

# Copleson, Frederick. (1993). "A History of Philosophy", J. I. Doubleday : New York.

## CHAPTER XXVIII

### LOGIC OF ARISTOTLE

1. ALTHOUGH Aristotle divides philosophy systematically in different ways on different occasions,<sup>1</sup> we may say that the following is his considered view of the matter.<sup>2</sup> (i) Theoretical Philosophy,<sup>3</sup> in which knowledge as such is the end in view and not any practical purpose, is divided into (a) Physics or Natural Philosophy, which has to do with material things which are subject to motion; (b) Mathematics, which has to do with the unmoved but unseparated (from matter); (c) Metaphysics, which has to do with the separated (transcendent) and unmoved. (Metaphysics would thus include what we know as Natural Theology.<sup>4</sup>) (ii) Practical Philosophy (πρακτική) deals principally with Political Science, but has as subsidiary disciplines Strategy, Economics and Rhetoric, since the ends envisaged by these disciplines are subsidiary to and depend on that of Political Science.<sup>5</sup> (iii) Poetical Philosophy (τεωρίᾳ) has to do with production and not with action as such, as in the case with Practical Philosophy (which includes ethical action in the wider or political sense), and is to all intents and purposes the Theory of Art.<sup>6</sup>

2. The Aristotelian Logic is often termed "formal" logic. Inasmuch as the Logic of Aristotle is an analysis of the forms of thought (hence the term *Analytic*), this is an apt characterisation; but it would be a very great mistake to suppose that for Aristotle logic concerns the forms of human thinking in such an exclusive way that it has no connection with external reality. He is chiefly concerned with the forms of proof, and he assumes that the conclusion of a scientific proof gives certain knowledge concerning reality. For example, in the syllogism "All men are mortal, Socrates is a man, therefore Socrates is mortal," it is not merely that the conclusion is deduced correctly according to the

<sup>1</sup> Cf. *Top.*, A 14, 105 b 19 ff.

<sup>2</sup> Cf. *Top.*, Z 6, 145 a 15 ff. *Metaph.*, E 1, 1025 b 25.

<sup>3</sup> Cf. *Metaph.*, K 7, 1064 b 1 ff.

<sup>4</sup> Cf. *Eth. Nic.*, A 1, 1094 a 18 ff.

<sup>5</sup> Determining the rank of the branches of philosophy according to the rank of their object, Aristotle gives the palm to "Theology." Cf. *Metaph.*, K 7, 1064 b 1 ff. It has been argued that the threefold division has no adequate warrant in Aristotle's own words and that he conceived the *Poetics*, not as a philosophical aesthetic theory, but simply as a practical manual.

formal laws of logic: Aristotle assumes that the conclusion is verified in reality. He presupposes, therefore, a realist theory of knowledge and for him logic, though an analysis of the forms of thought, is an analysis of the thought that thinks reality, that reproduces it conceptually within itself, and, in the true judgment, makes statements about reality which are verified in the external world. It is an analysis of human thought in its thought about reality, though Aristotle certainly admits that things do not always exist in extramental reality precisely as they are conceived by the mind, e.g. the universal.

This may be clearly seen in his doctrine of the Categories. From the logical viewpoint the Categories comprise the ways in which we think about things—for instance, predicating qualities of substances—but at the same time they are ways in which things actually exist: things are substances and actually have accidents. The Categories demand, therefore, not only a logical but also a metaphysical treatment. Aristotle's Logic, then, must not be likened to the Transcendental Logic of Kant, since it is not concerned to isolate *a priori* forms of thought which are contributed by the mind alone in its active process of knowledge. Aristotle does not raise the "Critical Problem": he assumes a realist epistemology, and assumes that the categories of thought, which we express in language, are also the objective categories of extramental reality.

