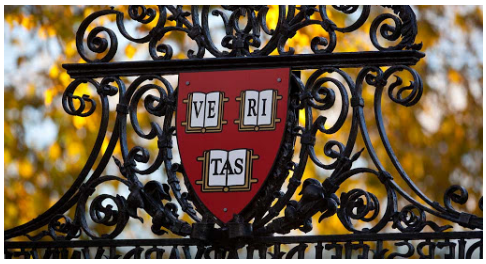
OUR SEMINAR-COURSE *TRUTH*

BARRY MAZUR



Readings for September 15: Some 'early' philosophical formats to think about for our discussion about 'Truth'

- Aristotle:
  (1) Topics, Book I Parts 1 and 14
  `http://classics.mit.edu/Aristotle/topics.1.i.html`
  (2) Prior Analytics, Book I Parts 1 and 4
  `http://classics.mit.edu/Aristotle/prior.1.i.html`
  (3) Posterior Analytics, Book I Part 1
  `http://classics.mit.edu/Aristotle/posterior.1.i.html`

- Plato: The Republic Book VI (esp.: [490] and [509] – [511])
  `http://www.perseus.tufts.edu/hopper/text?doc=Perseus%3Atext%3A1999.01.0168%3Abook%3D6&force=y`

- René Descartes: *Rules for the Direction of the Mind*. Specifically, see the excerpt in Section 13[1].

In the readings listed above I suggest that the focus of our discussion be on the *excerpts of those texts* that are quoted in the sections below.

Contents

[1]I list only the first twelve of Descartes' 21 rules; in any event, Descartes never finished this document.

1. Thinking about reasoning

We'll start with *process* (i.e., how to get it) rather than *essence* (i.e., what it 'is') for our discussion of the early (Greek) reflections about Truth.

Aristotle in his *Topics*, *Prior Analytics*, and *Posterior Analytics* establishes a setting, and sketches a format that is a basis for deliberation, discussion, argument, and communication of ideas.

1.1. **The underlying common understanding (*sensus communis*).**

(Aristotle: Topics Book I Part 1:)

> Our treatise proposes to find a line of inquiry whereby we shall be able to reason from opinions that are generally accepted about every problem propounded to us, and also shall ourselves, when standing up to an argument, avoid saying anything that will obstruct us.

1.1.1. *Reasoning per se.*

> First, then, *we must say what reasoning is*, and what its varieties are, in order to grasp *dialectical reasoning:* for this is the object of our search in the treatise before us.
>
> Now reasoning is an argument in which, certain things being laid down, something other than these necessarily comes about through them.

1.1.2. *Demonstrative.*

> It is a 'demonstration', when the premisses from which the reasoning starts are true and primary, or are such that our knowledge of them has originally come through premisses which are primary and true.

1.1.3. *Dialectical.*

> Reasoning, on the other hand, is 'dialectical', if it reasons from opinions that are generally accepted. Things are 'true' and 'primary' which are believed on the strength not of anything else but of themselves: for in regard to the first principles of science it is improper to ask any further for the why and wherefore of them; each of the first principles should command belief in and by itself. On the other hand, those opinions are 'generally accepted' which are accepted by every one or by the majority or by the philosophers-i.e. by all, or by the majority, or by the most notable and illustrious of them.

1.1.4. *Reasoning is 'contentious'.*

> ... if it starts from opinions that seem to be generally accepted, but are not really such, or again if it merely seems to reason from opinions that are or seem to be generally accepted. For not every opinion that *seems to be* generally accepted *actually* is generally accepted. For in none of the opinions which we call generally accepted is the illusion entirely on the surface, as happens in the case of the principles of contentious arguments; for the nature of the fallacy in these is obvious immediately, and as a rule even to persons with little power of comprehension. So then, of the contentious reasonings mentioned, the former really deserves to be called 'reasoning' as well, but the other should be called 'contentious reasoning', but not 'reasoning', since it appears to reason, but does not really do so.

1.1.5. *'Mis-reasonings?'*

> Besides all the reasonings we have mentioned there are the mis-reasonings that start from the premisses peculiar to the special sciences, as happens (for example) in the case of geometry and her sister sciences. For this form of reasoning appears to differ from the reasonings mentioned above; the man who draws a false figure reasons from things that are neither true and primary, nor yet generally accepted. For he does not fall within the definition; he does not assume opinions that are received either by every one or by the majority or by philosophers-that is to say, by all, or by most, or by the most illustrious of them-but he conducts his reasoning upon assumptions which, though appropriate to the science in question, are not true; for he effects his misreasoning either by describing the semicircles wrongly or by drawing certain lines in a way in which they could not be drawn...

1.2. **Ethical/Natural Philosophical/ Logical.**

(Aristotle, Topics Book I.14)

> Of propositions and problems there are[2] three divisions: for some are *ethical* propositions, some are on *natural philosophy*, while some are *logical*.
>
> - Propositions such as the following are *ethical*, e.g. 'Ought one rather to obey one's parents or the laws, if they disagree?';
> - such as this are *logical*, e.g. 'Is the knowledge of opposites the same or not?';
> - while such as this are on *natural philosophy*, e.g. 'Is the universe eternal or not?'
>
> Likewise also with problems. The nature of each of the aforesaid kinds of proposition is not easily rendered in a definition, but we have to try to recognize each of them by means of the familiarity attained through induction, examining them in the light of the illustrations given above.
>
> For purposes of philosophy we must treat of these things according to their truth, but for dialectic only with an eye to general opinion. All propositions should be taken in their most universal form; then, the one should be made into many. E.g. 'The knowledge of opposites is the same'; next, 'The knowledge of contraries is the same', and that 'of relative terms'. In the same way these two should again be divided, as long as division is possible, e.g. the knowledge of 'good and evil', of 'white and black', or 'cold and hot'. Likewise also in other cases...

