The Human Mind Emerged From Barbarism

Jean le Rond D'Alembert

In these two selections d'Alembert (1717-1783), French mathematician, philosopher, and a principal editor of the Encyclopédie, *provides a splendid summary of Enlightenment attitudes. The first is from the introduction he wrote for the first volume of the* Encyclopédie, *and the second, a stirring defense of his fellow French* philosophes, *is* à *1760 essay, "Reflections on the Present State of the Republic of Letters."*

When the human mind emerged from barbarism, it found itself in a kind of childhood, eager to accumulate ideas yet incapable at first of acquiring those of a certain order because the intellectual faculties had been for so long in a sluggish state....

While certain adversaries, either men of small attainments or of evil intent, openly made war on philosophy, the philosophic spirit itself took refuge in the writings of some great men. Without desiring to tear the blindfolds from the eyes of their contemporaries, they worked silently in the remote background to prepare the light of reason which gradually and by imperceptible degrees was to illuminate the world.

At the head of these illustrious personages must be placed the immortal Chancellor of England, Francis Bacon, whose works are so justly esteemed, and more esteemed than they are known, so that they deserve to be read even more than praised. If we consider the sound and extensive views of this great man, the multitude of subjects which his mind entertained, the boldness of his style which united everywhere the most sublime images with the most rigorous precision, we would be tempted to regard him as the greatest, the most universal, and the most eloquent of the philosophers. Bacon, who was born in the depths of dark night, felt that philosophy was not yet possible, although many people without a doubt flattered themselves that they excelled in it. For the coarser the century, the more men consider themselves learned in everything that can be known. He began, therefore, by considering with a general view the diverse objects of all the natural sciences. He divided these sciences into different branches of which he made the most exact enumeration possible. He investigated what was already known about each one of these subjects, and he made an immense catalogue of what remained to be discovered. This was the goal of his admirable work *De dignitate et augmentis scientiarum* [the final version of *The Advancement of Learning].* In the *Novum Organum* he perfected the views that he had given

in his first work, extending them even further, pointing out the necessity of scientific experimentation, a new idea at that time. An enemy of systems, he only considered philosophy as that part of our knowledge which must contribute to making us better and happier. He seems to have limited it to the science of useful things and at all times recommended the study of Nature. His other works were conceived with the same plan in mind. Everything, even the titles, announce the man of genius, the mind that sees things on a large scale. He collects facts, compares experiments, and indicates a great many that have to be performed. He invites men of learning to study and perfect the arts which he considers the most exalted and essential part of human knowledge. He states with noble simplicity *his conjectures and his thoughts* on the different subjects which are worthy of interesting mankind, and he could have said, like the venerable old Terence, that nothing concerning man was a matter of indifference to him: knowledge of economics, morality, nature, politics, in fact everything seemed to have fallen within the province of this luminous and profound mind. We do not know what we should admire the most, his rich intuitive views on all subjects or the dignified tone of his style. His writings can be compared only with those of Hippocrates on medicine; and they would be neither less admired nor less read if the cultivation of the mind were as dear to the human race as the conservation of health. But only the writings of leading sectarians can achieve a certain vogue; Bacon was not one of them, and his philosophic method was opposed to this: it was too judicious to astonish anyone. Scholasticism, which prevailed at that time, could only be overthrown by bold and new opinions; and it was not likely that a philosopher satisfied with saying to men: "Here is the little bit that you have learned; this is what remains to be investigated," was destined to make a great stir with his contemporaries. We would even venture to reproach Chancellor Bacon for having been perhaps too timid, if we did not know that prudence and in a way even devotion must be exercised in judging such a sublime genius. Although he acknowledges that the scholastics emasculated the sciences with their trifling questions, and that the mind must sacrifice the study of general things for the investigation of particular objects, it nevertheless seems that by the frequent use he made of medieval terms, sometimes even of scholastic principles, as well as the divisions and subdivisions which were then quite fashionable, that he showed a little too much caution and deference to the dominant taste of his century. This great man, after having destroyed so many fetters, was still held back by chains which he was unable or did not dare to break.

