

Chapter II.

Of Ratiocination, Or Syllogism.

§ 1. The analysis of the Syllogism has been so accurately and fully performed in the common manuals of Logic, that in the present work, which is not designed as a manual, it is sufficient to recapitulate, *memoriae causâ*, the leading results of that analysis, as a foundation for the remarks to be afterward made on the functions of the Syllogism, and the place which it holds in science.

To a legitimate syllogism it is essential that there should be three, and no more than three, propositions, namely, the conclusion, or proposition to be proved, and two other propositions which together prove it, and which are called the premises. It is essential that there should be three, and no more than three, terms, namely, the subject and predicate of the conclusion, and another called the middle term, which must be found in both premises, since it is by means of it that the other two terms are to be connected together. The predicate of the conclusion is called the major term of the syllogism; the subject of the conclusion is called the minor term. As there can be but three terms, the major and minor terms must each be found in one, and only one, of the premises, together with the middle term which is in them both. The premise which contains the middle term and the major term is called the major premise; that which contains the middle term and the minor term is called the minor premise.

Syllogisms are divided by some logicians into three *figures*, by others into four, according to the position of the middle term, which may either be the subject in both premises, the predicate in both, or the subject in one and the predicate in the other. The most common case is that in which the middle term is the subject of the major premise and the predicate of the minor. This is reckoned as the first figure. When the middle term is the predicate in both premises, the syllogism belongs to the second figure; when it is the subject in both, to the third. In the fourth figure the middle term is the subject of the minor premise and the predicate of the major. Those writers who reckon no more than three figures, include this case in the first.

Each figure is divided into *moods*, according to what are called the *quantity* and *quality* of the propositions, that is, according as they are universal or particular, affirmative or negative. The following are examples of all the legitimate moods, that is, all those in which the conclusion correctly follows from the premises. A is the minor term, C the major, B the middle term.

FIRST FIGURE.

All B is C No B is C All B is C No B is C All A is B All A is B Some A is B Some A is B therefore therefore therefore therefore All A is C No A is C Some A is C Some A is not C

SECOND FIGURE.

No C is B All C is B No C is B All C is B All A is B No A is B Some A is B Some A is not B therefore therefore therefore therefore No A is C No A is C Some A is not C Some A is not C

THIRD FIGURE.

All B is No B is C Some B is All B is Some B is No B is C C C C not C All B is All B is All B is Some B is All B is Some B is A A A A A A therefore therefore therefore therefore therefore therefore Some A is Some A is Some A is Some A is Some A is C not C C C not C not C

FOURTH FIGURE.

All C is B All C is B Some C is B No C is B No C is B All B is A No B is A All B is A All B is A Some B is A therefore therefore therefore therefore therefore Some A is C Some A is C Some A is C Some A is C Some A is not C not C not C

In these exemplars, or blank forms for making syllogisms, no place is assigned to *singular* propositions; not, of course, because such propositions are not used in ratiocination, but because, their predicate being affirmed or denied of the whole of the subject, they are ranked, for the purposes of the syllogism, with universal propositions. Thus, these two syllogisms--

All men are mortal, All men are mortal, All kings are men, Socrates is a man, therefore therefore All kings are mortal, Socrates is mortal,

are arguments precisely similar, and are both ranked in the first mood of the first figure.(50)

The reasons why syllogisms in any of the above forms are legitimate, that is, why, if the premises are true, the conclusion must inevitably be so, and why this is not the case in any other possible mood (that is, in any other combination of universal and particular, affirmative and negative propositions), any person taking interest in these inquiries may be presumed to have either learned from the common-school books of the syllogistic logic, or to be capable of discovering for himself. The reader may, however, be referred, for every needful explanation, to Archbishop Whately's *Elements of Logic*, where he will find stated with philosophical precision, and explained with remarkable perspicuity, the whole of the common doctrine of the syllogism.

