

# Chapter 13

## Reason, Authority and Science

We must strengthen the courage of those timid souls who dare discover nothing in physics, and confound the insolence of that temerity which introduces novelty into theology.

—Blaise Pascal

### Introduction

Blaise Pascal (1623-1662) was born in the town of Clermont, the capital of Auvergne, where his father, a leading mathematician and humanist, served as a high-ranking government official.<sup>1</sup> After the death of his wife, Antoinette, Étienne Pascal resigned from his official post and moved to Paris where he himself educated his son, Blaise, and his two daughters, Gilberte and Jacqueline. Blaise soon excelled in mathematics and experimental philosophy. He went on to publish numerous works on arithmetic, geometry and probability theory. Pascal also designed and constructed a new arithmetical machine, which was used to simplify taxing calculations, and which serves as a mechanical prototype of the modern computer.

Despite his numerous mathematical and scientific achievements, Pascal is perhaps most famous for his posthumously published *Pensées*, and also for his pseudonymously written *Provincial Letters*.<sup>2</sup> The former is an incomplete set of notes which Pascal had been preparing as an apology, or defense, of the Christian religion prior to his early death. The latter are a series of polemical letters, published in Paris during the years 1656 and 1657, which satirized the casuistry of Pascal's Jesuit opponents, and which defended a Jansenist understanding of salvation, to which Pascal himself adhered. Pascal's concern with theology, and specifically its relationship to other fields of inquiry (such as natural science) is apparent in his *Preface to the Treatise on the Vacuum*...

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<sup>1</sup>See Hammond, N. (Ed.), *The Cambridge Companion to Pascal*, Cambridge University Press, 2003. Of particular interest are the essays on "Pascal's life and times" (Ch. 1) by Ben Rogers and "Pascal's physics" (Ch. 5) by Daniel C. Fouke.

<sup>2</sup>See, for example, Pascal, B., *Pascal's Pensées*, E. P. Dutton & Co., 1958, and Pascal, B., *The Provincial Letters of Blaise Pascal*, Hurd and Houghton, New York, 1866.

## Reading

Pascal, B., Scientific treatises, in *Pascal, Great Books of the Western World*, vol. 33, edited by R. M. Hutchins, Encyclopedia Britannica, Chicago, 1952.

### Preface to the treatise on the vacuum

We have carried our respect for antiquity so far today, in matters in which it should have less influence, that we treat all its ideas as revelations and even its obscurities as mysteries; we can no longer advance new opinions without danger, and an author's text is enough to destroy the strongest arguments. . .

Not that my intention is to correct one vice by another, and to have no esteem for the ancients because they are too much esteemed. I do not want to banish their authority to set up reason alone, although there is an attempt to establish their authority alone to the prejudice of reason. . .

To make this important distinction with care we must consider that one group depend exclusively on memory and are purely historical, having as their only object to know what the authors have written; the other group depend exclusively on reason and are wholly dogmatic, having as their object to seek and discover hidden truths. Those of the first kind have the same limits as the books containing them. . .

It is in accordance with this distinction that we should regulate differently the extent of our respect. The respect that we should have for. . .

In matters in which we seek to know only what authors have written, as in history, geography, jurisprudence, languages, and above all in theology, and in short wherever either the simple fact or an institution, human or divine, is the starting point, we must necessarily have recourse to books, since all that can be known about such matters is contained there. Whence it is evident that we can have the whole of that knowledge and that it is not possible to add anything to it.

If it is a question of knowing who was the first king of France, where the geographers put the first meridian, what words are used in a dead language, and everything of this sort, how could we find it out except from books? And who can add anything new to what they tell us about it, since we desire to know only what they contain? Authority alone can give us light on such matters. But it is in theology that authority has its chief weight because there it is inseparable from truth, which we know only through it; so that to give absolute certainty to things which reason can least grasp, it is sufficient to point them out in Holy Scripture (as, to show the uncertainty of the most probable things, we need only point out that they are not included there); because the principles of theology are above nature and reason, and the mind of man, too feeble to reach them by its own efforts, can arrive at this highest knowledge only if carried there by an all-powerful and supernatural force.

It is quite otherwise with subjects accessible to sense or reasoning: here authority is useless, only reason can know them. Authority and reason have their separate rights: a moment ago one had all the advantage; here the other is queen in her turn. But since subjects of this kind are suited to the mind's reach, it has perfect freedom to concern itself with them; its inexhaustible fertility produces continually, and its discoveries can be at once without end and without interruption. . .