1.3. **Formal structure of 'Reasoning'.** (Aristotle: Prior Analytics, Book I Part I)

> We must first state the subject of our inquiry and the faculty to which it belongs: its subject is demonstration and the faculty that carries it out demonstrative science. We must next define a *premiss*, a *term*, and a *syllogism*, and the nature of a *perfect* and of an *imperfect* syllogism; and after that, the inclusion or non-inclusion of one term in another as in a whole, and what we mean by predicating one term of all, or none, of another...

[2] "to comprehend the matter in outline." writes Aristotle

Logic as in the *Prior Analytics* and *Posterior Analytics* of Aristotle is a framework within which we formulate our thoughts justifying statements we argue are true. It's, at the very least, the scaffolding for building such arguments and expressing such statements. For example, in Book I of the *Prior Analytics* Aristotle defines what he refers to as a *syllogism*:

> A syllogism is an argument (*logos*[3]) in which, certain things being posited, something other than what was laid down results by necessity because these things are so. (24b19-20)

Aristotle: Prior Analytics, Book I Part IV

> After these distinctions we now state by what means, when, and how every syllogism is produced; subsequently we must speak of demonstration. Syllogism should be discussed before demonstration because syllogism is the general: the demonstration is a sort of syllogism, but not every syllogism is a demonstration...

2. Recognition of Truth

Aristotle: Posterior Analytics, Book I Part IV

> All instruction given or received by way of argument proceeds from pre-existent knowledge. This becomes evident upon a survey of all the species of such instruction. The mathematical sciences and all other speculative disciplines are acquired in this way, and so are the two forms of dialectical reasoning, *syllogistic* and *inductive*; for each of these latter make use of old knowledge to impart new, the syllogism assuming an audience that accepts its premisses, induction exhibiting the universal as implicit in the clearly known particular.[4]

[3]But see Stephen Read's commentary on the translation of the word *logos* as'argument' in this quotation: `https://www.st-andrews.ac.uk/~slr/The_Syllogism.pdf`

[4]Compare this to Francis Bacon's proclamation in *Novum Organum*:

> The syllogism consists of propositions; propositions of words; words are the signs of notions. If, therefore, the notions (which form the basis of the whole) be confused and carelessly abstracted from things, there is no solidity in the superstructure. Our only hope, then, is in genuine induction.

Again, the persuasion exerted by rhetorical arguments is in principle the same, since they use either example, a kind of induction, or enthymeme[5], a form of syllogism.

The pre-existent knowledge required is of two kinds. In some cases admission of the fact must be assumed, in others comprehension of the meaning of the term used, and sometimes both assumptions are essential. Thus, we assume that every predicate can be either truly affirmed or truly denied of any subject, and that 'triangle' means so and so; as regards 'unit' we have to make the double assumption of the meaning of the word and the existence of the thing. The reason is that these several objects are not equally obvious to us.

Recognition of a truth may in some cases contain as factors both previous knowledge and also knowledge acquired simultaneously with that recognition-knowledge, this latter, of the particulars actually falling under the universal and therein already virtually known. For example, the student knew beforehand that the angles of every triangle are equal to two right angles; but it was only at the actual moment at which he was being led on to recognize this as true in the instance before him that he came to know 'this figure inscribed in the semicircle' to be a triangle. For some things (viz. the singulars finally reached which are not predicable of anything else as subject) are only learnt in this way, i.e. there is here no recognition through a middle of a minor term as subject to a major. Before he was led on to recognition or before he actually drew a conclusion, we should perhaps say that in a manner he knew, in a manner not...

3. Truth and Method

René Descartes: *Rules for the Direction of the Mind* [6]

For background see `https://plato.stanford.edu/entries/francis-bacon/#SciMetNovOrgTheInd`.

[5] a syllogism with an unstated premise

[6] The excerpt is taken from a translation by Elizabeth Anscombe and Peter Thomas Geach (Descartes: Philosophical Writings—(1954)).

(1) The aim of our studies should be to direct the mind with a view to forming true and sound judgements about whatever comes before it.
(2) We should attend only to those objects of which our minds seem capable of having certain and indubitable cognition.

    But one conclusion now emerges out of these considerations, viz. not, indeed, that Arithmetic and Geometry are the sole sciences to be studied, but only that in our search for the direct road towards truth we should busy ourselves with no object about which we cannot attain a certitude equal to that of the demonstrations of Arithmetic and Geometry.
(3) Concerning objects proposed for study, we ought to investigate what we can clearly and evidently intuit or deduce with certainty, and not what other people have thought or what we ourselves conjecture. For knowledge can be attained in no other way. We must read the works of the ancients; for it is an extraordinary advantage to have available the labors of so many men, both in order to recognize what true discoveries have already long since been made and -also to become aware of what scope is still left for invention in the various disciplines. There is, however; at the same time a great danger that perhaps some contagion of error, contracted from a too attentive reading of them, may stick to us against our will, in spite of all precautions.
(4) We need a method if we are to investigate the truth of things.
(5) The whole method consists entirely in the ordering and arranging of the objects on which we must concentrate our mind's eye if we are to discover some truth. We shall be following this method exactly if we first reduce complicated and obscure propositions step by step to simpler ones, and then, starting with the intuition of the simplest ones of all, try to ascend through the same steps to knowledge of all the rest.
(6) In order to distinguish the simplest things from those that are complicated and to set them out in an orderly manner, we should attend to what is most simple in each series of things in which we have directly deduced some truths from others, and should observe how all the rest are more, or less, or equally removed from the simplest.
(7) In order to make our knowledge complete, every single thing relating to our undertaking must be surveyed in a continuous and wholly uninterrupted sweep of thought, and be included in a sufficient and well-ordered enumeration.