3. In the *Categories* and in the *Topics* the number of Categories or *Fraedicamenta* is given as ten: οὐδεῖα or τί τοι (man or horse); πολὺ (three yards long); πολὺ (white); πρός τι (double); πών (in the market-place); πτοεῖ (last year); κείθει (lies, sits); ἔχειν (armed, with shoes); ποτεῖ (cuts); νέκτειν (is cut or burnt). But in the *Posterior Analytics* they appear as eight, ξεῖθει or *Situs* and ἔγειν or *Habitus* being subsumed under the other categories.<sup>1</sup> Aristotle, therefore, can hardly have looked upon the deduction of the Categories as definitive. Nevertheless, even if the tenfold division of the Categories was not looked upon as definitive by Aristotle, there is no reason to suppose that he regarded the list of Categories as a haphazard list, devoid of structural arrangement. On the contrary, the list of the Categories constitutes an orderly arrangement, a classification of concepts, the fundamental types of concepts governing our scientific knowledge. The word κατηγορεῖν means to predicate, and in the *Topics* Aristotle considers

the Categories as a classification of predicates, the ways in which we think of being as realised. For example, we think of an object either as a substance or as a determination of substance, as falling under one of the nine categories that express the way in which we think of substance as being determined. In the *Categories* Aristotle considers the Categories rather as the classification of genera, species and individuals from the *summum genus* down to individual entities. If we examine our concepts, the ways in which we represent things mentally, we shall find, for example, that we have concepts of organic bodies, of animals (a subordinate genus), of sheep (a species of animal); but organic bodies, animals, sheep, are all included in the category of substance. Similarly, we may think of colour in general, of blueness in general, of cobalt; but colour, blueness, cobalt, all fall under the category of quality. The Categories, however, were not in Aristotle's mind simply modes of mental representation, moulds of concepts: they represent the actual modes of being in the extramental world, and form the bridge between Logic and Metaphysics (which latter science has Substance as its chief subject).<sup>1</sup> They have, therefore, an ontological as well as a logical aspect, and it is perhaps in their ontological aspect that their orderly and structural arrangement appears most clearly. Thus, in order that being may exist, substance must exist: that is, as it were, the starting-point. Only singulars actually exist outside the mind, and for a singular to exist independently in this way it must be a substance. But it cannot exist merely as a substance, it must have accidental forms. For instance, a swan cannot exist unless it has some colour, while it cannot have colour unless it has quantity, extension. At once, then, we have the first three Categories—substance, quantity, quality, which are intrinsic determinations of the object. But the swan is the same in specific nature as other swans, is equal in size or unequal in size to other substances; in other words, it stands in some relation to other objects. Moreover, the swan as a physical substance, must exist in a certain *place* and at a certain *period*, must have a certain *posture*. Again, material substances, as belonging to a cosmic system, *act* and are *acted upon*. Thus some of the Categories belong to the object considered in itself, as its *intrinsic* determinations, while others belong to it as *extrinsic* determinations, affecting it as standing in relation to other material objects. It will be seen, therefore, that even if the

<sup>1</sup> Cf. e.g. *Anal. Post.*, A 22, 83 a 21 ff., b 15 ff.

<sup>1</sup> *Metaph.*, 1017 a 23-4. δοκούσις γέγονται, τοποτοπούσι το εἰλικρινέστερον.

number of the Categories could be reduced by subsuming certain Categories under others, the principle whereby the Categories are deduced is by no means merely a haphazard principle.

In the *Posterior Analytics* (in connection with definition) and in the *Topics*, Aristotle discusses the *Predicables* or various relations in which universal terms may stand to the subjects of which they are predicated. They are *genus* (*γένος*), *species* (*ειδος*), *difference* (*διαφορά*), *property* (*τύπος*), *accident* (*ουκεβηπόνος*). In the *Topics* (I, c. 8), Aristotle bases his division of the predicables on the relations between subject and predicate. Thus if the predicate is co-extensive with the subject, it either gives us the essence of the subject or a property of the subject; while if it is not co-extensive with the subject, it either forms part of the attributes comprised in the definition of the subject (when it will be either a genus or a difference) or it does not do so (in which case it will be an accident).

Essential definitions are strict definitions by genus and difference, and Aristotle considered definition as involving a process of division down to the *infimae species* (cf. Plato).<sup>1</sup> But it is important to remember that Aristotle, aware that we are by no means always able to attain an essential or real definition, allows for nominal or descriptive definitions;<sup>2</sup> even though he had no high opinion of them, regarding as he did essential definitions as the only type of definition really worthy of the name. The distinction, however, is of importance, since in point of fact, we have to be content, in regard to the natural objects studied by physical science, with distinctive or characteristic definitions, which even if they approach the ideal more closely than Aristotle's nominal or descriptive definition, do not actually attain it.