We now declare that we owe our tree of knowledge mainly to Chancellor Bacon. You will find it at the end of the *Discourse.* We have already acknowledged this several times in the *Prospectus;* we will recall it to your attention again; and we would not miss any opportunity to repeat it. Despite the fact that we recognize this great man as our master, we did not feel obligated to follow him point by point....

Chancellor Bacon was followed by the illustrious Descartes. This extraordinary man, whose fortunes have varied so much in less than a quarter of a century, had

the wherewithal to change the general lines of philosophy: a powerful imagination, an extremely rational mind, knowledge derived from himself more than from books, a great deal of courage to combat the most widely held prejudices, and an independence which gave him the freedom to criticize. He therefore experienced, even in his own lifetime, what happens as a rule to all men whose influence is too conspicuous. He had some enthusiastic followers and many determined enemies. Either because he knew his country or simply distrusted it, he took refuge in a completely free country in order to meditate in more favorable conditions. Although he thought much less of making disciples than of deserving them, persecution sought him out even in his retreat; and the secluded life which he led could not protect him. In spite of all the sagacity he employed to prove the existence of God, he was accused of denying it by clergymen who perhaps did not have any faith at all. Tormented and slandered by foreigners, shabbily treated by his compatriots, he went to die in Sweden without in any way presuming that his opinions would one day have such brilliant success.

Descartes can be considered either as a geometrician or as a philosopher. Although he seemed to have attached rather little value to mathematics, it is nevertheless the most solid and the least contested part of his reputation today. Algebra, created in a way by the Italians and prodigiously enlarged by our illustrious Vieta, was further developed at the hands of Descartes. One of the most notable contributions is his method for indeterminate equations, a rather ingenious and subtle device which has since been applied to a great number of subjects. But what has especially immortalized the name of this great man was his application of algebra to geometry, one of the most far-reaching and felicitous ideas which the human mind ever had, and which will always be the key to the most profound research, not only in sublime geometry but also in all the physico-mathematical sciences.

As a philosopher he was perhaps as great but not so fortunate. Geometry, which by the nature of the subject must always gain rather than lose ground, could not fail to make rather perceptible and evident progress when practiced by so great a genius. Philosophy, in a much different state, was just beginning: and how great is the effort required to make the first steps in any discipline? The merit of having taken small ones excuses people for not proceeding even further. If Descartes, who pointed the way for us, did not go as far as his followers would have us believe, it is, on the other hand, not true that the sciences owe him as little as his adversaries maintain. His method alone would have been sufficient to make him immortal; his *Dioptrics* is the greatest and most beautiful application yet made of geometry to physics. Finally we see in his works, even those least read today, the constant sparkle of inventive genius. If you judge without bias his solar vortex, which has become almost ridiculous today, you will agree, I dare say, that it was impossible to imagine anything better at the time. The astronomical observations used to destroy this idea were still imperfect or hardly recorded. Nothing was more natural than to assume the existence of a fluid which transports the planets. Only a long stream of phenomena, reasonings, and calculations, therefore a long sequence of time, could force people to renounce

such an attractive theory. Moreover it had the singular advantage of explaining the gravitation of bodies by the centrifugal force of the vortex itself. And I do not hesitate to maintain that this explanation of gravity is one of the most beautiful and ingenious hypotheses that philosophy has ever conceived. For physicists to abandon it they had to be tempted almost in spite of themselves by the theory of central forces and by experiments performed much later. Let us therefore admit that Descartes, forced to create a completely new physics, was not able to make it any better; that it was necessary, so to speak, to pass by means of the vortices to arrive at the true system of the earth; and that if he was mistaken about the laws of movement, he was at least the first to guess that there had to be some.

