

## PASCAL, BLAISE (1623-1662)

### Affiliation

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### 1 Synonyms (if possible)

### 2 Related Topics

mathematics, geometry, physics, barometric experience, mechanical computation, epistemology, vacuum, Cartesianism.

### 3 Definition/Introduction

Pascal's scientific work encompasses a vast range of issues from projective geometry (*Essay pour les Coniques*, 1640), to mechanical computation (*Lettre dédicatoire [...] sur le sujet de la machine [...] pour faire toutes sortes d'opérations d'arithmétique*, 1645), from fluid statics and the problem of the vacuum (*Expériences nouvelles touchant le vide*, 1647; *Récit de la grande expérience de l'équilibre des liqueurs*, 1648) to the problems of stakes, calculus of probabilities and combinatorial analysis (Correspondence with Fermat, 1654), to the calculus of indivisibles and the study of infinitesimal problems (*Lettres de A. Dettonville*, 1659). Despite several of his texts were left unfinished (*Generatio conisectionum*; *De l'esprit géométrique*; *Introduction à la géométrie*), had circulated in very limited editions (*Traité du triangle arithmétique*, printed in 1654 but not distributed, 1st. ed. 1665; items pertaining to the cycloid competition (1658-1659)), or were printed only posthumously (*Traité de l'équilibre des liqueurs et de la pesanteur de la masse de l'air*, 1654, 1st ed. 1663) Pascal was a leading figure of the early-modern scientific debate. More importantly, besides his outstanding contributions to different scientific fields, Pascal provided a lucid and cutting edge analysis of the aims and methods of modern science, explored the possibilities of new scientific practices, and proposed a theoretical reappraisal of the limits of scientific enterprises.

### 4 Text

Concerning the aims and the method of science, the draft of a preface to the *Treatise on vacuum* opposes “purely historical” disciplines, depending solely on memory (history, geography, jurisprudence, languages, and theology) to “entirely dogmatic” disciplines, depending solely on experience and reasoning (geometry, arithmetic, music, physics, medicine, architecture). The former kind of knowledge is limited and governed by the principle of authority, only seeking to know what previous authors have written. On the contrary, any respect for “ancient philosophers” is banned in the “entirely dogmatic” disciplines and their perfection “depends on time and pains”. Man is “formed for infinity” and all mankind together make continual progress in proportion as the world grows older. Experiments give us a continually increased knowledge of the “secrets of nature”. On the one hand, they allow to refuting long-standing doctrines, as in the case of Pascal's new experiences on the vacuum undermining

the scholastic thesis of nature's *horror vacui*. On the other hand, a new contrary experience can invalidate an experiment-based explanation of phenomena (Letter to E. Noël, 29 October 1647). "Expériences" constitute the only principle of physics and Pascal harshly rejected Descartes' project of providing a metaphysical foundation to natural philosophy.

Pascal's activity as a scientist proves his interest in the multiples possibilities of new scientific practices. He is highly aware that scientific experiments require a close (sometimes difficult) collaboration between scientists and artisans. In order to produce the "arithmetic machine", Pascal called up a team of workers and took advantage of the skills of Rouen's glassworkers to carry out experiments on atmospheric pressure. Moreover, Pascal made use of his talent as a writer to provide visibility to his scientific discoveries. Besides planning series of public barometric observations he published a report of the experiment conducted by his brother-in-law at the summit of Puy de Dôme. His *Récit de la grande expérience*, accompanied by a letter and a note by Pascal, allows the reader for "attending" to the experiments and "verifying" Pascal's hypotheses. Finally, Pascal renewed some common practices of the scientific community, as shown by the so-called "cycloid competition": in 1658 Pascal not only challenged European mathematicians to solve some problems relating to the cycloid curve (the "roulette"), but he also uncommonly decided to assign a rich money prize to the winner.

Pascal is led by his experience as a scientist to reappraise theoretically the limits of scientific enterprises. This is the subject of the well-known *pensée* Lafuma 199 titled "Disproportion de l'homme". By describing man as equally far from the double infinity of matter, the double infinity of science (first principles and last conclusions) and the infinity of the whole-parts relations, Pascal points out that human knowledge is marked by a radical "incapacité" to reach any total or perfect science. Scientific knowledge allows at its best to "perceive some appearance from the middle of the things, in an eternal despair at knowing neither their principle nor their end". Limited in its perfection, certainly opened to an indefinite progress, science is however "disproportioned" in its approach to nature.

## 5 Cross-References

Querelle des Anciens et des Modernes; Experimental Notes and Journals; Case Histories and Scientific Letters; Barometer; Cartesianism; Experimental-Speculative Distinction; Hypothetico-deductive method.

## 6 References

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