

Francis Bacon

Proposal for a new method of natural philosophy

Waseda University, SILS,
Introduction to History and Philosophy of Science

Experiment and Observation: The Baconian Approach

Francis Bacon was an English lawyer and politician, turned philosopher, who advocated a practical, experimental science.

Bacon was a highly religious man who believed in the truth of Biblical scripture, and in the effectiveness of *natural magic*.

Bacon, *The Proficiency and Advancement of Learning*

“The aim of magic is to recall natural philosophy from the vanity of speculations to the importance of experiments.”

He advocated a new vision of practical science and his ideas contributed to the rise of early modern *scientism*.

Francis Bacon (1561–1626)

Francis was the youngest son of Nicolas Bacon, Lord Keeper of the Seal.

He studied in France, but his father's early death made it necessary for him to obtain a profession. He studied law and was called to the bar in 1582. He was a career politician. He became Attorney-General and High Chancellor, Baron of Verulam, and Viscount of St. Albans.

He was charged with 23 counts of corruption, and then dedicated himself to philosophy.



Bacon's Work

- ▶ He advanced a new *philosophy of science* and a general program for scientific development.
- ▶ He advocated **experimental method** over rational speculation, **inductive logic** over deductive logic, and claimed that the goal of science should be *practical benefit for all people*.
- ▶ Works: Essays, *The Proficiency and Advancement of Learning* (1605), *Novum Organum* (1620), *The Great Instauration* (1620), *The New Atlantis* (1627), etc.

The Role of Technology

Bacon, *Novum Organum*

“Now, among all the benefits that could be conferred upon mankind, I found none so great as the discovery of new arts, endowments, and commodities for the bettering of man’s life.”

He praised the **printing press**, **gunpowder** and **magnetic compass**:

Bacon, *Novum Organum*

“For these three have changed the whole face and state of things throughout the world; the first in learning, the second in warfare, the third in navigation; whence have followed innumerable changes; insomuch that no empire, no sect, no star seems to have exerted greater power and influence in human affairs than these changes.”

For the Benefit of All...

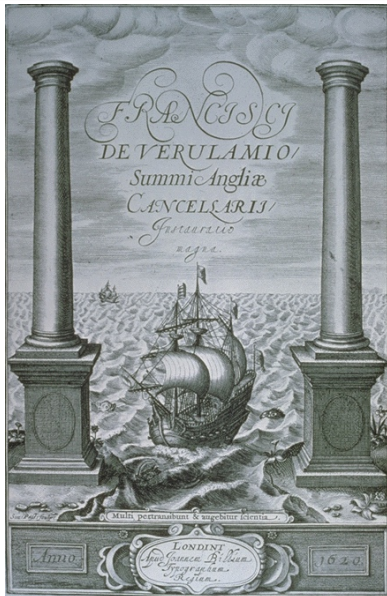
There are **three kinds of ambition**:

Bacon, *Novum Organum*

“The first is of those who desire to **extend their own power** in their native country; which kind is vulgar and degenerate. The second is of those who labor to **extend the power of their country** and its dominion among men. This certainly has more dignity, though is not less covetousness. But if a man endeavor to establish and **extend the power and dominion of the human race** itself over the universe, his ambition ... is without doubt both a more wholesome thing and more noble than the other two.”

This is an early statement of what has been called the scientific ethos, and is an important component of *scientism*.

Multi pertransibunt et augebitur scientia



Magic and Experiment

Although Bacon was critical of the magical and alchemical traditions for their secrecy, he considered them better than the scholastic philosophy then taught in the universities, with its focus on the Greek classics.

He claimed that the ancient Greeks had held that,

“The dignity of the human mind is impaired by long and close intercourse with experiments and particulars.”

While magic, on the other hand, was a ...

“... science which applies the knowledge of hidden forms to the production of wonderful operations; and by uniting (as they say) actives with passives, displays the wonderful works of nature.”

Bacon, *Novum Organum*

“We are making a history not only for nature free and unconstrained ... such as a history of the bodies of heaven and the sky, of land and sea, or minerals, plants and animals; but much more of nature confined and harassed, when she is forced from her own condition by art and human agency, and pressured and molded...

Moreover, we put much more effort and resources into the experimental part and...

“Pay no attention to men’s disgust or what they find attractive, since nature reveals herself more readily under the vexations of art than in her natural freedom.”

The Social Bureaucracy of Science

Bacon was interested in setting up methods that could be used by *anyone* – not depending on individual genius.

Bacon, *Novum Organum*

“Certainly if a man undertakes by steadiness of hand and power of eye to describe a straighter line or more perfect circle than anyone else, he challenges a comparison of abilities; but if he only says that he, with the help of a rule or pair of compasses can draw a straighter line or more perfect circle than anyone else can by hand and eye alone, he makes no great boast. And this remark, be it observed, applies not merely to the first and inceptive attempt of mine, but to all that shall take the work in hand hereafter: for my way of discovering sciences goes far to level men’s wits, and leaves but little to individual excellence; because it performs everything by the surest rules and demonstrations.”

Bacon's Legacy

Many scientists and philosophers have noted that it is not actually possible to produce new knowledge according to Bacon's model.

- ▶ There is no such thing as *pure observation*, since it is impossible to organize anything, or indeed, to really *see* anything, unless you know what you are looking for.
- ▶ Nor is there any certain method of induction from phenomena to theories; or else it would not be possible to come up with more than one theory for the same phenomena.

Nevertheless, Bacon's ideas have since been taken as fundamental to modern science and have been cited explicitly by many scientists as guiding their method (for example, Newton, Darwin, etc.)

The Problem of Induction

In the 18th century, the philosopher David Hume noticed that there was a serious logical problem with any type of inductive reasoning – that is, reasoning from past experiences to future expectations. He pointed out that reasoning this way always involves a *hidden assumption*.

Induction from the past, symbolically

1. In the past, X has always (or regularly) occurred.
 2. _____
- ∴ In the future, X will probably continue to occur.

The Problem of Induction

In the 18th century, the philosopher David Hume noticed that there was a serious logical problem with any type of inductive reasoning – that is, reasoning from past experiences to future expectations. He pointed out that reasoning this way always involves a *hidden assumption*.

Induction from the past, symbolically

1. In the past, X has always (or regularly) occurred.
2. The future will continue to be like the past.

∴ In the future, X will probably continue to occur.

The Problem of Induction (continued)

But how do we prove the claim that *the future will continue to be like the past*? We base this again on our past experience:

Induction from the past, symbolically

1. In our past experience, the future was like the past.
 2. _____
- ∴ The future will probably be like the past.

But this again contains the same *hidden assumption* that we are trying to prove. This involves us in *circular reasoning*.

The Problem of Induction (continued)

But how do we prove the claim that *the future will continue to be like the past*? We base this again on our past experience:

Induction from the past, symbolically

1. In our past experience, the future was like the past.
2. *The future will continue to be like the past.*

∴ The future will probably be like the past.

But this again contains the same *hidden assumption* that we are trying to prove. This involves us in *circular reasoning*.

Overview

Bacon can be seen as a typical early modern thinker, with one foot securely in the ancient traditions and the other pointing towards a future that he thought would be better than the past.

For all of the difficulties involved in realizing Bacon's projects, his *vision* of a science devoted to practical knowledge of the real world, which could be pursued by anyone with the appropriate training, played an important role in the development of early modern *scientism*.

Definition (Scientism)

The belief that science is inherently good and will change society for the better.

Moreover, his claim that science must be grounded firmly in experience and be forward-looking has formed a key component of our views.