His metaphysics, as ingenious and new as his physics, had approximately the same fate; and it is with approximately the same reasons that we can justify it. For such is today the fortune of this great man that after having had countless followers he is practically reduced to a few apologists. He was without doubt mistaken in assuming the existence of innate ideas: but if he had retained from the peripatetic sect [the Aristotelians] the only truth that they taught about the origin of ideas in the senses, perhaps the errors, which would dishonor this truth because of its association with it, would have been much more difficult to eradicate. Descartes dared at least to teach good minds how to shake off the yoke of scholasticism, public opinion, and authority; in a word, certain prejudices and barbaric attitudes. From this revolt, whose fruits we are now reaping, philosophy received from him a service much more difficult perhaps to render than all those which it owes to his illustrious successors. We can consider him as the head of a group of conspirators, the first to have the courage to rise against a despotic and arbitrary power, and while preparing a brilliant revolution, to have laid the foundations of a more just and valid government which he was unable to see established. If he finally believed that he had explained everything, at least he began by doubting everything; and the arms that we use to combat him do not belong to him any the less because we turn them against him. Moreover, when absurd opinions have become inveterate, we are sometimes forced to replace them with other errors (if we can do no better) in order to disabuse the human race. The uncertainty and vanity of the mind are such that it must always entertain an opinion: it is a child that must be presented with a toy so that we can take away a dangerous weapon; he will lay aside the toy himself when the age of reason is attained. In putting philosophers, or those who believe they are, on a false scent, we teach them at least to mistrust their own understanding, and this disposition is the first step toward the truth. Consequently Descartes was persecuted in his lifetime as if he had come to bring the truth to mankind.

Newton, whose path had been prepared by Huygens, finally appeared and gave to philosophy a method it seems obliged to retain. This great genius saw that it was time to banish from physics all vague conjectures and hypotheses, or at least to attribute to them only what they were worth, and that this science had to be submitted exclusively to experiments and to geometry. It is perhaps with this point of view that he first invented the calculus and the method of

infinite series, whose uses are so widespread in geometry itself and even more so in calculating the complex operations observed in nature, where everything seems to comply with a kind of infinite progression. The experiments with gravity and the observations of Kepler made this English philosopher discover the force which holds the planets in their orbits. At the same time he taught how to distinguish the various causes of their movements and how to calculate them with an accuracy that could only be demanded of work which had been carried on for several centuries. Creator of a completely new system of optics, he made light known to mankind by decomposing it. What we would be able to add to the praise of this great philosopher would be far beneath the universal testimony that is given today to his almost innumerable discoveries and to his genius, which was at the same time expansive, judicious, and profound. In enriching philosophy with a great quantity of real assets, he deserved without doubt all of its gratitude. But perhaps he did more than that by teaching it to be prudent, to restrict into the proper limits that sort of audacity which circumstances had forced upon Descartes. His Theory of the World (for I do not mean his System) is so generally accepted today that people are beginning to dispute the author's right to this discovery, because they begin by accusing great men of being mistaken and finally treat them as plagiarists....

Some scientists thought that they reproached Newton in a much more justifiable manner when they accused him of having brought back into physics the *occult qualities* of the scholastic and ancient philosophers. These two words, devoid of meaning in medieval works, were intended by the scholastics to designate something which they believed they understood. But are the scientists just mentioned really sure that the *occult qualities* of the ancient philosophers denoted anything more than the modest expression of their ignorance? Newton, who had studied Nature, did not imagine that he knew more than they about the first cause which produced the phenomena of Nature; but he did not use the same language for fear of shocking some contemporaries who would not have failed to misinterpret him. He was content to prove that Descartes' vortices could not explain the movements of the planets; that phenomena as well as the laws of mechanics united in overthrowing them; and that there is a force which induces the planets mutually to attract one another and whose principle is entirely unknown to us. He did not reject the theory of momentum; he merely asked scientists to use it more profitably than they had done in the past to explain planetary motion: his desires have not yet been fulfilled and perhaps will not be for a long time. After all, what harm did he do philosophy when he led us to think that matter could have certain properties which we did not suspect, and also when he disabused us of our ridiculous faith in the assumption that we already knew all of its properties?