(8) If in the series of things to be examined we come across something which our intellect is unable to intuit sufficiently well, we must stop at that point, and refrain from the superfluous task of examining the remaining items.
(9) We must concentrate our mind's eye totally upon the most insignificant and easiest of matters, and dwell on them long enough to acquire the habit of intuiting the truth distinctly and clearly.
(10) In order to acquire discernment we should exercise our intelligence by investigating what others have already discovered, and methodically survey even the most insignificant products of human skill, especially those which display or presuppose order.
(11) If, after intuiting a number of simple propositions, we deduce something else from them, it is useful to run through them in a continuous and completely uninterrupted train of thought, to reflect on their relations to one another, and to form a distinct and, as far as possible, simultaneous conception of several of them. For in this way our knowledge becomes much more certain, and our mental capacity is enormously increased.
(12) Finally we must make use of all the aids which intellect, imagination, sense-perception, and memory afford in order, firstly, to intuit simple propositions distinctly; secondly, to combine correctly the matters under investigation with what we already know, so that they too may be known; and thirdly, to find out what things should be compared with each other so that we make the most thorough use of all our human powers....

4. 'Truth'

(The Republic Book VI [490], [508]-[511])[7]

4.1. **Republic Book VI [490b].**

> [*Isn't it*]... the nature of the real lover of knowledge to strive emulously for true being and ... not linger over the many particulars that are opined to be real,... and the edge of his passion would not be blunted nor would his desire fail till he came into touch with the nature of each thing in itself by that part of his soul to

[7]The Jowett translation:
https://www.gutenberg.org/files/55201/55201-h/55201-h.htm

which it belongs to lay hold on that kind of reality— the part akin to it, namely— through that approaching it, and consorting with reality really, he would beget intelligence and truth, attain to knowledge and truly live and grow, and so find surcease from his travail of soul, but not before?

4.2. **Republic Book VI [508]-[511] "Divided Line".**

Did you ever consider that the objects of sight imply a faculty of sight which is the most complex and costly of our senses, requiring not only *objects of sense*, but also a medium, which is *light*; without which the sight will not distinguish between colours and all will be a blank?

For light is the noble bond between the perceiving faculty and the thing perceived, and the god who gives us light is the sun, who is the eye of the day, but is not to be confounded with the eye of man.

This eye of the day or sun is what I call the child of the good, standing in the same relation to the visible world as the good to the intellectual. When the sun shines the eye sees, and in the intellectual world where truth is, there is sight and light.

Now that which is the sun of intelligent natures, is the idea of good, the cause of knowledge and truth, yet other and fairer than they are, and standing in the same relation to them in which the sun stands to light.

O inconceivable height of beauty, which is above knowledge and above truth!

('You cannot surely mean pleasure,' he said. Peace, I replied.)

And this idea of good, like the sun, is also the cause of growth, and the author not of knowledge only, but of being, yet greater far than either in dignity and power.

'That is a reach of thought more than human; but, pray, go on with the image, for I suspect that there is more behind.'

There is, I said; and bearing in mind our two suns or principles, imagine further their corresponding worlds— one of *the visible*, the other of *the intelligible*;
—you may assist your fancy by figuring the distinction

under the image of a line divided into two unequal parts, and may again subdivide each part into two lesser segments representative of the stages of knowledge in either sphere.

The lower portion of the lower or visible sphere will consist of shadows and reflections, and its upper and smaller portion will contain real objects in the world of nature or of art.

The sphere of the intelligible will also have two divisions:

- one of *mathematics*, in which there is no ascent but all is descent; no inquiring into premises, but only drawing of inferences. In this division the mind works with figures and numbers, the images of which are taken not from the shadows, but from the objects, although the truth of them is seen only with the mind's eye; and they are used as hypotheses without being analysed.
- Whereas in the other division reason uses the hypotheses as stages or steps in the ascent to the idea of *good*, to which she fastens them, and then again descends, walking firmly in the region of ideas, and of ideas only, in her ascent as well as descent, and finally resting in them.

'I partly understand,' he replied; 'you mean that the ideas of science are superior to the hypothetical, metaphorical conceptions of geometry and the other arts or sciences, whichever is to be the name of them; and the latter conceptions you refuse to make subjects of pure intellect, because they have no first principle, although when resting on a first principle, they pass into the higher sphere.'

You understand me very well, I said. And now to those four divisions of knowledge you may assign four corresponding faculties:

- pure intelligence to the highest sphere[8];
- active intelligence to the second;[9]

[8]Noeisis
[9]Dianoia

—these classified as being in the sphere of 'knowledge' (episteme)—

- to the third, faith[10];
- to the fourth, the perception of shadows[11],

—these classified as being in the sphere of 'opinion' (doxa)—

and the clearness of the several faculties will be in the same ratio as the truth of the objects to which they are related.. . .

