# A. EXPLICATIVE REASONING

## CHAPTER 1

## *THE ARISTOTELIAN SYLLOGISTIC**[LP]

### §1. PRETENSIONS OF DEMONSTRATIVE REASONING

445. . . . It is easy to over-rate the importance of syllogism. Most of the older logics do that, in teaching that the substance of all reasoning lies in this. It is also easy to under-rate it; as many have done. The truth is, it is an essential element of almost all reasoning, perhaps of all.

A syllogism is a valid, *demonstrative*, *complete*, and *simply eliminative* argumentation.

446. To say that an argumentation is valid is to say that

* From chapter 9 of the *Grand Logic*, 1893. Cf. 3.162ff.

[1] To be well-read, or even fairly versed, in philosophy (no easy accomplishment) it is quite indispensible to have studied Aristotle; and the study of Aristotle may most conveniently begin with the two books of *Prior Analytics*, certainly the most elementary of all his writings. Two books precede these in the traditional arrangement (with which Aristotle himself probably had nothing to do). One of these, the *Predicaments* or *Categories*, is a metaphysico-logical treatise, of which only the outlines are important. The other, the *Peri hermenecias*, is purely logical, but difficult and confused; and the doctrine is not that of the *Analytics*. I should recommend every serious student of logic who can pick out easy Greek without much trouble to read the *Prior Analytics* at any rate, and the *Posterior Analytics* if he can find time. The *Posterior Analytics* is a splendid monument to the human intellect. Both treatises are in very easy Greek; and they have so much influenced medieval thought, and through that our own, that really a man does not understand what is said to him in the streets till he has read them. I would read them out of the Berlin edition; and if you want notes, there can be nothing better than the Greek scholia there given. Then by buying this edition, you have the advantage of having the index constantly at your hand; and it is of inestimable value, every day. Waitz's edition of the *Organon* is good; and Trendelenburg's *Beiträge*, *De Anima*, and little epitome [*Elementa Logices Aristoteleae*] are very valuable. There is a capital little epitome [*Outlines of the Philosophy of Aristotle*] by Wallace, and Grote's *Aristotle* has merit. But Grote is terribly one-sided. In fact, all modern commentators have strong leanings.

it is as truthful as it pretends to be. It is essential to reasoning, as already stated, that it should be accompanied by the reflection that it belongs to a class of reasonings, few or none of which lead from truth to falsity. All reasoning, therefore, makes a pretension; and if that pretension is true, the reasoning is *valid*.

447. *Demonstrative* reasoning pretends to be such that it is logically impossible for the premisses to be true while the conclusion is false. I think it would be just to add that demonstrative reasoning further pretends:

First, that its premisses are logically possible, or at least that the class of propositions to which they are considered as belonging contains possibly true propositions; and,

Second, that its conclusion is not logically necessary, or at least, that the class of propositions to which it is considered as belonging contains propositions not necessarily true.

This, at least, I think would have been Aristotle's way of conceiving the matter, had the question presented itself to him. For instance, if he had been asked what he would say of this reasoning:

> Chameleons assume the color of objects upon which they rest,
> ∴ Everything is what it is,

I think he would have said, this is no reasoning at all. Granted that the premiss cannot be true while the conclusion is false, because the conclusion cannot be false at all, reasoning pretends that there is some connection between premiss and conclusion, so that if the fact were the opposite of what is stated in the premiss, the conclusion would not necessarily be true. I think Aristotle would have made the same strictures upon an argument like this:

> Some parts are greater than their wholes;
> ∴ The eating of green fruit proves invariably fatal.

Such an argument cannot lead from true to false, because the premiss cannot be true. But if the reasoning pretends, as it seems to do, that from one thing being in a certain relation to another, it is safe to conclude a proposition about a totally different subject, in that sense it is false.

