

Chapter 10

Intellectual Transformation: The Scientific Revolution and the Age of Enlightenment

- The Medieval View of the Universe
- A New View of Nature
- The Newtonian Synthesis
- Prophets of Modern Science
- The Meaning of the Scientific Revolution
- The Age of Enlightenment: Affirmation of Reason and Freedom
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Focus Questions

1. How did the Scientific Revolution transform the medieval view of the universe?
2. How did the Scientific Revolution contribute to the shaping of the modern mentality?
3. What were the essential concerns of the *philosophes* of the Enlightenment?
4. How did the Enlightenment contribute to the shaping of the modern mentality?



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The movement toward modernity initiated by the Renaissance was greatly advanced by the Scientific Revolution of the seventeenth century. The Scientific Revolution destroyed the medieval view of the universe and established the scientific method—rigorous and systematic observation and experimentation—as the essential means of unlocking nature’s secrets. Increasingly, Western thinkers maintained that nature was a mechanical system, governed by laws that could be expressed mathematically. The new discoveries electrified the imagination. Science displaced theology as the queen of knowledge, and reason, which had been subordinate to religion in the Middle Ages, asserted its autonomy. The great confidence in reason inspired by the Scientific Revolution helped give rise to the Enlightenment, which explicitly rejected the ideas and institutions of the medieval past and articulated the essential norms of modernity. ❖

THE MEDIEVAL VIEW OF THE UNIVERSE*

Medieval thinkers had constructed a coherent picture of the universe that blended the theories of two ancient Greeks, Aristotle and Ptolemy of Alexandria, with Christian teachings. To the medieval mind, the cosmos was a giant ladder, a qualitative order, ascending toward heaven. God was at the summit of this hierarchical universe, and the earth, base and vile, was at the bottom, just above hell. It was also the center of the universe. In the medieval view, the earth’s central location meant that the universe centered on human beings, that by God’s design, human beings—the only creatures on whom God had bestowed reason and the promise of salvation—were lords of the earth. Around the stationary earth revolved seven transparent spheres, each of which carried one of the “planets”—the moon, Mercury, Venus, the sun, Mars, Jupiter, and Saturn. (Since the earth did not move, it was not considered a planet.) The eighth sphere, in which the stars were embedded, also revolved about the earth. Beyond the stars was a

heavenly sphere, the prime mover, that imparted motion to the planets and the stars, so that in one day the entire celestial system turned around the stationary earth. Enclosing the entire system was another heavenly sphere, the Empyrean, where God sat on his throne, attended by angels.

Medieval thinkers inherited Aristotle’s view of a qualitative universe. Earthly objects were composed of earth, water, air, and fire, whereas celestial objects, belonging to a higher world, were composed of ether or quintessence—an element too pure and perfect to be found on earth, which consisted of base matter. In contrast to earthly objects, heavenly bodies were incorruptible; that is, they experienced no change. Since the quintessential heavens differed totally from earth, the paths of planets could not follow the same laws that governed the motion of earthly objects. This two-world orientation blended well with the Christian outlook.

Like Aristotle, Ptolemy held that planets moved around the earth in perfect circular orbits and at uniform speeds. However, in reality the path of planets is not a circle but an ellipse, and planets do not move at uniform speed but accelerate as they approach the sun. Therefore, problems arose that required Ptolemy to incorporate into his system certain ingenious devices that earlier Greek astronomers had employed. For example, to save the appearance of circular orbits, Ptolemy made use of epicycles, small circles attached to the rims of larger circles. A planet revolved uniformly around the small circle, the epicycle, which in turn revolved about the earth in a larger circle. If one ascribed a sufficient number of epicycles to a planet, the planet could seem to move in a perfectly circular orbit.

The Aristotelian-Ptolemaic model of the cosmos did appear to accord with common sense and raw perception: the earth does indeed seem and feel to be at rest. And the validity of this view seemed to be confirmed by evidence, for the model enabled thinkers to predict with considerable accuracy the movement and location of celestial bodies and the passage of time. This geocentric model and the division of the universe into higher and lower worlds also accorded with passages in Scripture. Scholastic philosophers harmonized Aristotelian and Ptolemaic science with Christian theology, producing an intellectually and emotionally satisfying picture of the universe in which everything was arranged according to a divine plan.

*See also the chapter entitled “The Flowering and Dissolution of Medieval Civilization.”

Chronology 10.1 ❖ The Scientific Revolution and the Enlightenment

1543	Publication of Copernicus's <i>On the Revolutions of the Heavenly Spheres</i> marks the beginning of modern astronomy
1605	Publication of Bacon's <i>Advancement of Learning</i>
1610	Publication of Galileo's <i>The Starry Messenger</i> , asserting the uniformity of nature
1632	Galileo's teachings are condemned by the church, and he is placed under house arrest
1687	Publication of Newton's <i>Principia Mathematica</i>
1690	Publication of Locke's <i>Two Treatises of Government</i>
1733	Publication of Voltaire's <i>Letters Concerning the English Nation</i>
1751–1765	Publication of the <i>Encyclopedia</i> edited by Diderot
1776	Declaration of Independence
1789	French Revolution begins

A NEW VIEW OF NATURE

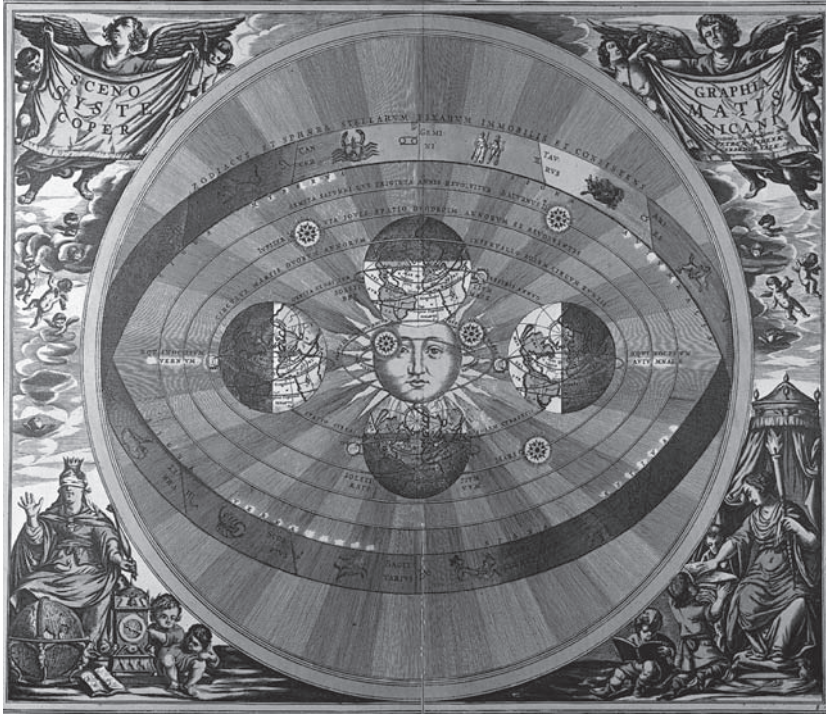
In several ways, the Renaissance contributed to the Scientific Revolution. The revival of interest in antiquity during the Renaissance led to the rediscovery of some ancient scientific texts, including the works of Archimedes (287–212 B.C.), which fostered new ideas in mechanics, and to improved translations of the medical works of Galen, a contemporary of Ptolemy, which stimulated the study of anatomy. Renaissance art, too, was a factor in the rise of modern science, for it linked an exact representation of the human body to mathematical proportions and demanded accurate observation of natural phenomena. By defining visual space and the relationship between the object and the observer in mathematical terms and by delineating the natural world with unprecedented scientific precision, Renaissance art helped to promote a new view of nature, which later found expression in the astronomy of Copernicus and Kepler and the physics of Galileo.

The Renaissance revival of ancient Pythagorean and Platonic ideas, which stressed mathematics as the key to comprehending reality, also contributed to the Scientific Revolution. Extending the mathematical harmony found in music to the universe at large, Pythagoras (c. 580–507 B.C.) and his followers

believed that all things have form, which can be expressed numerically, and that reality consists fundamentally of numerical relations, which the mind can grasp. Plato maintained that beyond the world of everyday objects made known to us through the senses lies a higher reality, the world of Forms, which contains an inherent mathematical order apprehended only by thought. The great thinkers of the Scientific Revolution were influenced by these ancient ideas of nature as a harmonious mathematical system knowable to the mind.

Nicolaus Copernicus: The Dethronement of the Earth

Modern astronomy begins with Nicolaus Copernicus (1473–1543), a Polish astronomer, mathematician, and church canon. He proclaimed that earth is a planet that orbits a centrally located sun together with the other planets. This heliocentric theory served as the kernel of a new world picture that eventually supplanted the medieval view of the universe. Copernicus did not base his heliocentric theory on new observations and new data. What led him to remove the earth from the center of the universe was the complexity and cumbersomeness of the Ptolemaic system, which offended his sense of mathematical order.



COPERNICAN SYSTEM. In his *On the Revolutions of the Heavenly Spheres*, Copernicus proposed a heliocentric model in which the planets orbit around the sun. (*The Granger Collection*)

To Copernicus, the numerous epicycles (the number had been increased since Ptolemy, making the model even more cumbersome) violated the Platonic vision of the mathematical symmetry of the universe.

Concerned that his theories would spark a controversy, Copernicus refused to publish his work, but, persuaded by his friends, he finally relented. His masterpiece, *On the Revolutions of the Heavenly Spheres*, appeared in 1543. As Copernicus had feared, his views did stir up controversy, but the new astronomy did not become a passionate issue until the early seventeenth century, more than fifty years after the publication of *On the Revolutions*. The Copernican theory frightened clerical authorities, who controlled the universities as well as the pulpits, for it seemed to conflict with Scripture. For example, Psalm 93 says: “Yea, the world is established, that it cannot be moved.” And Psalm 103 says that God “fixed the earth upon its foundation not to be moved forever.” In 1616, the church placed *On the*

Revolutions and all other works that ascribed motion to the earth on the Index of Prohibited Books.