5. Francis Bacon, Novum Organum Book 1 I- XXXVI

`https://oll.libertyfund.org/title/bacon-novum-organum`

6. Scientific Formats—the nature of experiment, the presentation of data, scientific consensus

7. Mathematical Formats—conjecture, proof, 'Truth beyond proof'

'Demonstrative' as opposed to 'Diualectical' reasoning

The Platonic and Aristotelian terms *episteme* and *techne*[12] on the one hand; *doxa*, *phronesis*[13] on the other—and *sophia* hovering above all—constitute a range of temperaments of thought within which it is traditional to consider concepts related to Truth. Palimpsested onto this gamut of vocabulary are the four levels of imagination and thought[14]: *noesis, dianoia*: and then *pistis, eikasia* corresponding to the "divided line" in Book VI of Plato's *Republic*.

All quotations below are passages from the above list that give the flavor (and the mission) of the fuller text. We will focus our discussion on these passages. The translations are taken from the web-site

[10]Pistis

[11]Eikasia

[12]Roughly: knowledge, theoretical and practical

[13]Roughly: common belief and practical wisdom

[14]Roughly, in descending order—*comprehension of principle* and *discursive reflection* (in the upper realm) and then: *confidential conjecture* and finally: *not particularly substantiated conjecture* (in the lower realm)

`http://classics.mit.edu/Aristotle/`. (I've made changes in the formatting. I've also introduced a few italics and have made some changes in punctuation.)

7.1. **Topics Book I Part 1.**

> Our treatise proposes to find a line of inquiry whereby we shall be able to reason from opinions that are generally accepted about every problem propounded to us, and also shall ourselves, when standing up to an argument, avoid saying anything that will obstruct us. First, then, *we must say what reasoning is*, and what its varieties are, in order to grasp *dialectical reasoning:* for this is the object of our search in the treatise before us.
>
> Now reasoning is an argument in which, certain things being laid down, something other than these necessarily comes about through them.
>
> **(a)** It is a 'demonstration', when the premisses from which the reasoning starts are true and primary, or are such that our knowledge of them has originally come through premisses which are primary and true:
>
> **(b)** reasoning, on the other hand, is 'dialectical', if it reasons from opinions that are generally accepted. Things are 'true' and 'primary' which are believed on the strength not of anything else but of themselves: for in regard to the first principles of science it is improper to ask any further for the why and wherefore of them; each of the first principles should command belief in and by itself. On the other hand, those opinions are 'generally accepted' which are accepted by every one or by the majority or by the philosophers-i.e. by all, or by the majority, or by the most notable and illustrious of them.
>
> Again **(c)**, reasoning is 'contentious' if it starts from opinions that seem to be generally accepted, but are not really such, or again if it merely seems to reason from opinions that are or seem to be generally accepted. For not every opinion that *seems to be* generally accepted *actually* is generally accepted. For in none of the opinions which we call generally accepted is the illusion entirely on the surface, as happens in the case of the principles of contentious arguments; for the nature of the fallacy

in these is obvious immediately, and as a rule even to persons with little power of comprehension. So then, of the contentious reasonings mentioned, the former really deserves to be called 'reasoning' as well, but the other should be called 'contentious reasoning', but not 'reasoning', since it appears to reason, but does not really do so.

Further **(d)**, besides all the reasonings we have mentioned there are the mis-reasonings that start from the premisses peculiar to the special sciences, as happens (for example) in the case of geometry and her sister sciences. For this form of reasoning appears to differ from the reasonings mentioned above; the man who draws a false figure reasons from things that are neither true and primary, nor yet generally accepted. For he does not fall within the definition; he does not assume opinions that are received either by every one or by the majority or by philosophers-that is to say, by all, or by most, or by the most illustrious of them-but he conducts his reasoning upon assumptions which, though appropriate to the science in question, are not true; for he effects his misreasoning either by describing the semicircles wrongly or by drawing certain lines in a way in which they could not be drawn...

7.2. **Topics Book I.14.**

Of propositions and problems there are[15] three divisions: for some are *ethical* propositions, some are on *natural philosophy*, while some are *logical*.

- Propositions such as the following are ethical, e.g. 'Ought one rather to obey one's parents or the laws, if they disagree?';
- such as this are logical, e.g. 'Is the knowledge of opposites the same or not?';
- while such as this are on natural philosophy, e.g. 'Is the universe eternal or not?'

Likewise also with problems. The nature of each of the aforesaid kinds of proposition is not easily rendered in a definition, but we have to try to recognize each of them

[15]to comprehend the matter in outline

> by means of the familiarity attained through induction, examining them in the light of the illustrations given above.
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> For purposes of philosophy we must treat of these things according to their truth, but for dialectic only with an eye to general opinion. All propositions should be taken in their most universal form; then, the one should be made into many. E.g. 'The knowledge of opposites is the same'; next, 'The knowledge of contraries is the same', and that 'of relative terms'. In the same way these two should again be divided, as long as division is possible, e.g. the knowledge of 'good and evil', of 'white and black', or 'cold and hot'. Likewise also in other cases...

7.3. **Prior Analytics, Book I Part I.**

> We must first state the subject of our inquiry and the faculty to which it belongs: its subject is demonstration and the faculty that carries it out demonstrative science. We must next define a premiss, a term, and a syllogism, and the nature of a perfect and of an imperfect syllogism; and after that, the inclusion or non-inclusion of one term in another as in a whole, and what we mean by predicating one term of all, or none, of another...

