Lecture II

Syllogism is a type of logical inference.
The demonstration is the application of syllogism procedure in order to acquire knowledge: this is the goal of science.
How can we trust that what we derive from the premises is true, since we cannot demonstrate the premises to be true themselves?
How can we prove our premises to be correct, in a non-demonstrative way, hence not by using a syllogism? We should try to apply a cognitive development.
It's not that we are born with innate ideas, Aristotle doesn't support this prospective. We need to acquire this type of understanding by observing a certain number of phenomena within a certain science and then we generalize (we draw a general principle). This is the first formulation of induction! In Aristotle, this was called epagoghè, the capacity to know the primary premises by generalizing. Of course we cannot just generalize what we observe, but there must be an intuition that is developed from the observation, and this intuition is called nous. Hence this is the process that brings us from observation to the premises.

This backup idea to demonstrative science put in place by Aristotle will be criticized by both rationalists (like Descartes) and experimentalists (like Francis Bacon).
What was the problem the rationalists had? Descartes criticizes the idea that mind is like a clean slate, it can only acquire content/knowledge by the experience of the senses. This ends up subduing knowledge, but he argues we should assume human minds come itself with a pack of innate ideas.
The justification of the premises of scientific demonstration, says Descartes, come from an already rule drive mind, it has innate ideas.
Then we have experimentalists: they argues that the mind appears to already know what to do (by generalizing, having intuits…) but it can be deceived. Epagoghè must create a different approach that is more adequate in showing how we can acquire reliable premises, a non-deductive approach, an approach we are able to test.
A branch of experimentalists is called nominalist (see Occam): they were the first modern philosophers, approaching philosophy in a different way than Aristotelian. The person who really turned induction in a new science was Bacon, a truly political writer (his week is called "new organa"). He was against the old, Aristotelian method. Why was Bacon so against Aristotelian way? Aristotelian method is a hasty method, it flies from the senses and particulates to general assumes, and from the senses proceeds to judgement and the discovery of the middle axioms. All is done in sort of a rush. Aphorisms were used by Bacon to explain his method.
This method (Aristotelian) became quite popular because it represents the natural way human mind work if it is let to itself. But Bacon says that our minds are full of prejudices and these might deceive our mind.
There are 4 types of idols:
• Tribe: these have their bases on the human race/nature, for the latter is sort of a distorting mirror. How does it distort things? For example, human mind is prone to believe there is more order in nature than it is actually disposed to discover, and it often ends up producing dogmas and fallacious theory. Once we have an idea of something, we try to distort everything we know in order to make it correspond to our idea. Senses are often inadequate, they can easily be deceived.
• Cave: this is due to individuals' personal weaknesses in reasoning due to particular personalities, likes and dislikes
• Marketplace: here is where people interact with each other; this is the place where idles are produced by the use of languages and their interaction. Words are normally used in their common meaning, but meanings are often conflicting because we have different purposes. Hence, if we try to correct these possible miscomprehensions, we can gene (43:00)
• Theatre: This is the following of academic dogma and not asking questions about the world. Dogmas often end up creating fictional worlds, not necessarily justified.
Bacon called being led to draw conclusions from premises not infected by idols as the "anticipation of nature/mind". This helps our way to get to scientific knowledge.

Induction by enumeration: it is bad education to infer principles of science through simple enumerations, namely through simple experience, for it relies on isolated observation, hence we cannot infer much. We need a good guidance to draw conclusion on these observations.

Bacon argues that, if we were to produce without a good guidance, isolated observations should be able to lead us ahead, but we don't have any evidence of this. Hence, he argues we need a guidance.

Science, up to Bacon's time, has been handled either by rationalists or empiricists. The latter, like ants, collect things and use them, while rationalists are like spiders that spin webs out of themselves. We should use a good middle way as a guidance. This shouldn't be only used by the power of the mind (spider) or the material nature (ants), but on the way of bees: they gather their material from the garden but then elaborates this power/knowledge on their own.

We go from a well organized experience to the principles and then we draw the principles again: this is the good induction that is draw by a guidance. Our senses require a guidance because they can easily disinform us. Bacon (he was a lawyer) says we need to vex/interrogate nature, as we were interrogating a witness.

This is the gradual induction: "Good induction proceeds by rejections and exclusions, and then after a sufficient number of negatives, come to a conclusion on the affirmative instances". This is the method he prefers to the Aristotelian induction by enumeration.

Bacon's method rely on experience and what he calls gradual induction.

Experience amounts to this: not only plain and passible observation, but facts arranged to a suitable order. In order to achieve this, we need the device of rules that allows us to classify facts.

First of all, we should classify facts in what he calls tables, that are sort of exempla. After we do this, we collect all of these instances in what he calls histories, which are like general surveys about specific phenomena. At that point, all of this is let to the interpretation of gradual induction. This history provides a well prepared experience to apply induction in a good way. Only if we do this, induction can take its proper course.

He applies it to the heat, hence he shows it can be done, and after concluding the experiment, he concludes that heat is motion. He does this by discarding many apparently good candidates/ assumptions, using his inductive method.

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Bacon gives us a new idea of scientific idea with this new idea of induction.

Bacon's text is full of metaphors and images.