Galileo: Uniformity of Nature and Experimental Physics

Galileo Galilei (1564–1642) is the principal reason that the seventeenth century has been called “the century of genius.” A Pisan by birth, Galileo was a talented musician and artist and a cultivated humanist; he knew and loved the Latin classics and Italian poetry. He was also an astronomer and physicist who helped shatter the medieval conception of the cosmos and shape the modern scientific outlook. Galileo was indebted to the Platonic tradition, which tried to grasp the mathematical harmony of the universe, and to Archimedes, the Hellenistic mathematician-engineer who had sought a geometric understanding of space and motion.

Galileo rejected the medieval division of the universe into higher and lower realms and proclaimed the modern idea of nature's uniformity. Learning that a telescope had been invented in Holland, Galileo built one for himself and used it to investigate the heavens—the first person to do so. From his observations of the moon, Galileo concluded

that the surface of the moon is not smooth, uniform, and precisely spherical as a great number of philosophers believe it (and the other heavenly bodies) to be, but is uneven, rough, and full of cavities and prominences, being not unlike the face of the earth, relieved by chains of mountains and deep valleys.¹

This discovery of the moon's craters and mountains and of spots on the supposedly unblemished sun led Galileo to break with the Aristotelian notion that celestial bodies were pure, perfect, and unchangeable. For Galileo, there was no difference in quality between celestial and terrestrial bodies. Nature was not a hierarchical order, in which physical entities were ranked according to their inherent quality; rather, it was a homogeneous system, the same throughout.

With his telescope, Galileo discovered the four moons that orbit Jupiter, an observation that overcame a principal objection to the Copernican system. Galileo showed that a celestial body could indeed move around a center other than the earth, that the earth was not the common center for all celestial bodies, and that a celestial body (the earth's moon or Jupiter's moons) could orbit a planet at the same time that the planet revolved around another body (the sun).

Galileo pioneered in experimental physics and advanced the modern idea that knowledge of motion should be derived from direct observation and from mathematics. In dealing with problems of motion, he insisted on applying mathematics to the study of moving bodies and did in fact study acceleration by performing experiments, which required careful mathematical measurement. For Aristotelian scholastics, a rock fell because it was striving to reach its proper place in the universe, thereby fulfilling its nature; it was acting in accordance with the purpose God had assigned it. Galileo completely rejected the view that motion is



SIR ISAAC NEWTON. Newton was a cautious experimentalist, whose discovery of the composition of light laid the foundation of the science of optics. (*Image Select/Art Resource, N.Y.*)

due to a quality inherent in an object. Rather, he said, motion is the relationship of bodies to time and distance. By holding that bodies fall according to uniform and quantifiable laws, Galileo posited an entirely different conceptual system. This system requires that we study angles and distances and search for mathematical ratios but avoid inquiring into an object's quality and purpose—the role God assigned it in a hierarchical universe. Moreover, Galileo's physics implied that celestial objects, which hitherto had belonged to a separate and higher realm, were subject to the same laws that governed terrestrial motion—another sign of nature's uniformity. The traditional belief in a sharp distinction between heavenly and earthly realms was weakened by both Galileo's telescopic observations of the moon and by his mechanistic physics.

For Galileo, the universe was a “grand book which . . . is written in the language of mathematics

and its characters are triangles, circles, and other geometric figures without which it is humanly impossible to understand a single word of it.”² In the tradition of Plato, Galileo sought to grasp the mathematical principles governing reality—reality was physical nature itself, not Plato’s higher realm, of which nature was only a poor copy—and ascribed to mathematics absolute authority. Like Copernicus and Kepler (see below), he believed that mathematics expresses the harmony and beauty of God’s creation.

Attack on Authority

Insisting that physical truth is arrived at through observation, experimentation, and reason, Galileo strongly denounced reliance on authority. Scholastic thinkers, who dominated the universities, regarded Aristotle as the supreme authority on questions concerning nature, and university education was based on his works. These doctrinaire Aristotelians angered Galileo, who protested that they sought truth not by opening their eyes to nature and new knowledge but by slavishly relying on ancient texts. In *Dialogue Concerning the Two Chief World Systems—Ptolemaic and Copernican* (1632), Galileo upheld the Copernican view and attacked the unquestioning acceptance of Aristotle’s teachings.

Galileo also criticized Roman Catholic authorities for attempting to suppress the Copernican theory. He argued that passages from the Bible had no authority in questions involving nature.

A sincere Christian, Galileo never intended to use the new science to undermine faith. What he desired was to separate science from faith so that reason and experience alone would be the deciding factors on questions involving nature. He could not believe that “God who has endowed us with senses, reason and intellect,”³ did not wish us to use these faculties in order to acquire knowledge. He was certain that science was compatible with Scripture rightly understood, that is, allowing for the metaphorical language of Scripture and its disinterest in conveying scientific knowledge. For Galileo, the aim of Scripture was to teach people the truths necessary for salvation, not to instruct them in the operations of nature, which is the task of science.

Galileo’s support of Copernicus aroused the ire of both scholastic philosophers and the clergy, who feared that the brash scientist threatened a world picture that had the support of venerable ancient authorities, Holy Writ, and scholastic tradition. Already traumatized by the Protestant threat, Catholic officials cringed at ideas that might undermine traditional belief and authority.

In 1616, the Congregation of the Index, the church’s censorship organ, condemned the teaching of Copernicanism. In 1633, the aging and infirm Galileo was summoned to Rome. Tried and condemned by the Inquisition, he was ordered to abjure the Copernican theory. Not wishing to bring harm to himself and certain that the truth would eventually prevail, Galileo bowed to the Inquisition. He was sentenced to life imprisonment—mostly house arrest at his own villa near Florence—the *Dialogue* was banned, and he was forbidden to write on Copernicanism. Not until 1820 did the church lift the ban on Copernicanism.

Johannes Kepler: Laws of Planetary Motion

Johannes Kepler (1571–1630), a German mathematician and astronomer, combined the Pythagorean-Platonic quest to comprehend the mathematical harmony within nature with a deep commitment to Lutheran Christianity. He contended that God gave human beings the ability to understand the laws of harmony and proportion.

As a true Pythagorean, Kepler yearned to discover the geometric harmony of the planets—what he called the “music of the spheres.” Such knowledge, he believed, would provide supreme insight into God’s mind. No doubt this mystical quality sparked the creative potential of his imagination, but to be harnessed for science, it had to be disciplined by the rational faculties.

Kepler discovered the three basic laws of planetary motion, which shattered the Ptolemaic cosmology. In doing so, he utilized the data collected by Tycho Brahe, a Danish astronomer, who for twenty years had systematically observed the planets and stars and recorded their positions with far greater accuracy than had ever been done. Kepler sought to fit Tycho’s observations into Copernicus’s heliocentric model.

Kepler's first law demonstrated that planets move in elliptical orbits—not circular ones, as Aristotle and Ptolemy (and Copernicus) had believed—and that the sun is one focus of the ellipse. This discovery that a planet's path was one simple oval eliminated all the epicycles that had been used to preserve the appearance of circular motion. Kepler's second law showed that planets do not move at uniform speed, as had been believed, but accelerate as they near the sun, and he provided the rule for deciphering a planet's speed at each point in its orbit. His third law drew a mathematical relationship between the time it takes a planet to complete its orbit of the sun and its average distance from the sun. On the basis of these laws, one could calculate accurately a planet's position and velocity at a particular time—another indication that the planets were linked together in a unified mathematical system.

Derived from carefully observed facts, Kepler's laws of planetary motion buttressed Copernicanism, for they made sense only in a heliocentric universe. But why did the planets move in elliptical orbits? Why did they not fly off into space or crash into the sun? To these questions Kepler had no satisfactory answers. It was Isaac Newton (1642–1727), the great British mathematician-scientist, who arrived at a celestial mechanics that linked the astronomy of Copernicus and Kepler with the physics of Galileo and accounted for the behavior of planets.

THE NEWTONIAN SYNTHESIS

The publication in 1687 of Isaac Newton's *Mathematical Principles of Natural Philosophy* marks the climax of the Scientific Revolution. Newton postulated three laws of motion that joined all celestial and terrestrial objects into a vast mechanical system, whose parts worked in perfect harmony and whose connections could be expressed in mathematical terms, and he invented the calculus, which facilitated the expression of physical laws in mathematical equations. Since Copernican astronomy was essential to his all-encompassing theory of the universe, Newton provided mathematical proof for the heliocentric system, and opposition to it dissipated.

Newton's first law is the principle of inertia: that a body at rest remains at rest unless acted on

by a force and that a body in rectilinear motion continues to move in a straight line at the same velocity unless a force acts on it. A moving body does not require a force to keep it in motion, as ancient and medieval thinkers had believed. Once started, bodies continue to move; motion is as natural a condition as rest. Newton's second law states that a given force produces a measurable change in a body's velocity; a body's change of velocity is proportional to the force acting on it. Newton's third law holds that for every action or force there is an equal and opposite reaction or force. The sun pulls the earth with the same force that the earth exercises on the sun. An apple falling to the ground is being pulled by the earth, but the apple is also pulling the earth toward it. (However, since the mass of the apple is so small in comparison with that of the earth, the force that the apple exercises on the earth causes no visible change in the earth's motion.)

Newton asserted that the same laws of motion and gravitation that operate in the celestial world also govern the movement of earthly bodies. Ordinary mechanical laws explain both why apples fall to the ground and why planets orbit the sun. Both the planet and the apple are subject to the same force, and the very same mathematical formula describes the sun's action on a planet and the earth's pull on an apple. Newtonian physics ended the medieval division of the cosmos into higher and lower worlds, with different laws operating in each realm. The universe is an integrated, harmonious mechanical system held together by the force of gravity. By demonstrating that the universe contains an inherent mathematical order, Newton realized the Pythagorean and Platonic visions. To his contemporaries, it seemed that Newton had unraveled all of nature's mysteries: the universe was fully explicable. It was as if Newton had penetrated God's mind.

Deeply committed to Anglican Christianity, Newton retained a central place for God in his world system. God for him was the grand architect whose wisdom and skill accounted for nature's magnificent clockwork design. Newton also believed that God periodically intervened in his creation to restore energy to the cosmic system and that there was no conflict between divine miracles and a mechanical universe. However, in future generations, thinkers called deists (see upcoming

section “Christianity Assailed: The Search for a Natural Religion”) came to regard miracles as incompatible with a universe governed by impersonal mechanical principles.