Logic as in the *Prior Analytics* and *Posterior Analytics* of Aristotle is a framework within which we formulate our thoughts justifying statements we argue are true. It's, at the very least, the scaffolding for building such arguments and expressing such statements. For example, in Book I of the *Prior Analytics* Aristotle defines what he refers to as a *syllogism*:

> A syllogism is an argument (*logos*[16]) in which, certain things being posited, something other than what was laid down results by necessity because these things are so. (24b19-20)

Mathematical logic in its more contemporary dress is an offshoot of this.

[16]But see Stephen Read's commentary on the translation of the word *logos* as'argument' in this quotation: `https://www.st-andrews.ac.uk/~slr/The_Syllogism.pdf`

7.4. **Prior Analytics, Book I Part IV.**

> After these distinctions we now state by what means, when, and how every syllogism is produced; subsequently we must speak of demonstration. Syllogism should be discussed before demonstration because syllogism is the general: the demonstration is a sort of syllogism, but not every syllogism is a demonstration...

8. Recognition of Truth

Aristotle: Posterior Analytics, Book I Part IV

> All instruction given or received by way of argument proceeds from pre-existent knowledge. This becomes evident upon a survey of all the species of such instruction. The mathematical sciences and all other speculative disciplines are acquired in this way, and so are the two forms of dialectical reasoning, syllogistic and inductive; for each of these latter make use of old knowledge to impart new, the syllogism assuming an audience that accepts its premisses, induction exhibiting the universal as implicit in the clearly known particular. Again, the persuasion exerted by rhetorical arguments is in principle the same, since they use either example, a kind of induction, or enthymeme, a form of syllogism.
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> The pre-existent knowledge required is of two kinds. In some cases admission of the fact must be assumed, in others comprehension of the meaning of the term used, and sometimes both assumptions are essential. Thus, we assume that every predicate can be either truly affirmed or truly denied of any subject, and that 'triangle' means so and so; as regards 'unit' we have to make the double assumption of the meaning of the word and the existence of the thing. The reason is that these several objects are not equally obvious to us. Recognition of a truth may in some cases contain as factors both previous knowledge and also knowledge acquired simultaneously with that recognition-knowledge, this latter, of the particulars actually falling under the universal and therein already virtually known. For example, the student knew beforehand that the angles of every triangle are equal to two right angles; but it was only at the actual moment

> at which he was being led on to recognize this as true in the instance before him that he came to know 'this figure inscribed in the semicircle' to be a triangle. For some things (viz. the singulars finally reached which are not predicable of anything else as subject) are only learnt in this way, i.e. there is here no recognition through a middle of a minor term as subject to a major. Before he was led on to recognition or before he actually drew a conclusion, we should perhaps say that in a manner he knew, in a manner not...

9. Plato:

9.1. **Republic Book VI [490b].** [*Isn't it*]... the nature of the real lover of knowledge to strive emulously for true being and ... not linger over the many particulars that are opined to be real,... and the edge of his passion would not be blunted nor would his desire fail till he came into touch with the nature of each thing in itself by that part of his soul to which it belongs to lay hold on that kind of reality—the part akin to it, namely— through that approaching it, and consorting with reality really, he would beget intelligence and truth, attain to knowledge and truly live and grow, and so find surcease from his travail of soul, but not before?

9.2. **Republic Book VI [510], [511] "Divided Line".**

Here is a clean excerpt, with a clear explanation:

`https://www.csus.edu/indiv/e/eppersonm/hist107/documents/An%20Excerpt%20from%20Book%20VI%20of%20Plato's%20Republic.pdf`

10. Francis Bacon, Novum Organum Book 1 I- XXXVI

`https://oll.libertyfund.org/title/bacon-novum-organum`

Part 1. Extended First session

centerline*Readings for September 15: Some 'early' philosophical formats to think about for our discussion about 'Truth'*

- Aristotle:
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  `http://classics.mit.edu/Aristotle/posterior.1.i.html`

- Plato: The Republic Book VI (esp.: [490] and [509] – [511])
  `http://www.perseus.tufts.edu/hopper/text?doc=Perseus%3Atext%3A1999.01.0168%3Abook%3D6&force=y`

- René Descartes: *Rules for the Direction of the Mind.* Specifically, see the excerpt in Section 13[17].

In the readings listed above I suggest that the focus of our discussion be on the *excerpts of those texts* that are quoted in the sections below.

11. Thinking about reasoning: Aristotle: Topics, Book 1

We'll start with *process* (i.e., how to get it) rather than *essence* (i.e., what it 'is') for our discussion of the early (Greek) reflections about Truth.

Aristotle in his *Topics*, *Prior Analytics*, and *Posterior Analytics* establishes a setting, and sketches a format that is a basis for deliberation, discussion, argument, and communication of ideas.

11.1. **The underlying common understanding.**

11.1.1. *(Sensus Communis).*

> Our treatise proposes to find a line of inquiry whereby we shall be able to reason from opinions that are generally accepted about every problem propounded to us, and also shall ourselves, when standing up to an argument, avoid saying anything that will obstruct us.

11.1.2. *Reasoning per se.*

> First, then, *we must say what reasoning is*, and what its varieties are, in order to grasp *dialectical reasoning:* for this is the object of our search in the treatise before us.

[17] I list only the first twelve of Descartes' 21 rules; in any event, Descartes never finished this document.

> Now reasoning is an argument in which, certain things being laid down, something other than these necessarily comes about through them.