Thus it is that geometry, arithmetic, music, physics, medicine, architecture, and all the sciences subject to experiment and reason must be added to if they are to become perfect. The ancients found them merely sketched by their predecessors, and we shall leave them to our successors in a more perfected state than we received them. Since their perfection depends upon time and effort, it is evident that even if our effort and time had gained us less than the labors of the ancients,

separated from ours, the two together nevertheless must have more effect than either alone.

The clearing up of this difference should make us pity the blindness of those who advance authority alone as proof in physics instead of reason or experiment, and should fill us with horror at the wickedness of others who use reason alone in theology instead of the authority of Scripture and the Fathers. We must strengthen the courage of those timid souls who dare discover nothing in physics, and confound the insolence of that temerity which introduces novelty into theology. Meanwhile the misfortune of the age is such that we see many new opinions in theology altogether unknown to antiquity maintained with obstinacy and received with applause; whereas those put forward in physics, though few in number, must be convicted of error, it seems, as soon as they shock, however little, received opinions. As if respect for the philosophers of antiquity were a duty but for the most ancient of the Fathers only decorum! I leave it to the judicious to observe the importance of this abuse which perverts the order of the sciences so unjustly, and I think there will be few who do not wish this. . .to be applied to other subjects, since new discoveries are inevitably errors in those matters we profane with impunity, whereas they are absolutely necessary for the perfection of so many other subjects incomparably lower which however we would be afraid to touch.

Let us make a more just distribution of our credulity and our doubt, and set limits to our respect for the ancients. Since reason is its source, reason should also be its measure. Let us consider that if the ancients had kept to this deference of daring to add nothing to the knowledge transmitted to them and if their contemporaries had been as much opposed to accepting anything new they would have deprived both themselves and their posterity of the fruit of their discoveries. Just as they used the discoveries handed down to them only as the means of making new ones, and that happy daring had opened the road for them to great achievements, so we should take the discoveries won for us by them in the same spirit, and following their example make these discoveries the means and not the end of our study, and thus by imitating the ancients try to surpass them. For what is more unfair than to treat our predecessors with more respect than they treated those who preceded them, and to have for them that inviolable respect they have deserved from us only because they did not themselves have it for those who had the same advantage over them? . . .

The secrets of nature are hidden. Although she is always at work, her effects are not always discovered: time reveals them from generation to generation and although always the same in herself, she is not always equally known. The experiments which give us our knowledge of nature multiply continually; and since they are the only principles of physics, the consequences multiply in proportion. It is in this way that we can today have other ideas and new opinions without scorn and without ingratitude, since the first knowledge given us by the ancients has served as steps to our own, and since we are indebted to them for the advantage of a position higher than theirs; because placed by them part way up the ladder, we are carried higher by our slightest effort, and with less labor and less glory we find ourselves above them. It is from that height we can discover things it was impossible for them to see. Our view has a wider range, and although they knew as well as we do everything they could observe of nature, they nevertheless did not know so much and we see more than they did.

However it is a strange thing how we reverence their opinions. To contradict them counts as a crime and to add to them is an outrage, as if they had left no more truths to know. Is not this to treat man's reason with indignity and to put it on a level with animal instinct, since we thereby take away the main difference, which consists in this that the effects of reason increase continually whereas instinct always remains in the same state? Beehives were as well laid out a thousand years ago as today, and each bee forms that hexagon as exactly the first time as the last. It is the same

with everything animals make by that hidden motion. Nature teaches them in response to the pressure of necessity; but this frail knowledge dies with its need: as they receive it without study, they do not have the happiness of preserving it; and every time they are given it, they find it new, because nature, whose object is merely to maintain animals in an order of limited perfection, infuses in them this necessary knowledge, always the same, lest they perish, and does not allow them to add to it lest they go beyond the boundaries prescribed to them. It is different with man, made only for infinity. He is ignorant in his life's first age, but he never ceases to learn as he goes forward, for he has the advantage not only of his own experience but also of his predecessors', because he always keeps in his memory the knowledge he has once acquired, and that of the ancients is always at hand in the books they have left. And since he keeps his knowledge, he can also easily increase it, so that men today are in a certain sense in the same condition which those ancient philosophers would be if they could have prolonged their old age until now, adding to the knowledge they had what their studies might have won for them by the grace of so many centuries. Hence it is that by a special prerogative not only does each man advance from day to day in the sciences, but all men together make a continual progress as the universe grows old, because the same thing happens in the succession of men as in the different ages of an individual man. So that the whole series of men during the course of so many centuries should be considered as one self-same man, always in existence and continually learning. Whence it is seen with what injustice we respect antiquity in the persons of its philosophers; for since old age is the age furthest removed from childhood, who does not see that the old age of this universal man should be sought not in the times near his birth but in those which are most distant from it? Those whom we call ancients were in truth new in every respect, and actually formed the childhood of man; and since we have added to their knowledge the experience of the succeeding centuries, it is in ourselves that that antiquity can be found which we revere in others.