With his discovery of the composition of light, Newton also laid the foundation of the science of optics. He was a cautious experimentalist who valued experimental procedures, including drawing appropriate conclusions from accumulated data. Both Newton’s mechanical universe and his championing of the experimental method were basic premises of the Age of Enlightenment.

PROPHETS OF MODERN SCIENCE

The accomplishments of the Scientific Revolution extended beyond the creation of a new model of the universe. They also included the formulation of a new method of inquiry into nature and the recognition that science could serve humanity. Two thinkers instrumental in articulating the implications of the Scientific Revolution were Francis Bacon and René Descartes. Both repudiated the authority of Aristotle and other ancients in scientific matters and urged the adoption of new methods for seeking and evaluating truth.

Francis Bacon: The Inductive Method

Sir Francis Bacon (1561–1626), an English statesman and philosopher, vigorously supported the advancement of science and the scientific method. Although he himself had no laboratory and made no discoveries, his advocacy of the scientific method has earned him renown as a prophet of modern science. Bacon attributed the limited progress of science over the ages to the interference of scholastic philosophers, who sought to bend theories of nature to the requirements of Scripture. Bacon also denounced scholastic thinkers for their slavish attachment to Aristotelian doctrines, which prevented independent thinking and the acquisition of new information about nature. To acquire new knowledge and improve the quality of human life, said Bacon, we should not depend on ancient texts: old authorities must be discarded, and knowledge must be pursued and organized in a new way.

The method that Bacon advocated as the way to truth and useful knowledge was the inductive approach: careful observation of nature and the systematic accumulation of data, drawing general laws from the knowledge of particulars, and testing these laws through constant experimentation. People committed to such a method would never subscribe to inherited fables and myths about nature or invent new ones. Rather, they would investigate nature directly and base their conclusions on observable facts. In his discovery of the circulation of blood, Bacon’s contemporary, British physician William Harvey (1578–1657), successfully employed the inductive method championed by Bacon. Grasping the essential approach of modern natural science, Bacon attacked practitioners of astrology, magic, and alchemy for their errors, secretiveness, and enigmatic writings and urged instead the pursuit of cooperative and methodical scientific research that could be publicly criticized.

Bacon was among the first to appreciate the value of the new science for human life. Knowledge, he said, should help us utilize nature for human advantage; it should improve the quality of human life by advancing commerce, industry, and agriculture. Holding that knowledge is power, Bacon urged the state to found scientific institutions and praised progress in technology and the mechanical arts. In Bacon’s transvaluation of values, the artisan, mechanic, and engineer advanced knowledge more and contributed more to human betterment than did philosopher-theologians who constructed castles in the air.

René Descartes: The Deductive Method

The scientific method encompasses two approaches to knowledge that usually complement each other: the empirical (inductive) and the rational (deductive). In the inductive approach, which is employed in such descriptive sciences as biology, anatomy, and geology, general principles are derived from the analysis of data collected through observation and experiment. The essential features of the inductive method, as we have seen, were championed by Bacon, who regarded sense data as the foundation of knowledge. In the



ENGRAVING OF RENÉ DESCARTES (1596–1650) TUTORING QUEEN CHRISTINA OF SWEDEN. Descartes was rare among major scientists in that he believed passionately in the intelligence of his female followers and correspondents. Rejecting authority, he asserted confidence in the human mind's ability to arrive at truth through its own capacities. (*Chateau de Versailles, France/The Bridgeman Art Library*)

deductive approach, which is employed in mathematics and theoretical physics, truths are derived in successive steps from first principles, indubitable axioms. In the seventeenth century, the deductive method was formulated by René Descartes (1596–1650), a French mathematician and philosopher, who is also regarded as the founder of modern philosophy.

In the *Discourse on Method* (1637), Descartes expressed his disenchantment with the learning of his day. Since much of what he had believed on the basis of authority had been shown to be untrue, Descartes resolved to seek no knowledge other than that which he might find within himself or within nature. Rejecting as absolutely false anything about which he could have the

least doubt, Descartes searched for an incontrovertible truth that could serve as the first principle of knowledge, the basis of an all-encompassing philosophical system.

Descartes found one truth to be certain and unshakable: that it was he who was doing the doubting and thinking. In his dictum “I think therefore I am,” Descartes had his starting point of knowledge. Descartes is viewed as the founder of modern philosophy because he called for the individual to question and if necessary to overthrow all traditional beliefs, and he proclaimed the mind's inviolable autonomy and importance, its ability and right to know truth. His assertions about the power of thought made people aware of their capacity to comprehend the world through their own mental powers.

Descartes saw the method used in mathematics as the most reliable avenue to certain knowledge. By applying mathematical reasoning to philosophical problems, we can achieve the same certainty and clarity evidenced in geometry. Mathematics is the key to understanding both the truths of nature and the moral order underlying human existence. The mathematical, or deductive, approach favored by Descartes consists of finding a self-evident principle, an irrefutable premise, such as a geometric axiom, and then deducing other truths from it through a chain of logical reasoning. The Cartesian deductive method, with its mathematical emphasis, perfectly complements Bacon's inductive approach, which stresses observation and experimentation. The scientific achievements of modern times have stemmed from the skillful synchronization of induction and deduction.

THE MEANING OF THE SCIENTIFIC REVOLUTION

The radical transformation of our conception of the physical universe produced by the Scientific Revolution ultimately transformed our understanding of the individual, society, and the purpose of life. The Scientific Revolution, therefore, was a decisive factor in the shaping of the modern world. It destroyed the medieval world-view, in which the earth occupied the central position, heaven lay just beyond the fixed stars, and every object had its place in a hierarchical and

qualitative order. It replaced this view with the modern conception of a homogeneous universe of unbounded space and an infinite number of celestial bodies. Gone were the barriers that separated the heavens and the earth. The glory of the heavens was diminished by the new view that celestial objects were composed of the same stuff and subject to the same laws as all other natural objects. Gone also was the medieval notion that God had assigned an ultimate purpose to all natural objects and to all plant and animal life, that in God's plan everything had an assigned role: we have eyes because God wants us to see and rain because God wants crops to grow. Eschewing ultimate purposes, modern science examines physical nature for mathematical relationships and chemical composition.

In later centuries, further implications of the new cosmology caused great anguish. The conviction that God had created the universe for them, that the earth was fixed beneath their feet, and that God had given the earth the central position in his creation had brought medieval people a profound sense of security. They knew why they were here, and they never doubted that heaven was the final resting place for the faithful. Copernican astronomy dethroned the earth, expelled human beings from their central position, and implied an infinite universe. In the sixteenth and seventeenth centuries, few thinkers grasped the full significance of this displacement. However, in succeeding centuries, this radical cosmological transformation proved as traumatic for the modern mind as did Adam and Eve's expulsion from the Garden of Eden for the medieval mind. Today we know that the earth is one of billions and billions of celestial bodies, a tiny speck in an endless cosmic ocean, and that the universe is some twelve billion years old. Could such a universe have been created just for human beings? Could it contain a heaven that assures eternal life for the faithful and a hell with eternal fires and torments for sinners?

Few people at the time were aware of the full implications of the new cosmology. One who did understand was Blaise Pascal (1623–1662), a French scientist and mathematician. A devout Catholic, Pascal was frightened by what he called “the eternal silence of these infinite spaces” and realized that the new science could stir doubt, uncertainty, and anxiety, which threatened belief.

The conception of reason advanced by Galileo and other thinkers of the period differed fundamentally from that of medieval scholastics. Scholastic thinkers viewed reason as a useful aid for contemplating divine truth; as such, reason always had to serve theology. Influenced by the new scientific spirit, thinkers now saw the investigation of nature as reason's principal concern. What is more, they viewed this activity as autonomous and not subject to theological authority.

The Scientific Revolution fostered a rational and critical spirit among the intellectual elite. Descartes's methodical doubt, rejection of authority, and insistence on the clarity, precision, and accuracy of an idea and Francis Bacon's insistence on verification pervaded the outlook of the eighteenth-century Enlightenment thinkers; they denounced magic, spells, demons, witchcraft, alchemy, and astrology as vulgar superstitions. Phenomena attributed to occult forces, they argued, could be explained by reference to natural forces. A wide breach opened up between the intellectual elite and the masses, who remained steeped in popular superstitions and committed to traditional Christian dogma.

The creators of modern science had seen no essential conflict between traditional Christianity and the new view of the physical universe and made no war on the churches. Indeed, they believed that they were unveiling the laws of nature instituted by God at the Creation—that at last the human mind could comprehend God's magnificent handiwork. But the new cosmology and new scientific outlook ultimately weakened traditional Christianity, for it dispensed with miracles and the need for God's presence.

The new critical spirit led the thinkers of the Enlightenment to doubt the literal truth of the Bible and to dismiss miracles as incompatible with what science teaches about the regularity of nature. So brilliantly had God crafted the universe, they said, so exquisite a mechanism was nature, that its operations did not require God's intervention. In the generations after the Scientific Revolution, theology, long considered the highest form of contemplation, was denounced as a barrier to understanding or even dismissed as irrelevant, and the clergy rapidly lost their position as the arbiters of knowledge. To many intellectuals, theology seemed sterile and profitless in comparison with the new science. Whereas science promised the certitude of mathematics, theologians seemed to quibble endlessly over unfathomable and,

even worse, inconsequential issues. That much blood had been spilled over these questions discredited theology still more. In scientific academies, in salons, and in coffee houses, educated men and some women met to discuss the new ideas, and journals published the new knowledge for eager readers. European culture was undergoing a great transformation, marked by the triumph of a scientific and secular spirit among the intellectual elite.

The Scientific Revolution repudiated reliance on Aristotle, Ptolemy, and other ancient authorities in matters concerning nature and substituted in their place knowledge derived from observation, experimentation, and mathematical thinking. Citing an ancient authority was no longer sufficient to prove a point or win an argument. The new standard of knowledge derived from experience with the world, not from ancient texts or inherited views. This new outlook had far-reaching implications for the Age of Enlightenment. If the authority of ancient thinkers regarding the universe could be challenged, could not inherited political beliefs be challenged as well—for example, the divine right of kings to rule? Impressed with the achievements of science, many intellectuals started to urge the application of the scientific method to all fields of knowledge.