All valid ratiocination; all reasoning by which, from general propositions previously admitted, other propositions equally or less general are inferred; may be exhibited in some of the above forms. The whole of Euclid, for example, might be thrown without difficulty into a series of syllogisms, regular in mood and figure.

Though a syllogism framed according to any of these formulæ is a valid argument, all correct ratiocination admits of being stated in syllogisms of the first figure alone. The rules for throwing an argument in any of the other figures into the first figure, are called rules for the *reduction* of syllogisms. It is done by the *conversion* of one or other, or both, of the premises. Thus an argument in the first mood of the second figure, as--

No C is B All A is B therefore No A is C,

may be reduced as follows. The proposition, No C is B, being a universal negative, admits of simple conversion, and may be changed into No B is C, which, as we showed, is the very same assertion in other words--the same fact differently expressed. This transformation having been effected, the argument assumes the following form:

No B is C All A is B therefore No A is C,

which is a good syllogism in the second mood of the first figure. Again, an argument in the first mood of the third figure must resemble the following:

All B is C All B is A therefore Some A is C,

where the minor premise, All B is A, conformably to what was laid down in the last chapter respecting universal affirmatives, does not admit of simple conversion, but may be converted *per accidens*, thus, Some A is B; which, though it does not express the whole of what is asserted in the proposition All B is A, expresses, as was formerly shown, part of it, and must therefore be true if the whole is true. We have, then, as the result of the reduction, the following syllogism in the third mood of the first figure:

All B is C Some A is B,

from which it obviously follows, that

Some A is C.

In the same manner, or in a manner on which after these examples it is not necessary to enlarge, every mood of the second, third, and fourth figures may be reduced to some one of the four moods of the first. In other words, every conclusion which can be proved in any of the last three figures, may be proved in the first figure from the same premises, with a slight alteration in the mere manner of expressing them. Every valid ratiocination, therefore, may be stated in the first figure, that is, in one of the following forms:

Every B is C No B is C All A is B, All A is B, Some A is B, Some A is B, therefore therefore All A is C. No A is C. Some A is C. Some A is not C.

Or, if more significant symbols are preferred:

To prove an affirmative, the argument must admit of being stated in this form:

All animals are mortal; All men/Some men/Socrates are animals; therefore All men/Some men/Socrates are mortal.

To prove a negative, the argument must be capable of being expressed in this form:

No one who is capable of self-control is necessarily vicious;

No one who is capable of self-control is necessarily vicious; All negroes/Some negroes/Mr. A's negro are capable of self-control; therefore No negroes are/Some negroes are not/Mr. A's negro is not necessarily vicious.

Though all ratiocination admits of being thrown into one or the other of these forms, and sometimes gains considerably by the transformation, both in clearness and in the obviousness of its consequence; there are, no doubt, cases in which the argument falls more naturally into one of the other three figures, and in which its conclusiveness is more apparent at the first glance in those figures, than when reduced to the first. Thus, if the proposition were that pagans may be virtuous, and the evidence to prove it were the example of Aristides; a syllogism in the third figure,

Aristides was virtuous, Aristides was a pagan, therefore Some pagan was virtuous,

would be a more natural mode of stating the argument, and would carry conviction more instantly home, than the same ratiocination strained into the first figure, thus--

Aristides was virtuous, Some pagan was Aristides, therefore Some pagan was virtuous.

A German philosopher, Lambert, whose *Neues Organon* (published in the year 1764) contains among other things one of the most elaborate and complete expositions which had ever been made of the syllogistic doctrine, has expressly examined what sort of arguments fall most naturally and suitably into each of the four figures; and his investigation is characterized by great ingenuity and clearness of thought.(51) The argument, however, is one and the same, in whichever figure it is expressed; since, as we have already seen, the premises of a syllogism in the second, third, or fourth figure, and those of the syllogism in the first figure to which it may be reduced, are the same premises in every thing except language, or, at least, as much of them as contributes to the proof of the conclusion is the same. We are therefore at liberty, in conformity with the

general opinion of logicians, to consider the two elementary forms of the first figure as the universal types of all correct ratiocination; the one, when the conclusion to be proved is affirmative, the other, when it is negative; even though certain arguments may have a tendency to clothe themselves in the forms of the second, third, and fourth figures; which, however, can not possibly happen with the only class of arguments which are of first-rate scientific importance, those in which the conclusion is a universal affirmative, such conclusions being susceptible of proof in the first figure alone.(52)