448. But although I think Aristotle or any other man of good sense would take this view, I propose to reject it, and to consider both the above reasonings as sound. My reason is, that such things are of no practical importance whatever — for as long as reasoning does not lead us astray, the whole purpose of logic is fulfilled — and to admit these reasonings as sound simplifies very considerably the whole doctrine of syllogism. In this I am by no means alone. Even in ancient times, many logicians took the same ground. . . .

449. A *complete* argument is one which professes to be not only necessary, but logically necessary.[1]

450. An *eliminative* argumentation is one which mentions something in the premisses in two opposite ways, so that it disappears from the conclusion. When we argue:

Washington was a high-minded politician;
∴ It is possible for a politician to be high-minded,

the argumentation is not eliminative. For what is dropped is mentioned but once. Again we may argue [that in:]

All men die;
∴ Holy men (if there are any) die,

we drop nothing, but insert something. Once more we may argue:

There are women whom all men reverence,
∴ Every man reverences some woman or another.

Here we neither drop nor insert. All these non-eliminative inferences are usually called *immediate inferences* by logicians; and have received very little attention. But Barbara and all eliminative inferences are said to be *mediate*. This terminology is ill-considered. Thus, the inference:

[1] An *incomplete* argumentation is properly called an *enthymeme*, which is often carelessly defined as a syllogism with a suppressed premiss, as if a sorites, or complex argumentation, could not equally give an enthymeme. The ancient definition of an *enthymeme* was "a rhetorical argumentation," and this is generally set down as a second meaning of the word. But it comes to the same thing. By a rhetorical argumentation was meant one not depending upon logical necessity, but upon common knowledge as defining a sphere of possibility. Such an argument is rendered logical by adding as a premiss that which it assumes as a leading principle.

Any two infinite planes have a line of intersection;

∴ Any three infinite planes have three lines of intersection,

is not eliminative, yet it plainly arises from steps of argumentation. We say of the three planes, A, B, C, that A and B, A and C, and B and C are pairs, each having an intersection, and we count three of these pairs. No logician has ever made out, or pretended to make out, that there is any sort of elimination between three premisses. Hence undecomposable eliminative arguments (not counting mere omissions) have two premisses each.

451. That the putting of the two premisses together is a distinct act of thought, so that the reasoning;

All men are mortal,
All patriarchs are men;
∴ All patriarchs are mortal,

really consists of these two steps:

All men are mortal,
All patriarchs are men;
∴ All men are mortal, and all patriarchs men;
∴ All patriarchs are mortal;

would be regarded by the ordinary logician as hair-splitting. Yet it is just in bringing the premisses together that all the difficulty lies! This preliminary uniting of the premisses is called *copulation*, or *colligation*.[1] Even between the copulate premiss and the conclusion another stage of thought might be inserted, which will appear if we vary one of the premisses thus:

All patriarchs are men, and all sinners are mortal;
∴ If all men are sinners, all patriarchs are mortal;
∴ All patriarchs are mortal.

[1] The latter term is more familiar to our generation, having been used by Whewell [*Novum Organum Renovatum*, II, iv]. But the former is the more legitimate historically. *Copulatum* with Aulus Gellius (XVI. viii. 10) translates the Stoical συμπεπλεγμένον in this sense. Conjunctions like *et* are called *copulative* by Priscian [*Institutiones Grammaticae*, lib. xvi, cap. 1]. Abelard uses *copulare*. We might use *colligation* where the propositions brought together are of one nature and function. But in syllogism, this is not the case. However, if the mood Darapti be admitted, it consists merely in compounding two premisses and dropping a term from the result. This will appear below.

