The Advancement of Learning
Review
Deduction and Induction
A **deductive argument** is...

an argument which aims to show that its conclusion *must* be true if its premises are true;

ie an argument in which it is impossible for the conclusion to be false if the premises are true;

ie an argument in which the truth of the premises **NECESSITATES** the conclusion.
An inductive argument is...

an argument that aims to show that if its premises all are true, then its conclusion is not certain to be true, but rather it is *probably* or *likely* true;

ie, it is unlikely that the conclusion is false if the premises are all true.

Inductive arguments aim to show we have good reasons to accept the conclusion despite the lack of *complete* certainty.
Food for thought...
Question: Which is better—deduction or induction?
As a general rule...

Inductive arguments are what scientists use to argue for their findings.
An exception would be recent advances in theoretical physics (which are by and large mathematical-deductive types of reasoning) which are not subject to experiment.
On the other hand...

Mathematicians and logicians almost exclusively use deductive arguments.
Question: Which is better—deduction or induction?
Depends on what you’re doing...
A deductive argument...

...is **valid** when the premises necessitate the conclusion; that is, when if the premises are true, the conclusion MUST be true.

...is **sound** when it is a. valid, and b. has true premises.
But...

Validity is **only** concerned with the logical relationship between the premises and the conclusion.

If you’re looking for truth, you’re looking for **soundness**.
1. If you have a beard, then you are a time traveller.
2. RCG wears a beard.
3. Therefore RCG is a time traveller.
1. In order to be justified in believing something, you must have good reasons for believing it.
2. Good reasons are themselves justified beliefs.
3. So in order to justifiably believe something, you must believe it on the basis of an infinite amount of good reasons.
4. No human can have an infinite amount of good reasons.
5. Therefore, it is humanly impossible to have justified beliefs, i.e. knowledge.
Storytime!
The Tudor Period (1485-1603)
Queen Elizabeth I (1558-1603)
Restoration of Protestantism and the Persecution of the Catholic Clergy
English defeat of the Spanish Armada (July-Aug 1588)
William Shakespeare (1564-1616)
Advancements in Cartography and the Study of Magnetism
Person of Interest: Francis Bacon

Occupation:
Philosopher
Statesman (Lord Chancellor)

Notable Accomplishment:
Credited with developing the scientific method

Notable Works:
The Advancement of Learning, 1605
Novum Organum, 1620
New Atlantis, 1627
By the middle of the 1500’s there were remarkable innovations in the making and use of tools of observation, as well as ways of conceptualizing and categorizing one’s findings. “Most important of these [innovations] was ‘experiment,’ whose meaning shifted from the broad and heterogeneous sense of experimentum as recipe, trial, or just common experience to a concertedly artificial manipulation, often using special instruments and designed to probe hidden causes” (Daston 2011: 82).
“Observation remained a way of life, not just a technique. Indeed, so demanding did this way of life become that it threatened to disrupt the observer’s other commitments to family, profession, or religion and to substitute epistolary contacts with other observers for local sociability with relatives and peers...

French naturalist Louis Duhamel du Monceau depleted not only his own fortune but that of his nephews on scientific investigations. By the late seventeenth century, the dedicated scientific observer who lavished time and money on eccentric pursuits was a sufficiently distinctive persona in sophisticated cultural capitals like London or Paris to be ridiculed by satirists and lambasted by moralists” (Daston 2011: 82-3).
“Baconians played a key role in the rise of the terminology of observation and experiment in mid-seventeenth-century scientific circles” (Daston 2011: 83).
The practice of science doesn’t come to fruition just from a common methodology; there must be a way for establishing joint ground and sharing insights. In *New Atlantis*, Bacon made a suggestion...
“[T]he scientific societies of the late seventeenth and early eighteenth centuries shifted the emphasis from observation as individual self-improvement, a prominent theme in earlier humanist travel guides, to observation as a collective, coordinated effort in the service of public utility” (Daston 2011: 90).
Question: What is knowledge?
“Bacon criticizes the Greeks. He says that the interrogation of nature should be pursued not to delight scholars but to serve man. It is to relieve suffering, to better the mode of life, and to increase happiness. Let us put nature to use. Knowledge should bear fruit in works; science should be applied to industry...