11.1.3. *Demonstrative.*

> It is a 'demonstration', when the premisses from which the reasoning starts are true and primary, or are such that our knowledge of them has originally come through premisses which are primary and true.

11.1.4. *Dialectical.*

> Reasoning, on the other hand, is 'dialectical', if it reasons from opinions that are generally accepted. Things are 'true' and 'primary' which are believed on the strength not of anything else but of themselves: for in regard to the first principles of science it is improper to ask any further for the why and wherefore of them; each of the first principles should command belief in and by itself. On the other hand, those opinions are 'generally accepted' which are accepted by every one or by the majority or by the philosophers-i.e. by all, or by the majority, or by the most notable and illustrious of them.

11.1.5. *Reasoning is 'contentious'.*

> ... if it starts from opinions that seem to be generally accepted, but are not really such, or again if it merely seems to reason from opinions that are or seem to be generally accepted. For not every opinion that *seems to be* generally accepted *actually* is generally accepted. For in none of the opinions which we call generally accepted is the illusion entirely on the surface, as happens in the case of the principles of contentious arguments; for the nature of the fallacy in these is obvious immediately, and as a rule even to persons with little power of comprehension. So then, of the contentious reasonings mentioned, the former really deserves to be called 'reasoning' as well, but the other should be called 'contentious reasoning', but not 'reasoning', since it appears to reason, but does not really do so.

11.1.6. *'Mis-reasonings?'*

> Besides all the reasonings we have mentioned there are the mis-reasonings that start from the premisses peculiar to the special sciences, as happens (for example) in the case of geometry and her sister sciences. For this form of reasoning appears to differ from the reasonings mentioned above; the man who draws a false figure reasons from things that are neither true and primary, nor yet generally accepted. For he does not fall within the definition; he does not assume opinions that are received either by every one or by the majority or by philosophers-that is to say, by all, or by most, or by the most illustrious of them-but he conducts his reasoning upon assumptions which, though appropriate to the science in question, are not true; for he effects his misreasoning either by describing the semicircles wrongly or by drawing certain lines in a way in which they could not be drawn...

11.2. **Part 5: We must now say what are 'definition', 'property', 'genus', and 'accident.'**

A **'definition'** is a phrase signifying a thing's essence,
A **'property'** is a predicate which does not indicate the essence of a thing,
A **'genus'** is what is predicated in the category of essence of a number of things exhibiting differences in kind.

> We should treat as predicates in the category of essence all such things as it would be appropriate to mention in reply to the question, "What is the object before you?"; as, for example, in the case of man, if asked that question, it is appropriate to say "He is an animal'."

An **accident** is what belongs as an attribute to a subject without being either its definition or its genus or a property.

11.3. **Part 7: Sameness.**

> First of all we must define the number of senses borne by the term 'Sameness'. Sameness would be generally regarded as falling, roughly speaking, into three divisions. We generally apply the term numerically or specifically or generically-numerically in cases where there is more than one name but only one thing, e.g. 'doublet' and

'cloak'; specifically, where there is more than one thing, but they present no differences in respect of their species, as one man and another, or one horse and another: for things like this that fall under the same species are said to be 'specifically the same'. Similarly, too, those things are called generically the same which fall under the same genus, such as a horse and a man. It might appear that the sense in which water from the same spring is called 'the same water' is somehow different and unlike the senses mentioned above: but really such a case as this ought to be ranked in the same class with the things that in one way or another are called 'the same' in view of unity of species.

11.4. **Part 9: Classes of Predicates.**

Next, then, we must distinguish between the classes of predicates in which the four orders in question are found. These are ten in number:

Essence, Quantity, Quality, Relation, Place,
Time, Position, State, Activity, Passivity.

For the accident and genus and property and definition of anything will always be in one of these categories: for all the propositions found through these signify either something's essence or its quality or quantity or some one of the other types of predicate. It is clear, too, on the face of it that the man who signifies something's essence signifies sometimes a substance, sometimes a quality, sometimes some one of the other types of predicate...

11.5. **Part 14: Ethical/Natural Philosophical/ Logical.**

Of propositions and problems there are[18] three divisions: for some are *ethical* propositions, some are on *natural philosophy*, while some are *logical*.

- Propositions such as the following are *ethical*, e.g. 'Ought one rather to obey one's parents or the laws, if they disagree?';

[18] "to comprehend the matter in outline." writes Aristotle

> - such as this are *logical*, e.g. 'Is the knowledge of opposites the same or not?';
> - while such as this are on *natural philosophy*, e.g. 'Is the universe eternal or not?'
>
> Likewise also with problems. The nature of each of the aforesaid kinds of proposition is not easily rendered in a definition, but we have to try to recognize each of them by means of the familiarity attained through induction, examining them in the light of the illustrations given above.
>
> For purposes of philosophy we must treat of these things according to their truth, but for dialectic only with an eye to general opinion. All propositions should be taken in their most universal form; then, the one should be made into many. E.g. 'The knowledge of opposites is the same'; next, 'The knowledge of contraries is the same', and that 'of relative terms'. In the same way these two should again be divided, as long as division is possible, e.g. the knowledge of 'good and evil', of 'white and black', or 'cold and hot'. Likewise also in other cases...

11.6. **Formal structure of 'Reasoning'.** (Aristotle: Prior Analytics, Book I Part I)

> We must first state the subject of our inquiry and the faculty to which it belongs: its subject is demonstration and the faculty that carries it out demonstrative science. We must next define a *premiss*, a *term*, and a *syllogism*, and the nature of a *perfect* and of an *imperfect* syllogism; and after that, the inclusion or non-inclusion of one term in another as in a whole, and what we mean by predicating one term of all, or none, of another...