The new outlook generated by the Scientific Revolution served as the foundation of the Enlightenment. The Scientific Revolution gave thinkers great confidence in the power of the mind, which had discovered nature's laws, reinforcing the confidence in human abilities expressed by Renaissance humanists. In time, it was believed, the scientific method would unlock all nature's secrets, and humanity, gaining ever greater knowledge and control of nature, would progress rapidly.

THE AGE OF ENLIGHTENMENT: AFFIRMATION OF REASON AND FREEDOM

The Enlightenment of the eighteenth century was the culmination of the movement toward modernity initiated by the Renaissance. The thinkers of the Enlightenment, called *philosophes*, aspired to create a more rational and humane society. To attain this goal, they attacked medieval otherworldliness, rejected theology as an avenue to

truth, denounced the Christian idea of people's inherent depravity, and sought to understand nature and society through reason alone, unaided by revelation or priestly authority. Adopting Descartes's method of systematic doubt, they questioned all inherited opinions and traditions. "We think that the greatest service to be done to men," said Denis Diderot, "is to teach them to use their reason, only to hold for truth what they have verified and proved."⁴ The philosophes believed that they were inaugurating an enlightened age. Through the power of reason, humanity was at last liberating itself from the fetters of ignorance, superstition, and despotism with which tyrants and priests had bound it in past ages. Paris was the center of the Enlightenment, but there were philosophes and adherents of their views in virtually every leading city in western Europe and North America.

In many ways, the Enlightenment grew directly out of the Scientific Revolution. The philosophes sought to expand knowledge of nature and to apply the scientific method to the human world in order to uncover society's defects and to achieve appropriate reforms. Newton had discovered universal laws that explained the physical phenomena. Are there not general rules that also apply to human behavior and social institutions? asked the philosophes. Could a "science of man" be created that would correspond to and complement Newton's science of nature—that would provide clear and certain answers to the problems of the social world in the same way that Newtonian science had solved the mysteries of the physical world?

By relying on the same methodology that Newton had employed to establish certain knowledge of the physical universe, the philosophes hoped to arrive at the irrefutable laws that operated in the realm of human society. They aspired to shape religion, government, law, morality, and economics in accordance with these natural laws. They believed that all things should be reevaluated to see if they accorded with nature and promoted human well-being.

In championing the methodology of science, the philosophes affirmed respect for the mind's capacities and for human autonomy. Individuals are self-governing, they insisted. The mind is self-sufficient; rejecting appeals to clerical or princely authority, it relies on its own ability to think, and it trusts the evidence of its own experience. Rejecting the authority of tradition, the philosophes wanted people to have

the courage to break with beliefs and institutions that did not meet the test of reason and common sense and to seek new guideposts derived from experience and reason unhindered by passion, superstition, dogma, and authority. The numerous examples of injustice, inhumanity, and superstition in society outraged the philosophes. Behind their devotion to reason and worldly knowledge lay an impassioned moral indignation against institutions and beliefs that degraded human beings.

CHRISTIANITY ASSAILED: THE SEARCH FOR A NATURAL RELIGION

The philosophes waged an unrelenting assault on traditional Christianity, denouncing it for harboring superstition, promulgating unreason, and fostering fanaticism and persecution. Relying on the facts of experience, as Bacon had taught, the philosophes dismissed miracles, angels, and devils as violations of nature's laws and figments of the imagination, which could not be substantiated by the norms of evidence. Applying the Cartesian spirit of careful reasoning to the Bible, they pointed out flagrant discrepancies between various biblical passages and rejected as preposterous the theologians' attempts to resolve these contradictions. David Hume (1711–1776), the Scottish skeptic, wrote in *The Natural History of Religion* (1757):

Examine the religious principles, which have, in fact, prevailed in the world. You will scarcely be persuaded, that they are anything but sick men's dreams: Or perhaps will regard them more as the playsome, whimsies of monks in human shape, than the serious, positive, dogmatical asseverations of a being, who dignifies himself with the name rational. . . . No theological absurdities so glaring that they have not, sometimes, been embraced by men of the greatest and most cultivated understanding.⁵

With science as an ally, the philosophes challenged Christianity's claim that it possessed infallible truths, and they ridiculed theologians for wrangling over pointless issues and for compelling obedience to doctrines that defied reason.



THE INQUISITION. In one of the first histories of all the world's religions (published in 1723), the engraver Bernard Picart depicted the Inquisition as cold and ruthlessly interrogating (top panel), then as barbarous in its use of torture; at the bottom center is the practice of water-boarding. (*Bibliothèque des Arts Decoratifs, Paris, France/Archives Charment/The Bridgeman Art Library*)

Moreover, the philosophes assailed Christianity for viewing human nature as evil and human beings as helpless without God's assistance, for focusing on heaven at the expense of human happiness on earth, and for impeding the acquisition of useful knowledge by proclaiming the higher authority of dogma and revelation. Frightened and confused by religion, people have been held in subjection by clergy and tyrants, the philosophes argued. To establish an enlightened society, clerical power must be broken, Christian dogmas repudiated, and the fanaticism that produced tortures, burnings, and massacres

purged from the European soul. The philosophes broke with the Christian past, even if they retained the essential elements of Christian morality.

François Marie Arouet (1694–1778), known to the world as Voltaire, was the recognized leader of the French Enlightenment. Few of the philosophes had a better mind, and none had a sharper wit. Living in exile in Britain in the late 1720s, Voltaire acquired a great admiration for English liberty, commerce, science, and religious toleration. Voltaire's angriest words were directed against established Christianity, to which he attributed many of the ills of French society. He regarded Christianity as "the Christ-worshipping superstition," which someday would be destroyed "by the weapons of reason." Many Christian dogmas are incomprehensible, said Voltaire, yet Christians have slaughtered one another to enforce obedience to these doctrines. Voltaire was appalled by all the crimes committed in the name of Christianity.⁶

While some philosophes were atheists, most were deists, including Voltaire and Thomas Paine (1737–1809), the English-American radical. Deists sought to fashion a natural religion that accorded with reason and science, and they tried to adapt the Christian tradition to the requirements of the new science. They denied that the Bible was God's revelation, rejected clerical authority, and dismissed Christian mysteries, prophecies, and miracles—the virgin birth, Jesus walking on water, the Resurrection, and others—as violations of a lawful natural order. They did consider it reasonable that this magnificently structured universe, operating with clockwork precision, was designed and created at a point in time by an all-wise Creator. But in their view, once God had set the universe in motion, he refrained from interfering with its operations. Thus, deists were at odds with Newton, who allowed for divine intervention in the world.

For deists, the essence of religion was morality—a commitment to justice and humanity—and not adherence to rituals, doctrines, or clerical authority. In *The Age of Reason* (1794–1795), Paine declared: "I believe in the equality of man; and I believe that religious duties consist in doing justice, loving mercy, and endeavoring to make our fellow-creatures happy."⁷ Deists deemed it entirely reasonable that after death those who had fulfilled God's moral law would be rewarded, while those who had not would be punished.

POLITICAL THOUGHT

Besides established religion, the philosophes identified another source of the evil that beset humanity: despotism. If human beings were to achieve happiness, they had to extirpate revealed religion and check the power of their rulers. "Every age has its dominant idea," wrote Diderot; "that of our age seems to be Liberty."⁸ Eighteenth-century political thought is characterized by a thoroughgoing secularism; an indictment of despotism, the divine right of kings, and the special privileges of the aristocracy and the clergy; a respect for English constitutionalism because it enshrined the rule of law; and an affirmation of John Locke's theory that government had an obligation to protect the natural rights of its citizens. Central to the political outlook of the philosophes was the conviction that political solutions could be found for the ills that afflicted society.

In general, the philosophes favored constitutional government that protected citizens from the abuse of power. With the notable exception of Rousseau, the philosophes' concern for liberty did not lead them to embrace democracy, for they put little trust in the masses. Several philosophes, notably Voltaire, placed their confidence in reforming despots, like Frederick II of Prussia, who were sympathetic to enlightened ideas. However, the philosophes were less concerned with the form of government—monarchy or republic—than with preventing the authorities from abusing their power.

Seventeenth-Century Antecedents: Hobbes and Locke

The political thought of the Enlightenment was greatly affected by the writings of two seventeenth-century English philosophers: Thomas Hobbes (1588–1679) and John Locke (1632–1704). Hobbes witnessed the agonies of the English civil war, including the execution of Charles I in 1649. These developments fortified his conviction that absolutism was the most desirable and logical form of government. Only the unlimited power of a sovereign, Hobbes wrote in his major work *Leviathan* (1651), could contain the human passions that disrupt the social order and threaten civilized life; only absolute rule could provide an environment secure enough for people to pursue their individual interests.

Influenced by the new scientific thought that saw mathematical knowledge as the avenue to truth, Hobbes aimed at constructing political philosophy on a scientific foundation and rejected the authority of tradition and religion as inconsistent with a science of politics. Thus, although Hobbes supported absolutism, he dismissed the idea advanced by other theorists of absolutism that the monarch's power derived from God. He also rejected the view of medieval theorists that the state, which belonged to a lower temporal order, was subordinate to the commands of a higher spiritual realm and its corollary that the state should not be obeyed when it violates God's law. Like Machiavelli, Hobbes made no attempt to fashion the earthly city in accordance with Christian teachings. As an astute observer of contemporary affairs, Hobbes, of course, recognized religion's importance in European political life. However, his view of human nature and human life rested on no religious presuppositions. Religious thinkers frequently denounced Hobbes as a heretic, if not an atheist. *Leviathan* is a rational and secular political statement; its significance lies in its modern approach, rather than in Hobbes's justification of absolutism.

Hobbes had a pessimistic view of human nature. Believing that people are innately selfish and grasping, he maintained that competition and dissension, rather than cooperation, characterize human relations. Without a stringent authority to make and enforce law, life would be miserable, a war of every man against every man, he said. Therefore, he prescribed a state with unlimited power, since only in this way could people be protected from one another and civilized life preserved. Although the philosophes generally rejected Hobbes's gloomy view of human nature, they embraced his secular approach to politics, particularly his denunciation of the theory of the divine right of kings. Hobbes's concern with protecting the social order from human antisocial tendencies is still a central consideration of modern political life.