In addition, Newton seems not to have entirely neglected the study of metaphysics. He was too great a philosopher not to feel that it is the foundation of our knowledge and that we must search in it for clear and exact notions of everything. From the works of this profound geometrician it even appears that he succeeded in creating such notions about the principal subjects which preoccupied him.

Nevertheless, he was either not very happy with his progress in other aspects of metaphysics, or he believed it difficult to give to the human race satisfactory or extensive knowledge about a science which is contentious and very often unreliable. Finally, he might have feared that within the shadow of his authority people might abuse his metaphysics as they had abused Descartes' in order to maintain dangerous and mistaken opinions. In any case, he refrained almost entirely from discussing it in those of his works which are most well-known; and we barely learn what he thought about different subjects of that area of learning save through the works of his disciples. Because he did not cause any revolution on this question, we shall therefore refrain from considering this aspect of his work.

What Newton had not dared or would not perhaps have been able to do, Locke undertook and executed with success. We can say that he created metaphysics almost as Newton had created physics. He understood that abstractions and ridiculous questions that had until then been debated, and even comprised the very essence of philosophy, had to be especially forbidden in its practice. He looked for the principal causes of our errors in these abstractions and in the abuse of symbols, and found them there in abundance. In order to know our mind, its ideas and affections, he did not study books, because they would have instructed him poorly: he was satisfied with examining himself intently; and after having contemplated himself for a long time, he merely offered to mankind in his *Essay Concerning Human Understanding* the mirror in which he had seen himself. In a word, he reduced metaphysics to what it must as a matter of fact be, the experimental science of the mind, a kind of science which is rather different from that of natural bodies, not only because of the subject, but also because of the manner in which it is considered. In the latter field unknown phenomena can be and often are discovered; in the former the facts, which are as ancient as the world, exist to the same extent in all men: so much the worse for anyone who believes that he has seen new ones. Rational metaphysics, like experimental science, can only consist of collecting all of the facts with great care, of arranging them into a body of knowledge, of explaining certain ones by others, and of distinguishing those of primary importance which serve as a foundation. In a word, the principles of metaphysics, as simple as axioms, are the same for philosophers and laymen. But the small amount of progress which this realm of knowledge has accomplished in such a long period of time demonstrates how rare is the successful application of these principles, either because of the difficulty which such work entails or perhaps because of the natural impatience which prevents people from exercising self-restraint. Nevertheless, the title of metaphysician or even of great metaphysician is still rather common in our century; for we love to lavish praise on everything: but few people are truly worthy of this name! How many are there who earn it only because of their unfortunate talents in obscuring clear ideas with a great deal of subtlety and in preferring the extraordinary to the true, which is always simple? We must not be astonished now when most of those who are called "metaphysicians" set little value on each other. I do not doubt that this title will soon become an insult

for our men of intelligence, just as the name sophist, which nevertheless means "sage," was debased in Greece by those who bore it and finally became rejected by true philosophers.

Let us conclude from all this history that England owes to us the origins of that philosophy which we received back from her. There is perhaps a greater distance from substantial forms to vortices than from vortices to universal gravitation; as there is perhaps a greater interval between pure algebra and the idea of applying it to geometry than between Barrow's small triangle and differential calculus.

These are the principal geniuses that the human mind must regard as its masters and for whom the Greeks would have erected statues, even if they were obliged to make more space by demolishing the monuments of some conquerors.

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Moral philosophers are fond of asking how men lived in what is called a state of *pure nature,* before there were organized societies and laws, and whether such a state was one of peace or war. They have written on this question endlessly, as on all questions where the pros or the cons can be maintained at will, without danger of being contradicted by actual experience. From all these dissertations one can learn what one can usually learn from metaphysical discussions—that is, nothing.