(Some writers have emphasised the influence of language on philosophy. For instance, because we speak of the rose as being red (and this is necessary for purposes of social life and communication), we are naturally inclined to think that in the actual objective order there is a quality or accident, "redness," which inheres in a thing or substance, the rose. The philosophical categories of substance and accident can thus be traced back to the influence of words, of language. But it should be remembered that language follows thought, is built up as an expression of thought, and this is especially true of philosophical terms. When Aristotle laid down the ways in which the mind thinks about

things, it is true that he could not get away from language as the medium of thought, but the language follows thought and thought follows things. Language is not an *a priori* construction.)

4. Scientific knowledge *par excellence* means for Aristotle, deducing the particular from the general or the conditioned from its cause, so that we know both the cause on which the fact depends and the necessary connection between the fact and its cause. In other words, we have scientific knowledge when we know the cause on which the fact depends, as the cause of that fact and of no other, and further, that the fact could not be other than it is.<sup>3</sup>

But though the premisses are prior to the conclusion from the logical viewpoint, Aristotle clearly recognises that there is a difference between logical priority or priority *in se* and epistemological priority *quoad nos*. He expressly states that "‘prior’ and ‘better known’ are ambiguous terms, for there is a difference between what is prior and better known in the order of being and what is prior and better known to man. I mean that objects nearer to sense are prior and better known to man; objects without qualification prior and better known are those further from sense."<sup>4</sup> In other words, our knowledge starts from sense, i.e. from the particular, and ascends to the general or universal. "Thus it is clear that we must get to know the primary premisses by induction; for the methods by which even sense-perception implants the universal is inductive."<sup>5</sup> Aristotle is thus compelled to treat not only of deduction, but also of induction. For instance, in the aforementioned syllogism the major premiss, "All men are mortal," is founded on sense-perception, and Aristotle has to justify both sense-perception and memory, since both are involved. Hence we have the doctrine that the senses *as such* never err: it is only the judgment which is true or false.

Thus if a patient who is suffering from *delirium tremens* "sees" pink rats, the senses as such do not err; error arises when the patient judges that the pink rats are "out there," as real extra-mentally-existing objects. Similarly, the sun *appears* smaller than the earth, but this is not an error on the part of the senses; indeed if the sun appeared as *larger* than the earth, the senses would be out of order. Error arises when, through a lack of

<sup>1</sup> *Anal. Post.*, B 13.

<sup>2</sup> *Anal. Post.*, B 8 and 10.

<sup>3</sup> *Anal. Post.*, I 2, 71 b.

<sup>4</sup> *Anal. Post.*, II 19, 100 b.

<sup>5</sup> *Anal. Post.*, 71 b-72 a.

astronomical knowledge, a man *judges* that the sun is objectively smaller than the earth.

5. In the *Analytics*, therefore, Aristotle treats, not only of scientific proof, demonstration or deduction, but also of induction (*τριγώνη*). Scientific induction means for him *complete* induction, and he expressly states that "induction proceeds through an enumeration of all the cases."<sup>1</sup> *Incomplete* induction is of use especially to the orator. Aristotle used experiment but did not elaborate a scientific methodology of induction and the use of hypothesis. Although he admits that "syllogism through induction is clearer to us,"<sup>2</sup> his ideal remains that of deduction, of syllogistic demonstration. The analysis of deductive processes he carried to a very high level and very completely; but he cannot be said to have done the same for induction. This was no doubt only natural in the Ancient World, where mathematics was so much more highly developed than natural science. Nevertheless, after stating that sense-perception as such cannot attain the universal, Aristotle points out that we may observe groups of singulars or watch the frequent recurrence of an event, and so, by the use of the abstract reason, attain to knowledge of a universal essence or principle.<sup>3</sup>

6. In the *Prior Analytics* Aristotle inquires into the forms of inference, and he defines the syllogism as "discourse in which certain things being stated, something other than what is stated follows of necessity from their being so."<sup>4</sup> He discusses the three figures of the syllogism, etc.:

- (i) The Middle Term is Subject in one premiss and Predicate in the other. Thus: M is P, S is M, therefore S is P. Every animal is a substance. Every man is an animal. Therefore every man is a substance.
- (ii) The Middle Term is Predicate in both premisses. P is M, S is not M, therefore S is not P.
- (iii) The Middle Term is Subject in both premisses. Thus: M is P, M is S, therefore S is P.

Every man is risible. But every man is an animal. Therefore no horse is a man.

