded and ignored in the centuries following. His insistence that theory be in continual interchange with experiment is fundamental to science and was assumed by Galileo, Kepler, and Newton. Yet the rise of mathematical physics, which seemed to contain its own safeguards against error, encouraged renewed trust in reason alone. Descartes's influence also gave authority to the mathematical mind and reasserted the old hunger for intuitive certainty, in contrast with Bacon's portrayal of a tricky, self-doubting, circuitous quest.

In the 1660s, promoters of experimental methods in England hoped that direct study of nature would offer a refuge from the theological wrangling and ensuing violence of the Civil War. Bacon's talk of enchanted mirrors and idolatries of mind had an almost Calvinist ring to those eager to link religion with the clear light of reason. Even Robert Boyle, who was closest to Bacon in his methods, intentions, and interests, wanted science and religion mutually to vindicate one another in "natural theology." But Bacon regarded scientific assumptions derived from

religion as "anticipations of nature" which had always prevented sound discoveries. Specifically, he rejected attempts to use the book of Genesis as an authority for science (1960, 65).

But in the heyday of natural theology (the eighteenth century), this was forgotten, and it was possible for a geologist to think he was heeding Bacon just because he looked at physical evidence, though his purpose was to vindicate the account in Genesis. The historian of science Charles Gillispie points out the discrepancy while offering another distortion. He derides Bacon for his "popular" notion that science required "not difficult abstract thought but only patience and the right method." He makes the common mistake of assuming that some mechanical ascent from experiment to theory is all that Bacon proposed (Gillispie 1951, 62–63; 1960, 81–82). Actually, Bacon's wished-for method of constantly questioning and retesting one's thought, going from works to axioms and back, as he put it, could hardly be more difficult (1960, 117).

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In fact, Bacon feared that people would judge his ideas wholly by his tentative suggestions for moving from data to low-level hypotheses. And that is exactly what has happened. These proposals (which have some limited value) are usually cited as *the* Baconian method, then dismissed as inadequate. Often, as Henry Bauer does in *Scientific Literacy and the Myth of Scientific Method*, critics proceed to their own view of what is important, ending up with reflections similar to Bacon's about pitfalls in the mind (Bauer 1992, 19, 147–50).[6] Bacon himself said that his positive proposals should be thrown out if they didn't serve. What mattered was the empirical testing of each theory's assumptions and conclusions, neither accepting old dogmas nor hurriedly forming new ones. For "the art of discovery" would also improve as science advanced.

The point is that Bacon's "method" is really a meta-method, a set of principles underlying method. He assumed that native wit would generate theories and that the real problem was to discipline them (1960, 130).

But the false "Baconianism" is not the only shadow blotting out Bacon's meaning. A common misconception is that he wanted science to aim at power instead of truth.[7] He is associated with the modern slogan, "knowledge is power," which he did not say. Usually, people mean by it that knowledge will bring us worldly triumph. Or, at best, that knowledge brings power to humanity in the form of useful technology. Bacon did want to achieve the latter eventually. But he was referring to the proof of scientific theories in saying:

> Knowledge and power meet in one; for where the cause is not known, the effect cannot be produced. Nature to be commanded must be obeyed; and that which in contemplation is as the cause is in operation as the rule. (1960, 3)

That is, only by making nature act a certain way (exercising "power") can you be sure that you understand how it does act, and only by knowing that can you control it.

This simple idea, like Dewey's "learning by doing," is far-reaching in implication. It reflects an appreciation of how people usually do behave: they talk highfalutin nonsense that is far from any facts. In Bacon's famous triad, they produce "fantastical," "contentious," or "delicate" learning; statements that are false, rhetorically persuasive only, or merely aesthetic wordplay (1874, III, 282).

Bacon's hope of *eventual* technology is regularly confused with his methodological concern with experiment (power) to verify knowledge.[8] He didn't want people to stop at quick practical gains. To shrink from intellectual challenge was as cowardly as to fear testing one's suppositions against reality. "Works themselves are of greater value as pledges of truth than as contributing to the comforts of life." Yet he did believe that to ease human misery was a noble purpose. Most people, he said, seek knowledge for professional advancement, profit, or to triumph over rivals; sometimes for idle curiosity. The benefit of one's country was a higher end, and better than all these, the good of mankind (1960, 70, 124, 129; 1874, 294–95).

In *The Advancement of Learning*, Bacon explained that by "use" he didn't mean achieving wealth or success, but what would be "solid and fruitful" as opposed to "vain and fantastical." If it is real knowledge, it has implications; it leads on, and makes one want to try it out. The hypothetical path to concrete reality should be intelligible, however complex. Sometimes people embrace dense ideologies of politics or psychoanalysis while avoiding the question, "But how exactly will any of this help?" even though their stated purpose is social reform or healing.

Grand philosophic systems are the fruit of struggle with some human problem. If their adherents retreat to obscurantism, often they have failed and refuse to admit it. When Khrushchev (a Baconian at times) asserted that there is "no Communism without sausages," the Marxist-Leninist experts in Moscow saw him as a buffoon. But his down-to-earth concern about hunger was part of a drive to truth that also made him speak out about Stalin and recognize the madness of nuclear war.[9]

What is called "utility" or "pragmatism" can be given different slants. William James tended to accept the practical value of ideas (loosely applied) that might not strictly be true. George Orwell, in *1984*, showed the dire everyday consequences of living by lies. For Bacon, practice proved the worth of ideas, but also (as for Orwell) showed the failure of false ones.