The ancients should be admired for the consequences they drew correctly from the little stock of principles they had, and they should be excused for those in which they lacked the advantage of experiment rather than force of reason.

For were they not excusable for their opinion about the Milky Way when, the weakness of their eyes as yet unaided by artifice, they attributed its color to a greater density in that part of the sky, which would more powerfully reflect the light? But would we not be inexcusable for holding to the same opinion now that with the help of the telescope we have discovered an infinity of little stars there, whose more abundant light has made us recognize the true cause of that whiteness?

Did they not also have cause to say that all corruptible bodies were contained within the sphere of the moon's heaven, when during the course of so many centuries they had never yet observed corruption or generation beyond this space? But should we not give contrary assurance when the whole earth has seen with its eyes comets burst into flame and vanish far beyond that sphere?

Thus it is that concerning the vacuum the ancients were right to say that nature did not permit it, because all their experiments had always led to the observation that she abhorred it and could not endure it. But if the new experiments had been known to them, perhaps they would have found reason to affirm what they had reason to deny because the vacuum had not yet appeared. Therefore in making the judgment that nature did not permit a vacuum, they meant to speak of nature only as they knew her; since to make the judgment in general it would not be enough to have seen it true in a hundred instances or in a thousand or in any other number however great, for if there remained a single case to examine, it alone would suffice to prevent the general definition, and if a single case were opposed, it alone. . . For in all matters whose proof is by experiment and not by demonstration no universal assertion can be made except by the general enumeration of all the parts and all the

different cases. Thus when we say the diamond is the hardest of all bodies, we mean of all bodies we know, and we neither can nor should include those we do not know. And when we say that gold is the heaviest of all bodies, it would be rash of us to include in this general proposition bodies not yet in our knowledge, although it is not impossible they are in nature. Similarly when the ancients asserted that nature did not permit a vacuum, they meant she did not permit a vacuum in all the experiments they had seen, and they could not without rashness include experiments they did not know. But if they had known them, undoubtedly they would have drawn the same consequences as we do and would by their avowal have given them the authority of that antiquity which men today want to make the sole principle of the sciences.

Thus without contradicting the ancients we can assert the opposite of what they said; and finally whatever the weight of antiquity, truth should always have the advantage, even when newly discovered, since it is always older than every opinion men have held about it, and only ignorance of its nature could imagine it began to be at the time it began to be known.

## Study questions

QUES. 13.1. Which is more trustworthy, the testimony of authorities or the testimony of reason? According to Pascal, in what field(s) of inquiry should one rely upon the testimony of each of these? And what is the consequence of using the testimony of authority or reason in the wrong context?

QUES. 13.2. Is there an essential difference between animals and men? Do you agree with Pascal?

QUES. 13.3. What is the difference between proof by experiment and proof by demonstration? What examples does Pascal provide of proof by experiment? What limits a proof by experiment? Does a proof by demonstration suffer from the same limitation?

QUES. 13.4. Is it true that “we may assert the opposite of what the ancients asserted without contradicting them”? What examples does Pascal provide to support this claim?

## Exercises

EX. 13.1 (PASCAL’S PHYSICS ESSAY). Pascal claims that the principles of physics are provided by experiments alone. Is he correct? More generally, do you agree with the philosophy of knowledge articulated here by Pascal?

## Vocabulary

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| 1. dogmatic      | 8. profane      |
| 2. jurisprudence | 9. impunity     |
| 3. meridian      | 10. credulity   |
| 4. temerity      | 11. deference   |
| 5. obstinacy     | 12. posterity   |
| 6. decorum       | 13. inviolable  |
| 7. judicious     | 14. ingratitude |