Yet there is, it seems to me, a shorter way to decide the question; that is, to examine the way in which men of letters have behaved throughout the centuries. For the man of letters is in relation to other men of letters almost in that state of pure nature about which we talk so much without really knowing what we are talking about. They struggle for renown much as, it is maintained, men without laws and government struggled, or would have struggled, for their food acorns. But in society no one has the right to live to the complete detriment of his fellows; therefore the laws regulate, at least roughly, the distribution of acorns—that is, the bare necessities of life—among men. On the contrary, in the best regulated society it is possible to live without renown, and often, indeed, to live more happily without it. Those who made the laws, therefore, have left this phantom to be disputed over by those who prize it.

Literary renown is then the reward of the first to take it: the scepter belongs to him who seizes it, or who has the skill to have it offered him. Passed endlessly from hand to hand, it is the prize of the strongest or the cleverest. Usually the cleverest enjoys it but briefly, for it comes back to the strongest and stays in his possession.

To gain this scepter, or at least to snatch off a few ornaments from it, men of letters write and intrigue, praise or tear to pieces. Some of them indeed protest that they scorn renown, all the while desiring it very much. But no one is the dupe of their protests, which do not prevent their getting renown if they deserve it, and which make them ridiculous only if they disdain it without deserving it.

Among men of letters there is one group against which the arbiters of taste, the

important people, the rich people, are united: this is the pernicious, the damnable group of *philosophes,* who hold that it is possible to be a good Frenchman without courting those in power, a good citizen without flattering national prejudices, a good Christian without persecuting anybody. These *philosophes* believe it right to make more of an honest if little-known writer than of a well-known writer without enlightenment and without principles, to hold that foreigners are not inferior to us in every respect, and to prefer, for example, a government under which the people are not slaves to one under which they are.

This way of thinking is for many people an unpardonable crime. What shocks them most of all, they say, is the tone the *philosophes* use, the tone of dogmatism, the tone of the master who knows. I admit that those of the *philosophes* who do indeed deserve this reproach would have done well to avoid deserving it. When it is necessary to hurt with what is said, it is wrong to hurt still more by the tone in which it is said. The writer is always master of his tone, his way of saying things. Truth can hardly be too modest. Truth indeed, just by being truth, runs always a sufficiently great risk of being rejected. But after all, this truth, so feared, so hated, so insulted, is so rare and precious, it seems to me, that those who tell it may be pardoned a little excess of fervor. The writer who wants to write more than ephemerally has got to be right. Form is in itself of little importance—it is something for the moment, for the passing generation, but nothing for the next one, still less for distant posterity. If a dogmatic tone, one that tells the truth crudely, shocks our delicate judges, they will do well never to open geometry books; they won't find more insolent ones.

The *philosophes,* they say, are enemies of authority. This is a more serious reproach and deserves a serious reply. The *philosophes* respect authority in the monarch, to whom it belongs, and whose love of truth and justice they recognize. They would respect power in the hands of those to whom he confided it, even though it were abused. What would they gain by attacking such power? Who would guarantee them against oppression? Who would take their part? A thousand voices would be raised to overwhelm them, and not one to defend them. What resolution can they take, save to obey and keep silent? What prerogative have they to claim to be dispensed from obedience? If they were persecuted, they would at most defend themselves. To protest is not to revolt. No, no, if legitimate authority has in these days been weakened under attack, it has not been from attacks by men of letters or *philosophes,* but rather by those who most openly declare themselves the enemies of the *philosophes.*

Let us speak without disguise or constraint. If those men we call *philosophes* haunted more often the antechambers of ministers, courted ladies of well-known piety, put themselves forward as advocates of persecution and intolerance, they would not be the targets for all the insults that are hurled at them. But they honor the great and flee them; they revere true piety and detest persecuting zeal; they believe the first of Christian duties is charity; and finally, as has been said elsewhere (for there are truths good to repeat for certain ears), they respect that which they ought to, and prize that which they can. This is their real crime.