In contrast to Hobbes, John Locke saw people as essentially good and humane and developed a conception of the state that was fundamentally different from Hobbes's. In the *Two Treatises of Government* (1690), Locke maintained that human beings are born with natural rights to life, liberty, and property, and they establish the state to protect these rights. Consequently, neither executive nor legislature—neither king nor assembly—has the authority to deprive individuals of their natural rights. Whereas

Hobbes justified absolute monarchy, Locke explicitly endorsed constitutional government, in which the power to govern derives from the consent of the governed and the state's authority is limited by agreement. Rulers hold their authority under the law; when they act outside the law, they forfeit their right to govern. Thus, if government fails to fulfill the end for which it was established—the preservation of the individual's right to life, liberty, and property—the people have a right to dissolve that government.

Both Hobbes and Locke agreed that the state exists in order to ensure the tranquillity, security, and well-being of its citizens. However, they proposed radically different ways of attaining this end. Unlike Hobbes, Locke believed that social well-being encompassed personal freedom. Rejecting Hobbes's view that absolute power can remedy the defects of the state of nature, Locke stated the case for limited government, the rule of law, the protection of fundamental human rights, and the right of resistance to arbitrary power. Underlying Locke's conception of the state is the conviction that people have the capacity for reason and freedom, and that political life can be guided by rational principles: "We are born Free as we are born Rational."⁹

The value that Locke gave to reason and freedom and his theories of natural rights, the rule of law, and the right to resist despotic authority had a profound effect on the Enlightenment and the liberal revolutions of the late eighteenth and early nineteenth centuries. Thus, in the Declaration of Independence, Thomas Jefferson restated Locke's principles to justify the American Revolution. Locke's tenets that property is a natural right and that state interference with personal property leads to the destruction of liberty also became core principles of modern liberalism.

Montesquieu

The contribution of Charles Louis de Secondat, baron de la Brède et de Montesquieu (1689–1755), to political theory rests essentially on his *Spirit of the Laws* (1748), a work of immense erudition covering many topics. Montesquieu held that the study of political and social behavior is not an exercise in abstract thought but must be undertaken in relation to geographic, economic, and historic conditions. To this end, Montesquieu accumulated and classified a wide diversity of facts, from which he tried to draw general rules governing society. He concluded that

different climatic and geographic conditions and different national customs, habits, religions, and institutions give each nation a particular character; each society requires constitutional forms and laws that pay heed to the character of its people. Montesquieu's effort to explain social and political behavior empirically—to found a science of society based on the model of natural science—makes him a forerunner of modern sociology.

Montesquieu regarded despotism as a pernicious form of government, corrupt by its very nature. Ruling as he wishes and unchecked by law, the despot knows nothing of moderation and institutionalizes cruelty and violence. The slavlike subjects, wrote Montesquieu, know only servitude, fear, and misery. Driven by predatory instincts, the despotic ruler involves his state in wars of conquest, caring not at all about the suffering this causes his people. In a despotic society, economic activity stagnates, for merchants, fearful that their goods will be confiscated by the state, lose their initiative. Reformers used Montesquieu's characterization of despotism to show the limitations of absolute monarchy.

To safeguard liberty from despotism, Montesquieu advocated the principle of separation of powers. In every government, said Montesquieu, there are three sorts of powers: legislative, executive, and judiciary. When one person or one body exercises all three powers—if the same body both prosecutes and judges, for example—liberty cannot be preserved. Where sovereignty is monopolized by one person or body, power is abused and political liberty is denied. In a good government, one power balances and checks another power, an argument that impressed the framers of the U.S. Constitution.

Several of Montesquieu's ideals were absorbed into the liberal tradition—constitutional government and the rule of law, separation of powers, freedom of thought, religious toleration, and protection of individual liberty. The conservative tradition drew on Montesquieu's respect for traditional ways of life and his opposition to sudden reforms that ignored a people's history and culture.

Voltaire

Unlike Hobbes and Locke, Voltaire was not a systematic political theorist, but a propagandist and polemicist, who hurled pointed barbs at all the



VOLTAIRE AND KING FREDERICK. The roundtable was beloved by the aristocracy because it claimed everyone as an equal. Here Voltaire visits with Frederick the Great and perhaps imagined himself as an equal. (*Bildarchiv Preussischer Kulturbesitz/Art Resource, N.Y.*)

abuses of the French society. Nevertheless, Voltaire's writings do contain ideas that form a coherent political theory that in many ways expresses the outlook of the Enlightenment.

Voltaire disdained arbitrary power, since it is based on human whim rather than on established law. He described a prince who imprisons or executes his subjects unjustly and without due process as “nothing but a highway robber who is called ‘Your Majesty.’” For Voltaire, freedom consisted in being governed by an established and standard code of law that applies equally to all. Without the rule of law, wrote Voltaire, there is no liberty of person, no freedom of thought or of religion, no protection of personal property, no

impartial judiciary, and no protection from arbitrary arrest. Underlying Voltaire's commitment to the rule of law was his conviction that power should be used rationally and beneficially.

Voltaire's respect for the rule of law was strengthened by his stay in England between 1726 and 1729, which led to the publication of *The English Letters* in 1733. In this work, Voltaire presents an idealized and, at times, inaccurate picture of English politics and society. More important, however, is the fact that his experience with English liberty gave him hope that a just and tolerant society was not a utopian dream, thereby strengthening his resolve to attack the abuses of French society.

As noted earlier, Voltaire was no democrat. He had little confidence in the capacities of the common people, whom he saw as prone to superstition and fanaticism. Nor did he advocate revolution. What he did favor was reforming society through the advancement of reason and the promotion of science and technology. Voltaire himself fought to introduce several reforms into France, including freedom of the press, religious toleration, a fair system of criminal justice, proportional taxation, and curtailment of the privileges of the clergy and nobility.

Rousseau

"Man is born free and everywhere he is in chains."¹⁰ With these stirring words, the Geneva-born French thinker Jean Jacques Rousseau (1712–1778) began *The Social Contract* (1762). Rousseau considered the state as it was then constituted to be unjust and corrupt. It was dominated by the rich and the powerful, who used it to further their interests, whereas the weak knew only oppression and misery. In Rousseau's view, the modern state deprived human beings of their natural freedom and fostered a selfish individualism, which undermined feelings of mutuality and concern for the common good.

Rousseau wanted the state to be a genuine democracy, a moral association that bound people together in freedom, equality, and civic devotion. For Rousseau, individuals fulfilled their moral potential not in isolation, but as committed members of the community; human character was ennobled when people cooperated with one another and cared for one another. Rousseau admired the ancient Greek city-state,



JEAN JACQUES ROUSSEAU ALONE, A SELF-EXILE FROM THE CITY. Rousseau viewed nature and solitude as curative. He also advocated reading for introspection and enlightenment. (*akg-images*)

the polis, for it was an organic community in which citizens set aside private interests in order to attain the common good. In *The Social Contract*, he sought to re-create the community spirit and the political freedom that characterized the Greek city-state.

What Rousseau proposed was that each person surrender unconditionally all his rights to the community as a whole and submit to its authority. To prevent the assertion of private interests over the common good, Rousseau wanted the state to be governed in accordance with the general will—an underlying principle that expressed what was best for the community. He did not conceive of the general will as a majority or even a unanimous vote, both of which could be wrong. Rather, it was a plainly visible truth, easily discerned by common sense and by reason and by listening to our hearts. In Rousseau's view, just and enlightened citizens imbued with public spirit would have the good sense and moral awareness to legislate in accordance with the general will.

Like ancient Athens, the state that Rousseau envisioned was a direct democracy, in which the citizens themselves, not their representatives, constituted the lawmaking body. Consequently, the governed and the government were one and the same. Rousseau condemned arbitrary and despotic monarchy, the divine-right theory of kingship, and the traditional view that people should be governed by their betters, lords and clergy, who were entitled to special privileges. He granted sovereignty to the people as a whole and affirmed the principle of equality.

Rousseau remains a leading theorist of democratic thought. His critics assert that his political thought, whose goal is a body of citizens who think alike, buttresses a dangerous collectivism and even totalitarianism. These critics argue that Rousseau did not place constitutional limitations on sovereignty or erect safeguards to protect individual and minority rights from a potentially tyrannical majority. They note, too, that Rousseau rejected entirely the Lockean principle that citizens possess rights independently of the state, as well as the right to act against the state.

SOCIAL AND ECONOMIC THOUGHT

The philosophes rejected the Christian belief that human beings are endowed with a sinful nature, a consequence of Adam and Eve's disobedience of God. They knew from experience, of course, that human beings behave wickedly and seem hopelessly attached to nonrational modes of thinking. While they retained a certain pessimism about human nature, however, the philosophes generally believed in individuals' essential goodness and in their capacity for moral improvement. "Nature has not made us evil," wrote Diderot, "it is bad education, bad models, bad legislation that corrupt us."¹¹ And Voltaire declared that a person is "born neither good nor wicked; education, example, the government into which he is thrown—in short, occasion of every kind—determines him to virtue or vice."¹² The philosophes' conception of human nature rested heavily on John Locke's epistemology, or theory of knowledge. To the philosophes, it seemed that Locke had discovered the fundamental principles governing the human mind, an achievement comparable to Newton's discovery of the laws governing physical bodies.

Epistemology, Psychology, and Education

In his *Essay Concerning Human Understanding* (1690), a work of immense significance in the history of philosophy, Locke argued that human beings are not born with innate ideas (the idea of God, principles of good and evil, and rules of logic, for example) divinely implanted in their minds, as Descartes had maintained. Rather, said Locke, the human mind is a blank slate upon which are imprinted sensations derived from contact with the phenomenal world. Knowledge is derived from experience.

Locke's theory of knowledge had profound implications. If there are no innate ideas, said the philosophes, then human beings, contrary to Christian doctrine, are not born with original sin, are not depraved by nature. All that individuals are derives from their particular experiences. If people are provided with a proper environment and education, they will behave morally; they will become intelligent and productive citizens. By the proper use of their reason, people could bring their beliefs, their conduct, and their institutions into harmony with natural law. This was how the reform-minded philosophes interpreted Locke. They preferred to believe that evil stemmed from faulty institutions and poor education, both of which could be remedied, rather than from a defective human nature.

The most important work of Enlightenment educational thought was Rousseau's *Émile* (1762), in which he suggested educational reforms that would instill in children self-confidence, self-reliance, and emotional security—necessary qualities if they were to become productive adults and responsible citizens. If the young are taught to think for themselves, said Rousseau, they will learn to cherish personal freedom. A strong faith in the essential goodness of human nature underlay Rousseau's educational philosophy. He also assumed that youngsters have an equal capacity to learn and that differences in intelligence are due largely to environmental factors.

