

SSP100 Class Notes
A Brief History of the Philosophy of Mind,
Reason and Computation

David Beaver
Stanford University

Spring, 2001

Epimenides (800–501BC????)

Zeno (495–430BC)

Socrates (Around 450–400BC?)

Plato (427–347BC)

Aristotle (384–322BC)

Al-Khwarizmi (770-840)

Francis Bacon (1561–1626)

Hobbes (1588–1679)

[**Descartes**] (1596 - 1650)

Pascal (1623–1662)

Locke (1632–1704)

Leibniz (1646–1716)

Berkeley (1685–1753)

Bayes (1702–1761)

Hume (1711–1776)

Kant (1724–1804)

Babbage (1792–1871)

Lovelace (1815–1852)

Boole (1815–1864)
Pierce (1839–1914)
Frege (1848–1925)
Hilbert (1862–1943)
Russell (1872–1970)
Wittgenstein (1889–1951)
Von Neumann (1903–1957)
Gödel (1906–1978)
Turing (1912–1954)

In more detail...

Epimenides (800–501BC????) This guy (a) said “All Cretans are Liars.”, and (b) supposedly slept for 57 years. Conclusion?

Zeno (495–430BC) His paradoxes of motion (to support arguments of his teacher Parmenides) are his main claim to fame: (a) The racetrack, (b) Achilles and the Tortoise, (c) The arrow.

Socrates (Around 450–400BC?) “There are many men concerning whom it is certain that very little is known, and other men concerning whom it is certain that a great deal is known; but in the case of Socrates the uncertainty is as to whether we know very little or a great deal.” (Russell, *A History of Western Philosophy* 1946)

Plato (427–347BC) Incurably brilliant writer. Some relevant highlights include his (somewhat spiritual) separation of mind and matter, his emphasis on the value of philosophical reflection above corporeal perception (mind over matter) as demonstrated admirably in the parable of the cave (Republic), and his views on the innateness of knowledge (cf especially the Meno).

Aristotle (384–322BC) His writings are much drier than Plato’s, but the breadth and depth of his original scientific and philosophical thought places him at a pinnacle of human achievement. Russell comments “Throughout modern times, practically every advance in science, logic or philosophy has to be made in the teeth of opposition from Aristotle’s disciples.” (ibid) Regarding logic, Russell regards Aristotle’s greatest advance as the syllogism, and thinks it highly over-rated. Indeed, Aristotle did over-emphasize deduction, and over-emphasize the syllogism in particular, but his greatest advance runs far deeper than Russell seems prepared to admit. It is the recognition that we can judge the validity of an argument on formal principles alone.

- Al-Khwarizmi** (770-840) (Algorizm, Algorithm)
- Francis Bacon** (1561–1626) The *inductive* method!
- Hobbes** (1588–1679) Unfortunately ahead of his time. The mind as mechanism, and society as mind.
- Descartes** (1596 - 1650) Perfectly in his time. The most famous single argument in history, and a mind-body split that would have made Plato proud - what Ryle later caricatured as the “Ghost in the Machine”.
- Pascal** (1623–1662) First mechanical computer - an adding machine. Or was it Schickard? Or da Vinci? Pascal was also “the Father of probability theory”, and gave us Pascal’s wager which shows how his interest in God was combined with a strong interest in gambling. With the other Father of Probability Theory (Fermat) he discussed numerous troublesome games of chance.
- Bayes** (1702–1761) His account of prior probability made probability theory a practical way to reason.
- Babbage** (1792–1871) The difference engine, the first programmable computer! (Also notes in his autobiography: “Deciphering is, in my opinion, one of the most fascinating of arts, and I fear I have wasted upon it more time than it deserves. I practiced it in its simplest form when I was at school. The bigger boys made ciphers, but if I got hold of a few words, I usually found out the key. The consequence of this ingenuity was occasionally painful: the owners of the detected ciphers sometimes thrashed me, though the fault really lay in their own stupidity.”)
- Lovelace** (1815–1852) Ada suggested how Babbage’s engine might calculate Bernoulli numbers. This plan, is now regarded as the first “computer program.” She also suggested that a machine like Babbage’s might compose music, and produce graphics, and would have both practical and scientific uses.
- Boole** (1815–1864) Realized that Aristotle’s syllogism’s could be turned into algebraic equations restricted to variables with values 0 or 1. The operations for combining these variables are the connectives of modern logic, and the logic gates of modern computers.
- Pierce** (1839–1914) Added abduction to deduction and induction.
- Frege** (1848–1925) Finally took logic and semantics well beyond Aristotle, solving the problem of multiple quantifiers. Attempted to put Mathematics on a logical footing, but there was a fundamental flaw in
- Hilbert** (1862–1943) Hilbert’s program was “to eliminate once and for all the questions regarding the foundations of mathematics, in the form in which they are now posed, by turning every mathematical proposition into a

formula that can be concretely exhibited and strictly derived, thus recasting mathematical definitions and inferences in such a way that they are unshakable and yet provide an adequate picture of the whole science.”

Russell (1872–1970) Russell’s paradox, the thesis of misleading form and ...
(with Whitehead) *Principia Mathematica*

Wittgenstein (1889–1951) The picture theory of meaning, and language games.

Von Neumann (1903–1957) Game theory and... the theory of computation.

Gödel (1906–1978) If a system is strong enough to express basic math and it’s internally consistent, then there are things in it that can’t be proven.

Turing (1912–1954) Turing machines! The decision problem decided! AI!