This last step is enthymematic. It wants, to make it logical, the expression of the leading principle, "All men are sinners." But put *men* in place of sinners, and this becomes a logical principle, not needing to be set forth as a premiss. It seems, however, that logicians recognize no difference between saying, "If all men are men, A is true," and saying directly "A is true"; and I suppose they are right. We cannot recognize logical formulæ as, properly speaking, assertions.[1]

## §2. RULES AND CASES

452. . . . In order to get at the real why and wherefore of Aristotle's choice of propositional forms, whatever he may himself have understood it to be, we must go back to this postulate:

*We cannot know anything except it be a uniformity.*

I am not pretending the uniformity or our knowledge need be perfect. Nor am I pretending we cannot become aware of a breach of uniformity. One uniformity may constitute a breach in another. I am simply suggesting, first, that an event altogether out of order and presenting no regularity could not come to our knowledge at all and second, that only in respect to its being orderly can we know it. I do not care to insist here upon the truth of this postulate. It would take me too far afield. I merely say that if it be granted, there seems to be a good reason for Aristotle's propositional forms; but if not, I am unable to defend the system.

A uniformity is a consequence. All we know is that from one thing another thing follows. Those two things themselves, when they come to be carefully thought out, are seen to be consequences, and so on indefinitely. I next ask that it be granted that there is an important class of inferences which have each of them more than one premiss. Of these, considering that each premiss judges or asserts that one thing follows

[1] What Kant calls an explicative, or analytical, judgment is either no judgment at all, because void of content (to use his phrase), or else it sets forth distinctly in the predicate what was only indistinctly thought (that is, not actually thought at all) in the subject. In that case, it is really synthetic, and rests on experience; only the experience on which it rests is mere internal experience — experience of our own imaginations. Association by resemblance, and association by contiguity: all lies in that great distinction.

from another, it is plain that the simplest is: from A follows B and from B follows C; and therefore from A follows C.

453. . . . [In the argument, "Men are sinners, and sinners are miserable; ∴ men are miserable,"] "Sinners are miserable," must be a *Rule* without exceptions. That is, it says in effect, if you take any sinner, you will find he is miserable. The second person appropriately expresses it, because there is a second premiss which draws attention to certain sinners, and virtually picks them out. If the rule has exceptions, all I can say is, that if you let *me* pick out the sinner he will turn out miserable. If I guarantee to find a miserable sinner, of course, I guarantee *there is* a sinner in the world. But if I turn the responsibility of picking out the sinner to you, I do not guarantee you can find one. I only say if you do find one, he will turn out miserable. This is the distinction between Universal and Particular propositions.*

The premiss

"Men are sinners,"

must refer to every character common to all sinners. No matter what the rule about sinners may be which the other premiss lays down, men are here said to be subject to that rule. If it were possible to find, in place of men, a race totally unlike sinners in every respect, the conclusion would hold that they were not miserable, if sinners were so. But that is an absurdity. For since sinners are things we can think about and speak of and reason correctly about sometimes, those other creatures would be creatures we could never think about, nor speak of, nor draw a single correct inference concerning them. For the same reason, while we can speak of angels as wanting *some* characters of sinners, it will not help us to assert they *possess* some characters of sinners, since every conceivable thing resembles every other in some respect — as for instance, in being conceivable or capable of being talked about, etc.[1]

* Cf. Hobbes, *Computation or Logic*, ch. II, §11.

[1] This does not hold in the case of a limited universe of marks. For if we are confining ourselves to a certain line of predicates, there will be nothing absurd in saying that things differ in every respect. In that case, there will be a lexis of predicates, distinct from the phasis. Certainly, if the nature of reasoning is to be explored, it is necessary to take account of cases in which we limit our thought to a particular order of predicates. Some logicians treat the subject as

When I speak of a common character of a class of objects, I must, for the purposes of the inference in Barbara, mean a general rule true of all that class. Now, if I say, you can take what rule you please applicable to all sinners, and it will be found applicable to men, I am not guaranteeing that there is any general rule true of all sinners. But when I say, I could find you a rule true of all sinners that does not hold good of all women (not, for instance, of the Blessed Virgin), I have committed myself to the proposition that there is such a rule. This is the distinction between *Affirmative* and *Negative* propositions. An affirmative proposition speaks of any general rule there may be, no matter what, while a negative says there is a rule and says that such a one can be elected so as to break down if applied to a certain subject (outside the class to which the rule refers).