In the *Topics*<sup>5</sup> Aristotle distinguishes *demonstrative* reasoning

(i.e. "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") from *dialectical* reasoning (i.e. reasoning "from opinions that are generally accepted," i.e. "by all, or by the majority, or by the most notable and illustrious of them"). He adds a third kind of reasoning, eristic or "contentious" reasoning (which "starts from opinions that seem to be generally accepted, but are not really such"). This third is dealt with at length in the *De Sophisticis Elenchis*, where Aristotle examines, classifies and solves the various kinds of fallacy.

7. Aristotle saw clearly that the premisses in deduction themselves need proof, while on the other hand if *every* principle needs proof, we shall be involved in a *processus in infinitum* and *nothing* will be proved. He held, therefore, that there are certain principles which are known intuitively and immediately without demonstration.<sup>6</sup> The highest of these principles is the *principle of contradiction*. Of these principles no proof can be given. For example, the logical form of the principle of contradiction—"Of two propositions, one of which affirms something and the other denies the same thing, one must be true and the other false"—is not a proof of the principle in its metaphysical form—e.g. "The same thing cannot be an attribute and not an attribute of the same subject at the same time and in the same way." It simply exhibits the fact that no thinker can question the principle which lies at the basis of all thinking and is presupposed.<sup>7</sup>

We have, therefore, (i) first principles, perceived by *νοῦς*; (ii) what is derived necessarily from first principles, perceived by *τριγώνην*; and (iii) what is contingent and could be otherwise, the subject of *δεξιά*. But Aristotle saw that the major premiss of a syllogism, e.g. All men are mortal, cannot be derived immediately from the first principles: it depends also on induction. This involves a realist theory of universals, and Aristotle declares that induction exhibits the universal as implicit in the clearly known particular.<sup>8</sup>

8. In a book of this nature it would scarcely be desirable to enter upon a detailed exposition and discussion of the Aristotelian logic, but it is necessary to emphasise the very great contribution that Aristotle made to human thought in this branch of science,

<sup>1</sup> *Anal. Prior.*, II 23, 68 b. <sup>2</sup> *Anal. Prior.*, II, 23, 68 b. <sup>3</sup> *Anal. Post.*, I, 31.

<sup>4</sup> *Anal. Prior.*, I, 1, 24 b. <sup>5</sup> I, 100 a b.

<sup>6</sup> Cf. *Anal. Post.*, I 3, 72 b. <sup>7</sup> Cf. *Metaph.*, 1005 b 35 ff.

<sup>8</sup> *Anal. Post.*, A 1, 71 a.

especially in regard to the syllogism. That logical analysis and division had been pursued in the Academy, in connection with the theory of Forms, is quite true (one has only to think of the discussions in the *Sophist*); but it was Aristotle who first constituted logic ("Analytics") as a separate science, and it was Aristotle who discovered, isolated and analysed the fundamental form of inference, namely, the syllogism. This is one of his lasting achievements, and even if it were his only positive achievement, it would still be one for which his name would rightly be held in lasting memory. One could not justifiably assert that Aristotle made a complete analysis of all deductive processes, for the classical syllogism supposes (i) three propositions, each in subject and predicate form; (ii) three terms, from which each proposition takes both subject and predicate, and, given this situation, determines the cases in which two of the propositions entail the third in virtue, either (a) of logical form only, or (b) of an adjoined existence assertion, as with *Darapti*. Aristotle, for instance, did not consider that other form of inference discussed by Cardinal Newman in his *Grammar of Assent*, when the mind derives conclusions, not from certain propositions but from certain concrete facts. The mind considers these facts and, after forming a critical estimate of them, infers a conclusion, which is not a general proposition (as in induction proper), but a particular conclusion such as, e.g., "The prisoner is innocent." It is certainly true that general propositions are implied (e.g. evidence of a certain type is compatible, or incompatible, with the innocence of an accused man), but the mind is not actually concerned to elicit the implication of presupposed propositions so much as to elicit the implications of a number of concrete facts. St. Thomas Aquinas recognised this type of reasoning, and attributed it to the *vis cognitiva*, also called *ratio particularis*.<sup>1</sup> Moreover, even in regard to that form of inference which Aristotle analysed, he did not really consider the question, whether these general principles from which it starts are simply formal principles or have ontological import. The latter view seems to be assumed for the most part.