Bacon saw clearly the dichotomy between the shifty language of men and nature's power, which could not be bought off by flattery or incantation. "To overcome not an adversary in argument, but nature in action" was his aim and the most important distinction he made (1960, pref., 36). He knew he was surrounded, as we are now, by adroit rhetoricians who refused to accept that words sometimes succeed and sometimes fail to get close to the things they purport to describe, and that it matters. The idea that thought can never be anything but rhetoric or "conversation" will only satisfy those who never feel obliged to act, and therefore to get reality right.

Iron and Love, Science and Art

Our literary-aesthetic traditions place great value on the metaphorical use of words that reached its height in the poetry of Bacon's day. This drew on the very habits of symbolism that Bacon saw must be eliminated from strict science, which uses language differently. The query, "Is this really love?" will never fully parallel, "Is this really iron?" We have agreed-upon tests to determine that a thing is iron. Love is an open concept, and iron, since modern chemistry, a closed one.

Science adds knowledge by showing what can't be. Mystical thinking sets no such bounds. Its glory is to give *meaning* to every perceived pattern, and its method permits any number of meanings apply. Sensitivity in pursuing metaphors is essential to art; it is needed only sparingly in science. Today, the revivers of pre-scientific medicine often use language evocatively, as advertisers do, piling on terms without indicating and proving what thing does what. Attempting to heal by suggestion or placebo is not alternative, but "aesthetic" medicine.

In setting himself against such habits, Bacon was indeed saying that the aesthetic way of thought could not be the scientific one, and people have been saying "ouch!" ever since. But should they? Must we have one big thing, the unified art-science that has become so fashionable a craving, rather than two different, equally valuable things? Must the universe melt down into a beautiful dream of our own—can it not be seen as a separate thing that we must specially equip our minds to decipher?

Science seeks ways to give a definite "no" to a plausible idea; in literature, plausibility is all. If a Shakespeare play has many interpretations, we say it is rich and complex. If a natural phenomenon does, we say the science is incomplete. Art frees us by creating a refuge against the time flux, but science frees us by enabling us to "command" nature by "obeying" her. It uses necessity to create freedom, as art uses freedom to create its own formal necessity.

Art may spur us to a scientific inkling; science, to an aesthetic one but that is all. The distinction should be cherished, not broken down. It permits us to value our mental motions for their own sake, or to adapt them for use in action, without confusion or self-deception.

The mingled promise and disarray of natural philosophy in his time led Bacon to appreciate two great freedoms of the mind. We can question whole systems that seem to violate evidence or logic. It does not matter how many people swear by such beliefs, or for how many centuries they have done so, or with what coercive power. But we can do better than reject the affirmations of the madding crowd. We can thread our own path through the forests of unsorted experience, trusting our minds not to guess right, but to devise tests for detecting falseness. Bacon did no science that today would have won him a Nobel prize. He founded no schools of philosophy. He was not, like Aristotle, "the master of them that know." But he was the friend of those who think, and for that reason, his writings should not be laid aside.

Notes

1. References in the text to the aphorisms in Bacon 1960 give the aphorism number put in Arabic numerals (all in Book I) for convenience in consulting other editions. References to *The Advancement of Learning* are those cited from Bacon 1874, Vol. III.

2. For a detailed account of how Bacon's actual words are ignored and old misconceptions continually revived, followed by dismissive attacks, see Vickers (1992). As a counterpoise, he recommends Urbach 1987 and Perez-Ramos 1990.

3. Needless to say, history contradicts James McClenon's claim that "pseudo-science" is a recent conception invented out of sociological need. He suggests that "science arose from a type of innovation but was forced to create deviant sciences just to survive." Actually, that crucial "innovation" was precisely to reject older methods similar to those of today praised as "deviant" by McClenon (1974, 30).

4. Gould 1999, 74–75. Unlike most citers of Bacon, Gould does appreciate the centrality of the Idols.

5. Herzen's interest in Bacon was only appreciated recently by Aileen Kelly (1980). François Roustang writes of his disillusionment with the psychoanalyst Jacques Lacan in terms that also parallel Bacon's critique of meretricious systems (though not referring to Bacon). The antiempiricist Lacan spoke, for example, of "the fatal contamination of analytical knowledge by the effects of practice"—i.e., seeing patients (1990, 10).

6. Despite his disparagement of a "myth" in his title, Bauer finds that, yes, Virginia, there is a scientific method, consisting of "reality testing," since (as Bacon might have put it) beyond science "stands nature, which we cannot force to behave in any other way than what comes naturally" (150).

7. As by Gerard Holton, who makes a misleading contrast between Bacon's "research program," aiming at "omnipotence," and Newton's, aiming at "omniscience": "basic" versus "applied" science. But Bacon sought basic science and truth, just as Newton tied theory and experiment together as Bacon wished. Holton's book aims to distinguish science from "the world-view against which Descartes and Galileo fought," pointedly omitting Bacon (1993, 109, 114–15, 119).

8. As by Neil Postman (1992). His important critique of our cultural submission to technology cites Bacon as exclusively concerned with "Power and Progress." And yet, like Bauer (1992), he concludes with intellectual concerns similar to Bacon's.

9. Khrushchev's 1954 question, "and what sort of Communist society is it that has no sausage?" caused Molotov to disparage him as a "practicist." In 1958, Khrushchev said that he was proud to be one (Frankland 1967, 148).

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