454. We thus see how syllogistic theory calls for precisely the formal distinctions of propositions that Aristotle draws, and needs no others.

## §3. THE QUADRANT

455. The distinction between Universal and Particular propositions is said to be the distinction in Quantity; that between Affirmative and Negative propositions the distinction in *Quality*. Such is the traditional terminology.[1] But this is a terrible abuse of the important words *quantity* and *quality*, the inconvenience of which is felt in studying the *Critic of the Pure Reason*. Therefore, notwithstanding their having a generation of occupancy for every card in the whist-pack, and one for the joker too, I for one shall vote to eject them. Let us say Universals and Particulars differ in *Lexis*, Affirmatives and

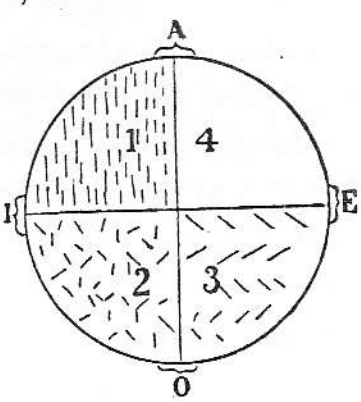
"extra-logical"; but that only means it is outside the scope of their own studies. If a mathematician should choose to characterize the differential calculus as "extra-mathematical," he would exhibit the same determination to keep his science small and simple that animates many of the logicians.

But although the limited universe of marks is not for me extra-logical, I think it is proper to exclude it from elementary syllogistic, for the reason that it is one of the simplest conceivable instances of the logic of relatives, and when that is treated this problem is virtually solved, even if it be not directly attended.

[1] It dates from Apuleius, and is more assified than golden. *Universal* and *Particular* have the same origin. *Affirmative* and *Negative* are words manufactured by Boethius. [See Prantl *op. cit.*, I, 691.]

Negatives in *Phasis*.[1] Lexis and Phasis are tell-way and say-way. Lexis is from λέγειν, to pick out, and also to tell; it is the mode of picking out, or of reckoning. Phasis is saying, in the sense of: "What do you say? Yes or No?"; being the base of κατάφασις, affirmation, and ἀπόφασις, negation. I really see no objection to them, except their novelty. For reversal of Lexis I shall use *metalexis*; for reversal of Phasis, *metaphasis*, though the meaning is nearly that of the Greek ἀντίφασις.

456. . . . Having taken the Diodoran, in opposition to the Philonian view of validity, Aristotle must for consistency hold the universal Affirmative implies the existence of its subject. . . . He must understand: "Some philosopher's stones are red" as not asserting the existence of any philosopher's stone. . . . As the distinction between Universal and Particular propositions concerns the subject, so the distinction between Affirmative and Negative ought, for the sake of symmetry, concern the predicate; so that the difference between asserting and not-asserting the existence of the subject ought to be the distinction between Universals and Particulars, not between Affirmatives and Negatives. Universal propositions do not, while particular propositions do, imply the existence of their subjects. The following figure illustrates the precise sense here assigned to the four forms A, E, I, O.




In the quadrant marked 1 there are lines which are all vertical; in the quadrant marked 2 some lines are vertical and some not; in quadrant 3 there are lines none of which are

[1] From φημί, not φαίνω; therefore nothing to do with phase.

vertical; and in quadrant 4 there are no lines. Now, taking *line* as subject and *vertical* as predicate,

A is true of quadrants 1 and 4 and false of 2 and 3.
E is true of quadrants 3 and 4 and false of 1 and 2.
I is true of quadrants 1 and 2 and false of 3 and 4.
O is true of quadrants 2 and 3 and false of 1 and 4.

Hence, A and O precisely deny each other, and so do E and I. But any other pair of propositions may be both true, or both false, or either true while the other is false.