‘The true and lawful goal of science is to endow human life with new powers and inventions’ ” (Kline 1967: 280).
Pragmatism is the view that an individual has knowledge about a given subject if the agent can successfully apply the information in practice; e.g., a scientist has knowledge about solar eclipses if she can predict the next solar eclipse.
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Pragmatist:
Knowledge is the ability to produce physical results, e.g., the ability to control some part of the natural world.
Knowledge just is those beliefs that allow a person to do something. If you can’t do anything with your beliefs, then they are not knowledge.
We can imagine a theory that produces good physical results, yet it is still, in fact, inaccurate and wrong; e.g., the geocentric model of the solar system, alchemy, etc.
“Early chemists, for example Robert Boyle, ascribed the fact that substances such as sulphur were easily set afire to the presence of a special substance called phlogiston” (Kline 1967, 282).
Pragmatists often accept this and make use of a coherentist approach to justification.

**Coherentism** is the view that:

a. Our beliefs are like a web that coheres (or fits) together, and

b. Our beliefs are justified if they cohere with the rest of our web of beliefs.
INFORMAL FALLACY OF THE DAY
Improper Appeal to Ignorance

This is a fallacy in which an arguer lends support to his/her conclusion by claiming that his/her view is true since it has not yet been proven false.
There is a teapot orbiting our sun.
It's located somewhere between Mars and Earth.
Since you can't prove me wrong, that means it's there.
I DON'T KNOW
THEREFORE ALIENS
Standard Form(?)
1. You haven’t proved me wrong.
2. Therefore, I am right.
Modern-day pragmatists do not believe that their view is definitely true. They acknowledge that further empirical research may require them to update their beliefs.
“No fact is safe from the next generation of scientists with the next generation of tools” (Firestein 2012).
“There is so much innovative research going on that in ten years, today’s experts might feel like Plato in the presence of a brain-scanning machine” (Barrett 2017, 13).
“As I’ve said it, I stand refutable: My thesis is empirically committed and is therefore falsifiable by empirical developments” (Doris 2002: 85).
Maybe that’s enough?
“Science was born of faith in the mathematical interpretation of Nature, held long before it had been empirically verified” (Randall 1976: 235).

In other words, the great success of the natural sciences today was not yet empirically validated in the 17th century.

It was a time of intellectual and social upheaval...
Morris Kline (1967; chapter 9) surveys the intellectual climate of the period and its effect on various mathematicians, scientists, and philosophers.
“Whether or not the civilization of medieval Europe might in due time have given rise to mathematical activity will never be known.

But dramatic changes, largely initiated by non-European forces, drastically altered the Christian world...
“The earliest influence tending to transform thought and life in medieval Europe may be credited to the Arabs” (Kline 1967: 200).

Once the Arabs stabilized their empire, they readily absorbed the mathematics and science of the Greeks and Hindus and added contributions of their own.
While the Arabic civilization was flourishing, Europe was rocked by several events that destabilized their worldview, a worldview which had been their primary mode of thinking for a thousand years.
- The collapse of the Byzantine Empire
- The discovery of America
- The discovery of a route to China around Africa, and exposure to Chinese inventions (like the compass and gunpowder)
- The Protestant Reformation
- The invention of printing
Bloodletting
Uroscopy
Couching for Cataracts
“It was to be expected that the insular world of medieval Europe accustomed for centuries to one rigid, dogmatic system of thought would be shocked and aroused by the series of events we have just described. The European world was in revolt. As John Donne put it, ‘All in pieces. All coherence gone’ (Kline 1967: 202).