Logic as in the *Prior Analytics* and *Posterior Analytics* of Aristotle is a framework within which we formulate our thoughts justifying statements we argue are true. It's, at the very least, the scaffolding for building such arguments and expressing such statements. For example, in Book I of the *Prior Analytics* Aristotle defines what he refers to as a *syllogism*:

> A syllogism is an argument (*logos*[19]) in which, certain things being posited, something other than what was laid down results by necessity because these things are so. (24b19-20)

Aristotle: Prior Analytics, Book I Part IV

> After these distinctions we now state by what means, when, and how every syllogism is produced; subsequently we must speak of demonstration. Syllogism should be discussed before demonstration because syllogism is the general: the demonstration is a sort of syllogism, but not every syllogism is a demonstration...

12. Recognition of Truth

Aristotle: Posterior Analytics, Book I Part IV

> All instruction given or received by way of argument proceeds from pre-existent knowledge. This becomes evident upon a survey of all the species of such instruction. The mathematical sciences and all other speculative disciplines are acquired in this way, and so are the two forms of dialectical reasoning, *syllogistic* and *inductive*; for each of these latter make use of old knowledge to impart new, the syllogism assuming an audience that accepts its premisses, induction exhibiting the universal as implicit in the clearly known particular.[20]

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[19]But see Stephen Read's commentary on the translation of the word *logos* as'argument' in this quotation: `https://www.st-andrews.ac.uk/~slr/The_Syllogism.pdf`

[20]Compare this to Francis Bacon's proclamation in *Novum Organum*:

> The syllogism consists of propositions; propositions of words; words are the signs of notions. If, therefore, the notions (which form the basis of the whole) be confused and carelessly abstracted from things, there is no solidity in the superstructure. Our only hope, then, is in genuine induction.

For background see `https://plato.stanford.edu/entries/francis-bacon/#SciMetNovOrgTheInd`.

> Again, the persuasion exerted by rhetorical arguments is in principle the same, since they use either example, a kind of induction, or enthymeme[21], a form of syllogism.
>
> The pre-existent knowledge required is of two kinds. In some cases admission of the fact must be assumed, in others comprehension of the meaning of the term used, and sometimes both assumptions are essential. Thus, we assume that every predicate can be either truly affirmed or truly denied of any subject, and that 'triangle' means so and so; as regards 'unit' we have to make the double assumption of the meaning of the word and the existence of the thing. The reason is that these several objects are not equally obvious to us.
>
> *Recognition of a truth* may in some cases contain as factors both previous knowledge and also knowledge acquired simultaneously with that recognition-knowledge, this latter, of the particulars actually falling under the universal and therein already virtually known. For example, the student knew beforehand that the angles of every triangle are equal to two right angles; but it was only at the actual moment at which he was being led on to recognize this as true in the instance before him that he came to know 'this figure inscribed in the semicircle' to be a triangle. For some things (viz. the singulars finally reached which are not predicable of anything else as subject) are only learnt in this way, i.e. there is here no recognition through a middle of a minor term as subject to a major. Before he was led on to recognition or before he actually drew a conclusion, we should perhaps say that in a manner he knew, in a manner not...

13. Truth and Method

René Descartes: *Rules for the Direction of the Mind* [22]

(1) The aim of our studies should be to direct the mind with a view to forming true and sound judgements about whatever comes before it.

[21] a syllogism with an unstated premise

[22] The excerpt is taken from a translation by Elizabeth Anscombe and Peter Thomas Geach (Descartes: Philosophical Writings—(1954)).

(2) We should attend only to those objects of which our minds seem capable of having certain and indubitable cognition.

But one conclusion now emerges out of these considerations, viz. not, indeed, that Arithmetic and Geometry are the sole sciences to be studied, but only that in our search for the direct road towards truth we should busy ourselves with no object about which we cannot attain a certitude equal to that of the demonstrations of Arithmetic and Geometry.

(3) Concerning objects proposed for study, we ought to investigate what we can clearly and evidently intuit or deduce with certainty, and not what other people have thought or what we ourselves conjecture. For knowledge can be attained in no other way. We must read the works of the ancients; for it is an extraordinary advantage to have available the labors of so many men, both in order to recognize what true discoveries have already long since been made and -also to become aware of what scope is still left for invention in the various disciplines. There is, however; at the same time a great danger that perhaps some contagion of error, contracted from a too attentive reading of them, may stick to us against our will, in spite of all precautions.

(4) We need a method if we are to investigate the truth of things.

(5) The whole method consists entirely in the ordering and arranging of the objects on which we must concentrate our mind's eye if we are to discover some truth. We shall be following this method exactly if we first reduce complicated and obscure propositions step by step to simpler ones, and then, starting with the intuition of the simplest ones of all, try to ascend through the same steps to knowledge of all the rest.

(6) In order to distinguish the simplest things from those that are complicated and to set them out in an orderly manner, we should attend to what is most simple in each series of things in which we have directly deduced some truths from others, and should observe how all the rest are more, or less, or equally removed from the simplest.

(7) In order to make our knowledge complete, every single thing relating to our undertaking must be surveyed in a continuous and wholly uninterrupted sweep of thought, and be included in a sufficient and well-ordered enumeration.

(8) If in the series of things to be examined we come across something which our intellect is unable to intuit sufficiently well, we

must stop at that point, and refrain from the superfluous task of examining the remaining items.