Rousseau understood that children should not be treated like little adults, for children have their own ways of thinking and feeling. He railed against those who robbed children of the joys and innocence of childhood by chaining them to desks, ordering them about, and filling their heads with rote learning. Instead, he urged that children experience direct contact with the environment to develop their

bodies and senses and their curiosity, ingenuity, resourcefulness, and imagination. It is the whole child that concerns Rousseau.

Freedom of Conscience and Thought

The philosophes regarded religious persecution—whose long and bloodstained history included the burning of heretics in the Middle Ages, the slaughter of Jews and Muslims during the First Crusade, and the massacres of the wars of the Reformation—as humanity’s most depraved offense against reason. While the worst excesses of religious fanaticism had dissipated by the eighteenth century, examples of religious persecution still abounded, particularly in Catholic lands. In his pleas for tolerance, Voltaire spoke for all the philosophes:

*I shall never cease . . . to preach tolerance from the housetops . . . until persecution is no more. The progress of reason is slow, the roots of prejudice lie deep. Doubtless, I shall never see the fruits of my efforts, but they are seeds which may one day germinate.*¹³

Censorship was a serious and ever-present problem for the philosophes. After the publication of Voltaire’s *English Letters*, his printer was arrested and the book confiscated and publicly burned as irreligious. On another occasion, when Voltaire was harassed by the authorities, he commented that “it is easier for me to write books than to get them published.”¹⁴ Denounced by ecclesiastical and ministerial authorities as a threat to religion and constituted authority, *On the Mind* (1758), by Claude-Adrien Helvetius (1715–1771), was burned by the public executioner. Denis Diderot (1713–1784), the principal editor of the thirty-eight-volume *Encyclopedia*, whose 150 or more contributors included the leading Enlightenment thinkers, had to contend with French authorities, who at times suspended publication. After the first two volumes appeared, the authorities condemned the work for containing “maxims that would tend to destroy royal authority, foment a spirit of independence and revolt . . . and lay the foundations for the corruption of morals and religion.”¹⁵ In 1759, Pope Clement XIII condemned the *Encyclopedia* for having “scandalous

doctrines [and] inducing scorn for religion.”¹⁶ It required careful diplomacy and clever ruses to finish the project and still incorporate ideas considered dangerous by religious and governmental authorities. The *Encyclopedia* had been undertaken in Paris during the 1740s as a monumental effort to bring together all human knowledge and to propagate Enlightenment ideas. Its numerous articles on science and technology and its limited coverage of theological questions attest to the new interests of eighteenth-century intellectuals. With the project’s completion in 1772, Diderot and Enlightenment opinion triumphed over clerical, royal, and aristocratic censors.

An article in the *Encyclopedia*, “The Press,” conveys the philosophes’ yearning for freedom of thought and expression. For them, the term *press* designated more than newspapers and journals; it encompassed everything in print, particularly books.

*People ask if freedom of the press is advantageous or prejudicial to a state. The answer is not difficult. It is of the greatest importance to conserve this practice in all states founded on liberty. I would even say that the disadvantages of this liberty are so inconsiderable compared to the advantages that this ought to be the common right of the universe, and it is certainly advisable to authorize its practices in all governments.*¹⁷

Humanitarianism

A humanitarian spirit, which no doubt owed much to Christian compassion, pervaded the outlook of the philosophes. It expressed itself in attacks on torture, which was commonly used to obtain confessions in many European lands, on cruel punishments for criminals, on slavery, and on war. The philosophes’ humanitarianism rested on the conviction that human nature was essentially virtuous and that human beings were capable of benevolent feelings toward one another.

In *On Crimes and Punishments* (1764), Cesare Beccaria (1738–1794), an Italian economist and criminologist inspired in part by Montesquieu, condemned torture as inhuman, “a criterion fit for a

cannibal.”¹⁸ He saw it as an irrational way of determining guilt or innocence, for an innocent person unable to withstand the agonies of torture will confess to anything and a criminal with a high threshold for pain will be exonerated. Influenced by Beccaria’s work, reform-minded jurists, legislators, and ministers called for the elimination of torture from codes of criminal justice, and several European lands abolished torture in the eighteenth century.

Though not pacifists, the philosophes denounced war as barbaric and an affront to reason. They deemed it to be a scourge promoted by power-hungry monarchs and supported by fanatical clergy, wicked army leaders, and ignorant commoners. In his literary masterpiece, *Candide* (1759), Voltaire ridiculed the rituals of war.

*Nothing could be smarter, more splendid, more brilliant, better drawn up than the two armies. Trumpets, fifes, hautboys [oboes], drums, cannons, formed a harmony such as has never been heard even in hell. The cannons first of all laid flat about six thousand men on each side; then the musketry removed from the best of worlds some nine or ten thousand blackguards who infested its surface. The bayonet also was the sufficient reason for the death of some thousands of men. The whole might amount to thirty thousand souls.*¹⁹

Voltaire was particularly outraged by the belief that the outcome of this “heroic butchery” was ordained by God. The article “Peace” in the *Encyclopedia* described war as

*the fruit of man’s depravity; it is a convulsive and violent sickness of the body politic. . . . [It] depopulates the nation, causes the reign of disorder. . . . makes the freedom and property of citizens uncertain . . . disturbs and causes the neglect of commerce; land becomes uncultivated and abandoned. . . . If reason governed men and had the influence over the heads of nations that it deserves, we would never see them inconsiderately surrender themselves to the fury of war; they would not show that ferocity that characterizes wild beasts.*²⁰

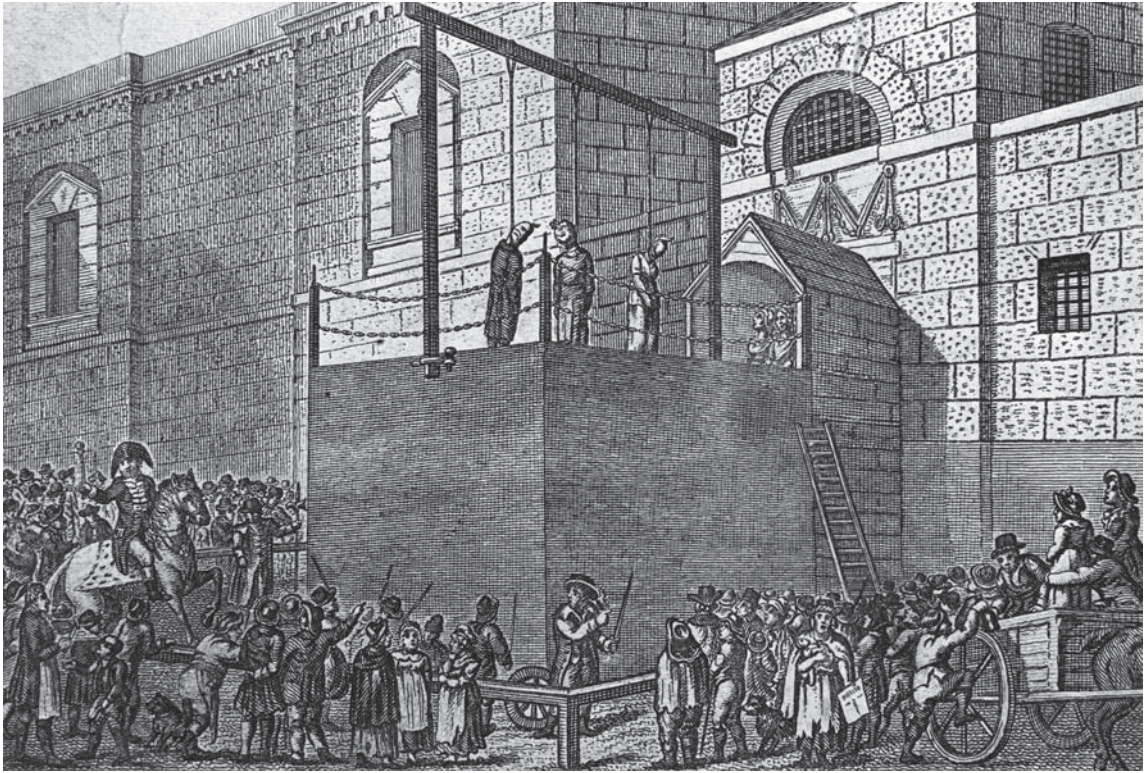
Montesquieu, Voltaire, Hume, Benjamin Franklin, Thomas Paine, and other philosophes condemned

slavery and the slave trade. In Book 15 of *The Spirit of the Laws*, Montesquieu scornfully refuted all justifications for slavery. Ultimately, he said, slavery, which violates the fundamental principle of justice underlying the universe, derived from base human desires to dominate and exploit other human beings. Adam Smith (see next section), the Enlightenment’s leading economic theorist, demonstrated that slave labor was inefficient and wasteful. In 1780, Paine helped draft the act abolishing slavery in Pennsylvania. An article in the *Encyclopedia*, “The Slave Trade,” denounced slavery as a violation of the individual’s natural rights:

*If commerce of this kind can be justified by a moral principle, there is no crime, however atrocious it may be, that cannot be made legitimate. . . . Men and their liberty are not objects of commerce; they can be neither sold nor bought. . . . There is not, therefore, a single one of these unfortunate people regarded only as slaves who does not have the right to be declared free.*²¹

The philosophes, although they often enjoyed the company of intelligent and sophisticated women in the famous salons, continued to view women as intellectually and morally inferior to men. Although some philosophes, notably Condorcet (see upcoming section “The Idea of Progress”), who wrote *Plea for the Citizenship of Women* (1791), did argue for female emancipation, they were the exception. Most retained traditional views, concurring with David Hume, who held that “nature has subjected” women to men and that their “inferiority and infirmities are absolutely incurable.”²² Rousseau, who also believed that nature had granted men power over women, regarded traditional domesticity as a woman’s proper role.