457. Quadrant 1 includes the case in which the predicate covers the whole *universe* of discourse;[1] so that there is this intrinsic distinction between Affirmatives and Negatives, that the latter deny their predicates to be necessary, which the former permit; just as there is this intrinsic distinction between Universals and Particulars, that the latter assert the existence of their subjects, which the former do not insist upon.

458. There are some languages which take the negative particle in such a sense that a repetition of it is intensive; but I shall understand the negativing of a proposition to be a reversal of the above diagram across its sinister diagonal, interchanging quadrants 3 and 1, so that All S is not-not-P shall mean, All S is P. And in like manner, I shall use the word *some*, in such a sense that a repetition of it is not sinister, but to signify a reversal of the diagram across the dexter diagonal, interchanging quadrants 2 and 4, so that Some-some-S is P shall mean All S is P. This I do for the sake of symmetry; at the same time, it is easy to give an intelligible sense to it. To say: "Every S is P" is to say: "An S, even if one of the worst cases is selected, will be identical with a P, favorably chosen." To say: "Some S is P" is to say: "An S, if not one of the worst is chosen, will be identical with a P favorably chosen." But to say: "An S, if not other than one of the worst is chosen, will be identical with a P favorably chosen," reproduces the universal. By "favorably" is to be understood, favorably to the identity, but by the "worst cases" are to be understood those most calculated to overthrow the assertion. To say: "An S, if no one of the worst is selected, will be

[1] The term *universe*, now in general use, was introduced by De Morgan in 1846. *Cambridge Philosophical Transactions*, VIII, 380.

identical with a P unfavorably chosen," implies that every P is an S, just as "Any not-S is not P" implies the same thing. So to say: "An S, even if one of the worst cases is selected, is not identical with a P not favorably selected," is as much as to say that some P is not S, just as "Some not-S is P" implies the same thing. This meaning of the word "some" certainly departs very far indeed from the ordinary usage of speech. But that is nothing: it is perfectly intelligible, and is taken so as to give balance and symmetry to the logical system, which is a matter of the utmost importance, if that system is to fulfill a philosophical function. If the main object of the syllogistic forms were in actual application, to test reasonings as to whose validity or invalidity we found it difficult to decide, as some logicians seem naively to suppose, then their close connection with ordinary habits of thought might be a paramount consideration. But in reality, their main function is to give us an insight into the inward structure of reasoning in general; and for that purpose systematic perfection is indispensable. . . .

459. It is a blunder on Aristotle's part to call the propositions A and E contraries merely because they may both be false, but not both true. They ought to be called *incongruous* or *disparates*, and both these terms are somewhat in use. Subcontraries (a word of Boëthius,* imitating the ὑπεναντία of Ammonius) are propositions of opposite ecphasis but, being particular, both can be true, though both cannot be false. It would be well to follow the usage of those writers who call any two propositions which can logically both be true but not both false, subcontraries. *Contradictories* (Aristotle's ἀντικείμενα, the word *contradictoria* comes from Boëthius)† are two propositions which cannot both be true nor both false, but precisely deny one another. *Subaltern* (a word found in the translation of Porphyry's *Isagoge* by Marius Victorinus in the fourth century‡ Porphyry's word is ὑπάλληλον, but in the present sense first found in Boëthius)§ is a particular proposition which follows by an immediate inference from its corresponding universal to which it is said to be subaltern.

460. But in my system none of the relations shown in the

* See Prantl, *op. cit.*, I, 687 ff.

† *Ibid.*, 687.

‡ *Ibid.*, 661.

§ *Ibid.*, 684, 692.

diagram of Apuleius [the square of opposition] are preserved, except the two pairs of contradictories. All other pairs of propositions may be true together or false together.

A and E, All S is P, and No S is P, are true together when no S exists, and false together when part only of the S's are P. I and O, some S is P, some S is not P, are true and false together under precisely the opposite conditions.

A and I, Any S is P, Some S is P, are true together when there are S's all of which are P, and are false together when there are S's none of which are P. E and O, No S is P, and Some S is not P, are true and false together under precisely the opposite circumstances. . . .