§ 2. On examining, then, these two general formulæ, we find that in both of them, one premise, the major, is a universal proposition; and according as this is affirmative or negative, the conclusion is so too. All ratiocination, therefore, starts from a *general* proposition, principle, or assumption: a proposition in which a predicate is affirmed or denied of an entire class; that is, in which some attribute, or the negation of some attribute, is asserted of an indefinite number of objects distinguished by a common characteristic, and designated, in consequence, by a common name.

The other premise is always affirmative, and asserts that something (which may be either an individual, a class, or part of a class) belongs to, or is included in, the class respecting which something was affirmed or denied in the major premise. It follows that the attribute affirmed or denied of the entire class may (if that affirmation or denial was correct) be affirmed or denied of the object or objects alleged to be included in the class: and this is precisely the assertion made in the conclusion.

Whether or not the foregoing is an adequate account of the constituent parts of the syllogism, will be presently considered; but as far as it goes it is a true account. It has accordingly been generalized, and erected into a logical maxim, on which all ratiocination is said to be founded, insomuch that to reason, and to apply the maxim, are supposed to be one and the same thing. The maxim is, That whatever can be affirmed (or denied) of a class, may be affirmed (or denied) of every thing included in the class. This axiom, supposed to be the basis of the syllogistic theory, is termed by logicians the *dictum de omni et nullo*.

This maxim, however, when considered as a principle of reasoning, appears suited to a system of metaphysics once indeed generally received, but which for the last two centuries has been considered as finally abandoned, though there have not been wanting in our own day attempts at its revival. So long as what are termed Universals were regarded as a peculiar kind of substances, having an objective existence distinct from the individual objects classed under them, the *dictum de omni* conveyed an important meaning; because it expressed the intercommunity of nature, which it was necessary on that theory that we should suppose to exist between those general substances and the particular substances which were subordinated to them. That every thing predicable of the universal was predicable of the various individuals contained under it, was then no identical proposition, but a statement of what was conceived as a fundamental law of the universe. The assertion that the entire nature and properties of the *substantia secunda* formed part of the nature and properties of each of the individual substances called by the same name; that the properties of Man, for example, were properties of all men; was a proposition of real significance when man did not *mean* all men, but something inherent in men, and vastly superior to them in dignity. Now, however, when it is known that a class, a universal, a genus or species, is not an entity *per se*, but neither more nor less than the individual substances themselves which are placed in the class, and that there is nothing real in the matter except those objects, a common name given to them, and common attributes indicated by the name; what, I should be glad to know, do we learn by being told, that whatever can be affirmed of a class, may be affirmed of every object contained in the class? The class *is* nothing but the objects contained in it: and the *dictum de omni* merely amounts to the identical proposition, that whatever is true of certain objects, is true of each of those objects. If all ratiocination were no more than the application of this maxim to particular cases, the syllogism would indeed be, what it has so often been declared to be, solemn trifling. The *dictum de omni* is on a par with another truth, which in its time was also reckoned of great importance, "Whatever is, is." To give any real meaning to the *dictum de omni*, we must consider it not as an axiom, but as a definition; we must look upon it as intended to explain, in a circuitous and paraphrastic manner, the meaning of the word *class*.