*I would a thousand times rather have a homely girl, simply brought up, than a learned lady and a wit who would make a literary circle of my house and install herself as its president. A female wit is a scourge to her husband, her children, her friends, her servants, to everybody. From the lofty height of her genius, she scorns every womanly duty, and she is always trying to make a man of herself.*²³



ENGRAVING, NEWGATE PRISON, EIGHTEENTH CENTURY. Prison conditions during the Age of Enlightenment were appalling. Here, a manacled man struggles with a wheelbarrow, and two others are led off to the gallows. Meanwhile, a guard watches over the dungeon filled with bound prisoners, who were as often debtors as criminals. (HIP/Art Resource, N.Y.)

Nevertheless, by clearly articulating the ideals of liberty and equality, the philosophes made a women's movement possible. The growing popularity of these ideals could not escape women, who measured their own position by them. Moreover, by their very nature, these ideals were expansive. Denying them to women would ultimately be seen as an indefensible contradiction.

Thus, Mary Wollstonecraft's *Vindication of the Rights of Woman* (1792), written under the influence of the French Revolution, protested against the prevailing subordination and submissiveness of women and the limited opportunities afforded them to cultivate their minds. If women were also endowed with reason, why should men alone de-

termine the standards and ground rules, she asked pungently. She reminded enlightened thinkers that the same arbitrary power that they objected to when wielded by monarchs and slave owners they condoned when exercised by husbands in domestic life. She considered it an act of tyranny for women "to be excluded from a participation of the natural rights of mankind."²⁴

Laissez-Faire Economics

In *An Inquiry into the Nature and Causes of the Wealth of Nations* (1776), Adam Smith (1732–1790), professor of moral philosophy in

Scotland, attacked the theory of mercantilism, which held that a state's wealth was determined by the amount of gold and silver it possessed. According to this theory, to build up its reserves of precious metals, the state should promote domestic industries, encourage exports, and discourage imports. Mercantilist theory called for government regulation of the economy so that the state could compete successfully with other nations for a share of the world's scarce resources. Smith argued that the real basis of a country's wealth was measured by the quantity and quality of its goods and services, not by its storehouse of precious metals. Government intervention, he said, retards economic progress; it reduces the real value of the annual produce of the nation's land and labor. On the other hand, when people pursue their own interests—when they seek to better their condition—they foster economic expansion, which benefits the whole society.

Smith limited the state's authority to maintaining law and order, administering justice, and defending the nation. The concept of *laissez faire*—that government should not interfere with the market—became a core principle of nineteenth-century liberal thought.

The Idea of Progress

"Despite all the efforts of tyranny, despite the violence and trickery of the priesthood, despite the vigilant efforts of all the enemies of mankind," wrote Baron Paul Henri Holbach, "the human race will attain enlightenment."²⁵

The philosophes were generally optimistic about humanity's future progress. Two main assumptions contributed to this optimism. First, accepting Locke's theory of knowledge, the philosophes attributed evil to a flawed but remediable environment, not to an inherently wicked human nature. Hopeful that a reformed environment would bring out the best in people, they looked forward to a day when reason would prevail over superstition, prejudice, intolerance, and tyranny. Second, the philosophes' veneration of science led them to believe that the progressive advancement of knowledge would promote material and moral progress.

A work written near the end of the century epitomized the philosophes' vision of the future: *Sketch for a Historical Picture of the Progress of the Human Mind* (1794) by Marie Jean Antoine Nicolas Caritat, marquis de Condorcet (1743–1794). A mathematician and historian of science and a contributor to the *Encyclopedia*, Condorcet campaigned for religious toleration and the abolition of slavery. During the French Revolution, he attracted the enmity of the dominant Jacobin party and in 1793 was forced to go into hiding. Secluded in Paris, he wrote *Sketch*. Arrested in 1794, Condorcet died during his first night in prison, either from exhaustion or from self-administered poison. In *Sketch*, Condorcet lauded recent advances in knowledge that enabled reason to "lift her chains (and) shake herself free"²⁶ from superstition and tyranny. Passionately affirming the Enlightenment's confidence in reason and science, Condorcet expounded a theory of continuous and indefinite human improvement. He pointed toward a future golden age, characterized by the triumph of reason and freedom.

Our hopes for the future condition of the human race can be subsumed under three important heads: the abolition of inequality between nations, the progress of equality within each nation, and the true perfection of mankind. . . .

*The time will therefore come when the sun will shine only on free men who know no other master but their reason; when tyrants and slaves, priests and their stupid or hypocritical instruments will exist only in works of history and on the stage; and we shall think of them only to pity their victims and their dupes; to maintain ourselves in a state of vigilance by thinking on their excesses; and to learn how to recognize and so to destroy, by force of reason, the first seeds of tyranny and superstition, should they ever dare to reappear amongst us.*²⁷

But the philosophes were not starry-eyed dreamers. They knew that progress was painful, slow, and reversible. Voltaire's *Candide* was a protest against a naive optimism that ignored the granite might of human meanness, ignorance, and

irrationality. “Let us weep and wail over the lot of philosophy,” wrote Diderot. “We preach wisdom to the deaf and we are still far indeed from the age of reason.”²⁸

CONFLICTS AND POLITICS

The major conflicts of the eighteenth century were between Britain and France for control of territory in the New World and between Austria and Prussia for dominance in central Europe. Then, in the late 1700s, the American and French Revolutions broke out; they helped shape the liberal-democratic tradition.

Warfare and Revolution

In 1740, Prussia, ruled by the aggressive Frederick the Great, launched a successful war against Austria and was rewarded with Silesia, which increased the Prussian population by 50 percent. Maria Theresa, the Austrian queen, never forgave Frederick and in 1756 formed an alliance with France against Prussia. The ensuing Seven Years’ War (1756–1763), which involved every major European power, did not significantly change Europe, but it did reveal Prussia’s growing might.

At the same time, the French and the English fought over their claims in the New World. England’s victory in the conflict (known in American history as the French and Indian War) deprived France of virtually all of its North American possessions and set in motion a train of events that culminated in the American Revolution. The war drained the British treasury, and now Britain had the additional expense of paying for troops to guard the new North American territories that it had gained in the war. As strapped British taxpayers could not shoulder the whole burden, the members of Parliament thought it quite reasonable that the American colonists should help pay the bill; after all, Britain had protected the colonists from the French and was still protecting them in their conflicts with Indians. New colonial taxes and import duties imposed by Parliament produced vigorous protests from the Americans.

The quarrel turned to bloodshed in April and June 1775, and on July 4, 1776, delegates from

the various colonies adopted the Declaration of Independence, written mainly by Thomas Jefferson. Applying Locke’s theory of natural rights, this document declared that government derives its power from the consent of the governed, that it is the duty of a government to protect the rights of its citizens, and that people have the right to “alter or abolish” a government that deprives them of their “unalienable rights.”

Why were the American colonists so ready to revolt? Each of the thirteen colonies had an elected assembly, which acted like a miniature parliament. In these assemblies, Americans gained political experience and quickly learned to be self-governing.

Familiarity with the thought of the Enlightenment and the republican writers of the English Revolution also contributed to the Americans’ awareness of liberty. The ideas of the philosophes traversed the Atlantic and influenced educated Americans, particularly Thomas Jefferson and Benjamin Franklin. Like the philosophes, American thinkers expressed a growing confidence in reason, valued freedom of religion and of thought, and championed the principle of natural rights.

Another source of hostility toward established authority among the American colonists was their religious traditions, particularly those of the Puritans, who believed that the Bible was infallible and its teachings a higher law than the law of the state. Like their counterparts in England, American Puritans challenged political and religious authorities who, in their view, contravened God’s law. Thus, Puritans acquired two habits that were crucial to the development of political liberty: dissent and resistance. When transferred to the realm of politics, these Puritan tendencies led Americans to resist authority that they considered unjust.

American victory came about in 1783 as a result of several factors. George Washington proved to be a superior leader, able to organize and retain the loyalty of his troops. France, seeking to avenge its defeat in the Seven Years’ War, helped the Americans with money and provisions and then, in 1778, entered the conflict. Britain had difficulty shipping supplies across three thousand miles of ocean, was fighting the French in the West Indies and elsewhere at the same time, and ultimately lacked commitment to the struggle.

Reformers in other lands quickly interpreted the American victory as a successful struggle of liberty against tyranny. During the Revolution, the various American states drew up constitutions based on the principle of popular sovereignty and included bills of rights that protected individual liberty. They also managed, somewhat reluctantly, to forge a nation. Rejecting both monarchy and hereditary aristocracy, the Constitution of the United States created a republic in which power derived from the people. A system of separation of powers and checks and balances set safeguards against the abuse of power, and the Bill of Rights provided for protection of individual rights. To be sure, the ideals of liberty and equality were not extended to all people—slaves knew nothing of the freedom that white Americans cherished, and women were denied the vote and equal opportunity. But to reform-minded Europeans, it seemed that Americans were fulfilling the promise of the Enlightenment; they were creating a freer and better society.

Enlightened Despotism

The philosophes used the term *enlightened despotism* to refer to an ideal shared by many of them: rule by a strong monarch who would implement rational reforms and remove obstacles to freedom. Some eighteenth-century monarchs and their ministers—Frederick the Great in Prussia, Catherine the Great in Russia, Charles III in Spain, Maria Theresa and, to a greater extent, her son Joseph II in Austria, and Louis XV in France—did institute educational, commercial, and religious reforms.

Behind the reforms of enlightened despots lay the realization that the struggle for power in Europe called for efficient government administration and ample funds. Enlightened despots appointed capable officials to oversee the administration of their kingdoms, eliminate costly corruption, and collect taxes properly. Rulers strengthened the economy by encouraging the expansion of commerce through reduced taxes on goods and through agricultural reforms. In central and Eastern Europe, some rulers moved

toward abolishing serfdom, or at least improving conditions for serfs. (In western Europe, serfdom had virtually died out.) Provisions were made to care for widows, orphans, and invalids. Censorship was eased, greater religious freedom was granted to minorities, criminal codes were made less harsh, and there were some attempts at prison reform. By these measures, enlightened despots hoped to inspire greater popular support for the state, an important factor in the European power struggle.