There are two vintages:
1. Produces an hypothesis
2. Further testing to establish our results with more confidence

This way, his rules of induction are the best way to discover the truth f premises that in the Aristotelian format were somewhat took for granted. This way, we can attribute a better evidence to the premises, which leads us to better conclusions.

We now have demonstrable knowledge that is different from the Aristotelian demonstrable knowledge.

Bacon wants, in his scientific method, to rely on an idea of indubitability rather than infallibility (what we can prove to an idea rather than what we can attach on an idea).

In the new organon, Bacon proclaims we should rely on his method because it is the best available one.

Once we embrace Bacon's method, according to him, we have a method that, independently of individual skills, can lead us to good results. If this method is correctly followed, its conclusions cannot be doubtable.

This is a new territory, hence Bacon must convince the others is method is good to follow, he has to face the very long Aristotelian tradition.

Bacon agrees that the results that his method brings about are not taking us to infallible certainties, because infallibility is proper of logic, which is proper of deduction.

Still, Bacon gives us reasons to believe that it is possible to reach some formal certainties, by filling his book with further tools that should make us more comfortable with the ideas he his suggesting.

Prediction amounts to the chance of a method of giving us certainties (?).

Bacon suggests that conclusions well accompanied by evidences are to be considered more comfortable, more certain. Certain here is not logical infallibility but empirical indubitability.

Is this optimism really motivated? How reliable is induction even in this laboriously described manner?

Since here we observed that, for what concerns deduction: (all Italians eat is pasta; Eleonora is Italian; Eleonora eats past); we start from a universal statement and end up to a specific statement. This is the logical syllogism. The peculiarity of deductive reasoning is that, if the premises are true, than the conclusion is also true and vice versa. In this type of reasoning, we conclude something on the middle term that is included in the major term, but how do we know the premises are true? It is a problem for Aristotle when he makes logic bare on science. How do we know all Italians eat pasta? The idea here is we acquire a wide enough number of repeated instances (induction by enumeration) and then we subdue this list to a series of condition (what Bacon tries to do) and we then feel entitled to state what we state. We are now generalizing to the universal case. All Italians eat pasta in a generalization, in an inductive approach. Then we now go from the single case/instances to the general rule/statement.

The principle of induction: if a large number of objects As have been observed under a wide variety of conditions, and if all those observed As without exceptions possessed the property b, then all As have b. It will make legitimate not only how we go from the particular to the universal, but also it'll allow us to draw conclusions on the instances that have yet to be observed.

All swans are white. We can draw two conclusions: probably, the next swan I'll see will be white, and, probably, all the other swans I'm going to see are going to be white. Induction relies on experience and on senses, for example we use induction when we expect to be attending classes day after day: we have an empirical proof to be expecting to find the teacher the following days.

We are entering a slightly dangerous territory: the conclusion of deductive inference does not say much more than its premises, and if the premises is true I will be assured the conclusion is also true. Still, induction can't make us so certain. How wide must be our number of observed facts to be certain of them, for example?

The whole point in science, as reminded by Bacon, is to establish the truth of the premises, to improve and expand our knowledge. And deductive reasoning doesn't expand our knowledge, while induction does.

How justified are we in making these assumptions? We know how risky it is to follow induction, specifically from a logical point of view: in an induction, we might start from true premises but could eventually end up with a wrong conclusion. Do really all Italians eat pizza? I can even say all swans are white, even if I haven't seen them: this is very dangerous of induction.

David Hume analyzed the problem of induction. What is his strategy to face induction and to correctly use it to increase our knowledge? He faces these problems in his book "An Enquiry Concerning Human Understanding".

The first distinction is that all the objects of human reason or enquiry may naturally (02:06:00)

Relations of ideas: propositions that are discoverable by the mere operation of thought; even if there were no triangles on Earth, Pitagora's theorem would still be true. They are subject to logical contradiction as well and they can be demonstrated to be false

Matters of facts: the contradiction comes out when we make a logical contradiction, but here it is not as easy as in the relations of ideas. We cannot say "the sun will rise tomorrow" if the sun doesn't exist: the sun's existence is not a matter of logic, so it is not possible to find out whether such a proposition is true merely by reasoning. We need to appeal to experience. If we do this, we defeat the very purpose of inference in the first place, for inference wants to arrive to conclusion before using senses to draw a conclusion.

Apriori knowledge of matters of facts is impossible.

Relations of ideas can be known by deductive relations.

Hume wants to enquire how are we able to establish the truth of our proposition without experience, how it is possible to infer a universal generalization "the sun will always rise" from a collection fo observation of what the sun has done up until today.

Hume says that only some of our factual knowledge is based on something we perceive directly.

If you were to ask a man why he believes his friend his out of town, he will reply by giving another matter of fact, like he has received a letter from his friend where he says he is out of town. A man finds a watch in a desert island, therefore he concludes there must have been someone else there before him, without direct acquaintance.

All matters of facts relies on a present facts and another fact which the former is inferred from. How do we reason here? Exactly in the same way in which we reason when we connect an effect to a cause: we see something and we asked ourselves what brought it about. How do we formulate this type of reasoning? Are we entitled to make this connection? Can we acquire knowledge from this connection?