But it would be absurd to criticise Aristotle adversely for not having made a complete study of all the forms of inference, and for not having clearly raised and solved all the questions that might be raised in connection with the forms of human thought:

the task that he did undertake to accomplish, he accomplished very well, and the group of his logical treatises (later termed the *Organon*) constitute a masterpiece of the human mind. It is not without reason, we may be sure, that Aristotle represents himself as being a pioneer in logical analysis and systematisation. At the close of the *De Sophisticis Elenchis* he remarks, that while much had been said by others before him on the subject of Rhetoric, for instance, he had no anterior work to speak of on the subject of reasoning, which he might have used as a foundation, but was compelled to break what was practically new ground. It was not the case that systematic analysis of the reasoning-processes had been already completed in part: nothing at all existed in this line. The professors of rhetoric had given their pupils an empirical training in "contentious arguments," but they never worked out a scientific methodology or a systematic exposition of the subject: he had had to start from the beginning by himself. Aristotle's claim in reference to the particular subject-matter of the *De Sophisticis Elenchis* is doubtless substantially just in regard to the discovery and analysis of the syllogism in general.

Occasionally one hears people speak as though modern logical studies had deprived the traditional Aristotelian logic of all value, as though one could now relegate the traditional logic to the lumber-room of museum pieces, of interest only to the philosophical antiquarian. On the other hand, those who have been brought up according to the Aristotelian tradition may be tempted to display a mistaken loyalty to that tradition by attacking, e.g. modern symbolic logic. Either extreme is in fact unwarranted, and it is necessary to adopt a sane and balanced position, recognising indeed the incompleteness of the Aristotelian logic and the value of modern logic, but at the same time refusing to discredit the Aristotelian logic on the ground that it does not cover the whole province of logic. This sane and balanced position is the position maintained by those who have made a deep study of logic, a point that needs to be emphasised lest it be thought that it is only Scholastic philosophers, speaking *pro domo sua*, who in the present age still attach any value to the logic of Aristotle. Thus, while affirming, and rightly affirming, that "it is no longer possible to regard it as constituting the whole subject of deduction," Susan Stebbing admits that "the traditional syllogism retains its value";<sup>1</sup> while Heinrich Scholz declares that "the

<sup>1</sup> *Ia*, 78, 4. Cf. *IIa*, *IIae*, 2, 1.

<sup>1</sup> Susan Stebbing, *A Modern Introd. to Logic*, p. 102. (London, 1933.)

Aristotelian *Organon* is to-day still the most beautiful and instructive introduction to logic ever written by man."<sup>1</sup> Modern symbolic logic may be an addition, and a very valuable addition, to the logic of Aristotle, but it should not be regarded as a completely opposite counter thereto: it differs from non-symbolic logic by its higher degree of formalisation, e.g. by the idea of propositional functionality.

9. This necessarily brief and curtailed treatment of the Aristotelian logic may profitably be concluded by a summary of a few characteristic topics discussed in the *Organon*, a summary from which will appear the wide range of the Aristotelian logical analysis. In the *Categories*, Aristotle treats of the range of variability of Subject and *Predicate*, in the *De Interpretatione* of the opposition of propositions, modal and assertoric, which leads him into an interesting discussion of excluded middle in Chapters 7 and 10. In the first book of the *Prior Analytics* he discusses the conversion of pure propositions and of necessary and contingent propositions, analyses the syllogisms in the three figures, and gives rules for constructing or discovering syllogisms dealing with, e.g. oblique inference (Ch. 36), negation (Ch. 46), proofs *per impossible* and *ex hypothesi* (Chs. 23 and 44). In the second book Aristotle deals with the distribution of truth and falsity between premisses and conclusion, the defects in the syllogism, induction in a narrow sense, through "enumeration of all the cases" (Ch. 23), the enthymeme, etc.

The first book of the *Posterior Analytics* treats of the structure of a deductive science and its logical starting-point, the unity, diversity, distinction and logical ranking of sciences, ignorance, error and invalidity; while the second book is concerned with definitions, essential and nominal, the difference between definition and demonstration, the indemonstrability of the essential nature, the way in which basic truths become known, etc. The *Topics* is concerned with the predicates, definition, the technique of proof or the practice of dialectic, the *De Sophisticis Elenchis* with the classification of fallacies and their solutions.

<sup>1</sup> *Geschichte der Logik*, p. 27. (Berlin, 1931.)