THE ENLIGHTENMENT AND THE MODERN MENTALITY

The philosophes articulated core principles of the modern outlook. Asserting that human beings are capable of thinking independently of authority, they insisted on a thoroughgoing rational and secular interpretation of nature and society. They critically scrutinized authority and tradition and valued science and technology as a means for promoting human betterment. Above all, they sought to emancipate the mind from the bonds of ignorance and superstition and to rescue people from intolerance, cruelty, and oppression. Because of their efforts, torture (which states and Christian churches had endorsed and practiced) was eventually abolished in Western lands, and religious toleration and freedom of speech and of the press became the accepted norms. The arguments that the philosophes marshaled against slavery were utilized by those who fought against the slave trade and called for emancipation. Enlightenment economic thought, particularly Adam Smith's *Wealth of Nations*, gave theoretical support to a market economy based on supply and demand—an outlook that fostered commercial and industrial expansion. The separation of church and state, a basic principle of modern political life, owes much to the philosophes, who frequently cited the dangers of politics inflamed by religious passions. The philosophes' denunciation of despotism and championing of natural rights,

equality under the law, and constitutional government are the chief foundations of modern liberal government.

The ideals of the Enlightenment spread from Europe to America and helped shape the political thought of the Founding Fathers. The Declaration of Independence clearly articulated Locke's basic principles: that government derives its authority from the governed; that human beings are born with natural rights, which government has a responsibility to protect; and that citizens have the right to resist a government that deprives them of these rights. The Constitution asserted that the people are sovereign: "We the People of the United States . . . do ordain and establish this Constitution for the United States of America." And it contained several safeguards against despotic power, including Montesquieu's principle of separation of powers, which was also written into several state constitutions. Both the bills of rights drawn up by the various states and the federal Bill of Rights gave recognition to the individual's inherent rights and explicitly barred government from tampering with them—a principal concern of the philosophes.

The *Federalist Papers*, the major American contribution to eighteenth-century political thought, in many ways epitomized Enlightenment thinking. It incorporated specific ideas of Locke, Montesquieu, Hume, and the *Encyclopedia*; analyzed political forms in a rational, secular, and critical spirit; regarded the protection of personal freedom as a principal goal of the state; and expressed a willingness to break with past traditions when they conflicted with good sense. The new American republic, says Peter Gay, was "convincing evidence, to the philosophes . . . that men had some capacity for self-improvement and self-government, that progress might be a reality instead of a fantasy, and that reason and humanity might become governing rather than merely critical principles."²⁹

The philosophes broke with the traditional Christian view of human nature and the purpose of life. In that view, men and women were born in sin; suffering and misery were divinely ordained, and relief could come only from God; social inequality was instituted by God; and for

many, eternal damnation was a deserved final consequence. In contrast, the philosophes saw injustice and suffering as man-made problems that could be solved through reason; they expressed confidence in people's ability to attain happiness by improving the conditions of their earthly existence and articulated a theory of human progress that did not require divine assistance. Rejecting the idea of a static and immutable order of society instituted by God, the philosophes had confidence that human beings could improve the conditions of their existence and they pointed to advances in science and technology as evidence of progress.

Thus, the idea of secular progress, another key element of modernity, also grew out of the Enlightenment. After two world wars and countless other conflicts, after Auschwitz and other examples of state-sponsored mass murder, and with the development of weapons of mass destruction, it is difficult to realize that at the beginning of the twentieth century most westerners were committed to a doctrine of perpetual progress that embodied the hopes of the philosophes.

To be sure, the promise of the Enlightenment has not been achieved. More education for more people and the spread of constitutional government have not eliminated fanaticism and superstition, violence and war, or evil and injustice. In the light of twentieth-century and twenty-first century events, it is difficult to subscribe to Condorcet's belief in linear progress, that history is inexorably carrying humanity toward a golden age. As Peter Gay observes:

The world has not turned out the way the philosophes wished and half expected that it would. Old fanaticisms have been more intractable, irrational forces more inventive than the philosophes were ready to conjecture in their darkest moments. Problems of race, of class, of nationalism, of boredom and despair in the midst of plenty have emerged almost in defiance of the philosophes' philosophy. We have known horrors, and may know horrors, that the men of the Enlightenment did not see in their nightmares.³⁰

The world-view of the philosophes has come under attack. Building on the critique of early nineteenth-century romantics, critics have accused the philosophes of overvaluing the intellect at the expense of human feelings. According to this view, the philosophes did not recognize the value of the feelings as a source of creativity and did not call for their full development. Rather, they viewed the emotions as impediments to clear thinking that had to be overcome.

Another failing of the philosophes, critics argue, is that they did seek to understand a past age on its own terms but judged it according to preconceived norms, disdaining and rejecting anything that contradicted their idea of truth and their view of the good society. Such an outlook, say the critics, led the philosophes to underestimate the extent to which the past governs the present. Holding with Hume that human nature remains the same in all nations and ages, the philosophes regarded differences between peoples and civilizations as superficial and inconsequential. Since reason was common to humanity, government, law, morality, education, and all other institutions and systems of thought could be based on universal principles and could apply to all peoples throughout the globe regardless of their cultures and history.

In reality, this meant that the outlook of a small party of thinkers would become normative for all peoples and cultures. Such an undervaluing of the complex relationship between past and present, of human diversity, and of the immense appeal of familiar beliefs, traditions, and institutions—even if they seem so blatantly in opposition to reason—promotes the presumptuous and dangerous belief that society and government can be easily and rapidly molded to fit abstract principles and that reformers need pay only scant attention to historically conditioned cultural forms.

The philosophes' belief in universality, in timeless truths that apply to all peoples at all times, also contains an inherent danger. In politics, it could create true believers totally committed to an abstraction, such as the exploited class or the infallible party. To realize their ideal, these devotees will employ terror and mass murder with a clear

conscience. As Isaiah Berlin notes, "Of course, nobody believed in universality more than the Marxists: Lenin, Trotsky, and the others who triumphed saw themselves as disciples of the Enlightenment thinkers, corrected and brought up to date by Marx."³¹ Robespierre and the Reign of Terror during the French Revolution might be viewed as an early manifestation of this attempt to make society adhere to a conceptual grid.

Another criticism is that the philosophes' exuberant view of science and reason prevented them from realizing that reason is a double-edged sword: it could demean as well as ennoble human personality. The philosophes believed that removing thought from the realm of myth and religion and eliminating irrational forms of social organization would foster human emancipation. They could not foresee that modern bureaucracy and technology, both creations of the rational mind, could fashion a social order that devalues and depersonalizes the individual. In its determination to make the social world accord with a theoretical model, rationalism strives for uniformity and efficiency; in the process, it threatens to regulate, organize, and manipulate the individual as it would any material object. Future periods would not only reveal the limitations of reason—its inability to cope with powerful irrational drives and instincts that incite acts of inhumanity—but also the dangers of reason—its capacity to subordinate and sacrifice the individual to theoretical systems, particularly political ideologies.

Nevertheless, despite limitations, the philosophes' achievement should not be diminished. Their ideals became an intrinsic part of the liberal-democratic tradition and inspired nineteenth- and twentieth-century reformers. The spirit of the Enlightenment will always remain indispensable to all those who cherish the traditions of reason and freedom. Isaiah Berlin, the distinguished historian of ideas, eloquently summed up the Enlightenment's importance: "the intellectual power, honesty, lucidity, courage, and disinterested love of the truth of the most gifted thinkers of the eighteenth-century remain to this day without parallel. Their age is one of the best and most hopeful episodes in the life of mankind."³²

Primary Source

René Descartes, *Discourse on Method*

In this important work in the history of modern philosophy, Descartes describes his search for truth.

I was brought up from childhood on letters, and because I had been led to believe that by this means one could acquire clear and positive knowledge of everything useful in life, I was extremely anxious to learn them. But, as soon as I had completed this whole course of study, at the end of which it is usual to be received into the ranks of the learned, I completely changed my opinion. For I was assailed by so many doubts and errors that the only profit I appeared to have drawn from trying to become educated, was progressively to have discovered my ignorance. And yet I was at one of the most famous schools in Europe, where I thought there must be learned men, if there were any such anywhere on earth. I had learnt there everything the others learned; and further, not contenting myself merely with the subjects taught, I had gone through all the books I could lay my hands on dealing with the occult and rare sciences. . . .

I shall say nothing about philosophy, except that, seeing that it has been cultivated by the very best minds which have ever existed over several centuries and that, nevertheless, not one of its problems is not subject to disagreement, and consequently is uncertain, I was not presumptuous enough to hope to succeed in it any better than others; and seeing how many different opinions are sustained by learned men about one item, without its being possible for more than one ever to be true, I took to be tantamount to false everything which was merely probable. . . .

This is why, as soon as I reached an age which allowed me to emerge from the tutelage of my teachers, I abandoned the study

of letters altogether, and resolving to study no other science than that which I could find within myself or else in the great book of the world. . . .

It is true that, while I merely observed the behaviour of others I found little basis in it for certainty, and I noticed almost as much diversity as I had done earlier among the opinions of philosophers. . . . [M]any things which, although they may seem to us very extravagant and ridiculous, are nevertheless commonly accepted and approved by other great peoples. . . .

[On the basis of these experiences with books and people, the first rule Descartes adapted] was never to accept anything as true that I did not know to be evidently so: that is to say, carefully to avoid precipitancy and prejudice, and to include in my judgements nothing more than what presented itself so clearly and so distinctly to my mind that I might have no occasion to place it in doubt. . . .

[A]s I wanted to concentrate solely on the search for truth, I thought I ought to . . . reject as being absolutely false everything in which I could suppose the slightest reason for doubt, in order to see if there did not remain after that anything in my belief which was entirely indubitable. So, because our senses sometimes play us false, I decided to suppose that there was nothing at all which was such as they cause us to imagine it; and because there are men who make mistakes in reasoning, even with the simplest geometrical matters, and make paralogisms, judging that I was as liable to error as anyone else, I rejected as being false all the reasonings I had hitherto accepted as proofs. And finally, considering that all the same thoughts that we have when we are awake can also come to us when we are asleep, without any one of them then being true, I resolved to pretend that nothing which had ever entered my mind was any more true than the illusions

of my dreams. But immediately afterwards I became aware that, while I decided thus to think that everything was false, it followed necessarily that I who thought thus must be something; and observing that this truth: *I think, therefore I am*, was so certain and so evident that all the most extravagant suppositions of the sceptics were not capable

of shaking it, I judged that I could accept it without scruple as the first principle of the philosophy I was seeking.

Rene Descartes, *Discourse on Method* and *The Meditations*, trans. FE. Sutchliffe, 29, 32–33, 41, 53–54. Copyright © 1968 by Penguin Books. Reproduced by permission.



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NOTES

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