(9) We must concentrate our mind's eye totally upon the most insignificant and easiest of matters, and dwell on them long enough to acquire the habit of intuiting the truth distinctly and clearly.

(10) In order to acquire discernment we should exercise our intelligence by investigating what others have already discovered, and methodically survey even the most insignificant products of human skill, especially those which display or presuppose order.

(11) If, after intuiting a number of simple propositions, we deduce something else from them, it is useful to run through them in a continuous and completely uninterrupted train of thought, to reflect on their relations to one another, and to form a distinct and, as far as possible, simultaneous conception of several of them. For in this way our knowledge becomes much more certain, and our mental capacity is enormously increased.

(12) Finally we must make use of all the aids which intellect, imagination, sense-perception, and memory afford in order, firstly, to intuit simple propositions distinctly; secondly, to combine correctly the matters under investigation with what we already know, so that they too may be known; and thirdly, to find out what things should be compared with each other so that we make the most thorough use of all our human powers....

14. 'Truth'

(The Republic Book VI [490], [508]-[511])[23]

14.1. **Republic Book VI [490b].**

> [*Isn't it*]... the nature of the real lover of knowledge to strive emulously for true being and ... not linger over the many particulars that are opined to be real,... and the edge of his passion would not be blunted nor would his desire fail till he came into touch with the nature of each thing in itself by that part of his soul to which it belongs to lay hold on that kind of reality— the part akin to it, namely— through that approaching

[23]The Jowett translation:
https://www.gutenberg.org/files/55201/55201-h/55201-h.htm

it, and consorting with reality really, he would beget intelligence and truth, attain to knowledge and truly live and grow, and so find surcease from his travail of soul, but not before?

14.2. **Republic Book VI [508]-[511] "Divided Line".**

Did you ever consider that the objects of sight imply a faculty of sight which is the most complex and costly of our senses, requiring not only *objects of sense*, but also a medium, which is *light*; without which the sight will not distinguish between colours and all will be a blank?

For light is the noble bond between the perceiving faculty and the thing perceived, and the god who gives us light is the sun, who is the eye of the day, but is not to be confounded with the eye of man.

This eye of the day or sun is what I call the child of the good, standing in the same relation to the visible world as the good to the intellectual. When the sun shines the eye sees, and in the intellectual world where truth is, there is sight and light.

Now that which is the sun of intelligent natures, is the idea of good, the cause of knowledge and truth, yet other and fairer than they are, and standing in the same relation to them in which the sun stands to light.

O inconceivable height of beauty, which is above knowledge and above truth!

('You cannot surely mean pleasure,' he said. Peace, I replied.)

And this idea of good, like the sun, is also the cause of growth, and the author not of knowledge only, but of being, yet greater far than either in dignity and power.

'That is a reach of thought more than human; but, pray, go on with the image, for I suspect that there is more behind.'

There is, I said; and bearing in mind our two suns or principles, imagine further their corresponding worlds—one of *the visible*, the other of *the intelligible*;

—you may assist your fancy by figuring the distinction under the image of a line divided into two unequal parts,

and may again subdivide each part into two lesser segments representative of the stages of knowledge in either sphere.

The lower portion of the lower or visible sphere will consist of shadows and reflections, and its upper and smaller portion will contain real objects in the world of nature or of art.

The sphere of the intelligible will also have two divisions:

- one of *mathematics*, in which there is no ascent but all is descent; no inquiring into premises, but only drawing of inferences. In this division the mind works with figures and numbers, the images of which are taken not from the shadows, but from the objects, although the truth of them is seen only with the mind's eye; and they are used as hypotheses without being analysed.
- Whereas in the other division reason uses the hypotheses as stages or steps in the ascent to the idea of *good*, to which she fastens them, and then again descends, walking firmly in the region of ideas, and of ideas only, in her ascent as well as descent, and finally resting in them.

'I partly understand,' he replied; 'you mean that the ideas of science are superior to the hypothetical, metaphorical conceptions of geometry and the other arts or sciences, whichever is to be the name of them; and the latter conceptions you refuse to make subjects of pure intellect, because they have no first principle, although when resting on a first principle, they pass into the higher sphere.'

You understand me very well, I said. And now to those four divisions of knowledge you may assign four corresponding faculties:

- pure intelligence to the highest sphere[24];
- active intelligence to the second;[25]

—these classified as being in the sphere of 'knowledge' (episteme)—

[24]Noeisis

[25]Dianoia

- to the third, faith[26];
- to the fourth, the perception of shadows[27],

—these classified as being in the sphere of 'opinion' (doxa)—

> and the clearness of the several faculties will be in the same ratio as the truth of the objects to which they are related.. . .

likenesses or images [eikones, homoiötha], such as shadows or reflections (509E1, 510A10);

the originals of these likenesses or images, i.e. "all the flora and fauna there are in the world, and every kind of artifact too" (510A5-6; cf. 510B4);

"the realm of beliefs" [ta doxasta, things grasped by doxa] (510A9);

"the realm of knowledge" [ta gnösta, things grasped by gnösis] (510A9).

15. Francis Bacon, Novum Organum Book 1 I- XXXVI

`https://oll.libertyfund.org/title/bacon-novum-organum`

16. Scientific Formats—the nature of experiment, the presentation of data, scientific consensus

17. Mathematical Formats—conjecture, proof, 'Truth beyond proof'

[26]Pistis

[27]Eikasia