An error which seemed finally refuted and dislodged from thought, often needs only put on a new suit of phrases, to be welcomed back to its old quarters, and allowed to repose unquestioned for another cycle of ages. Modern philosophers have not been sparing in their contempt for the scholastic dogma that genera and species are a peculiar kind of substances, which general substances being the only permanent things, while the individual substances comprehended under them are in a perpetual flux, knowledge, which necessarily imports stability, can only have relation to those general substances or universals, and not to the facts or particulars included under them. Yet, though nominally rejected, this very doctrine, whether disguised under the Abstract Ideas of Locke (whose speculations, however, it has less vitiated than those of perhaps any other writer who has been infected with it), under the ultra-nominalism of Hobbes and Condillac, or the ontology of the later German schools, has never ceased to poison philosophy. Once accustomed to consider scientific investigation as essentially consisting in the study of universals, men did not drop this habit of thought when they ceased to regard universals as possessing an independent existence: and even those who went the length of considering them as mere names, could not free themselves from the notion that the investigation of truth consisted entirely or partly in some kind of conjuration or juggle with those names. When a philosopher adopted fully the Nominalist view of the signification of general language, retaining along with it the *dictum de omni* as the foundation of all reasoning, two such premises fairly put together were likely, if he was a consistent thinker, to land him in rather startling conclusions. Accordingly it has been seriously held, by writers of deserved celebrity, that the process of arriving at new truths by reasoning consists in the mere substitution of one set of arbitrary signs for another; a doctrine which they suppose to derive irresistible confirmation from the example of algebra. If there were any process in sorcery or necromancy more preternatural than this, I should be much surprised. The culminating point of this philosophy is the noted aphorism of Condillac, that a science is nothing, or scarcely any thing, but *une langue bien faite*; in other words, that the one sufficient rule for discovering the nature and properties of objects is to name them properly: as if the reverse were not the truth, that it is impossible to name them properly except in proportion as we are already acquainted with their nature and properties. Can it be necessary to say, that none, not even the most trivial knowledge with respect to Things, ever was or could be originally got at by any conceivable manipulation of mere names, as such; and that what can be learned from names, is only what somebody who used the names knew before? Philosophical analysis confirms the indication of common sense, that the function of names is but that of enabling us to *remember* and to *communicate* our thoughts. That they also strengthen, even to an incalculable extent, the power of thought itself, is most true: but they do this by no intrinsic and peculiar virtue; they do it by the power inherent in an artificial memory, an instrument of which few have adequately considered the immense potency. As an artificial memory, language truly is, what it has so often been called, an instrument of thought; but it is one thing to be the instrument, and another to be the exclusive subject upon which the instrument is exercised. We think, indeed, to a considerable extent, by means of names, but what we think of, are the things called by those names; and there can not be a greater error than to imagine that thought can be carried on with nothing in our mind but names, or that we can make the names think for us.

§ 3. Those who considered the *dictum de omni* as the foundation of the syllogism, looked upon arguments in a manner corresponding to the erroneous view which Hobbes took of propositions. Because there are some propositions which are merely verbal, Hobbes, in order apparently that his definition might be rigorously universal, defined a proposition as if no propositions declared any thing except the meaning of words. If Hobbes was right; if no further account than this could be given of the import of propositions; no theory could be given but the commonly received one, of the combination of propositions in a syllogism. If the minor premise asserted nothing more than that something belongs to a class, and if the major premise asserted nothing of that class except that it is included in another class, the conclusion would only be that what was included in the lower class is included in the higher, and the result, therefore, nothing except that the classification is consistent with itself. But we have seen that it is no sufficient account of the meaning of a proposition, to say that it refers something to, or excludes something from, a class. Every proposition which conveys real information asserts a matter of fact, dependent on the laws of nature, and not on classification. It asserts that a given object does or does not possess a given attribute; or it asserts that two attributes, or sets of attributes, do or do not (constantly or occasionally) co-exist. Since such is the purport of all propositions

which convey any real knowledge, and since ratiocination is a mode of acquiring real knowledge, any theory of ratiocination which does not recognize this import of propositions, can not, we may be sure, be the true one.

Applying this view of propositions to the two premises of a syllogism, we obtain the following results. The major premise, which, as already remarked, is always universal, asserts, that all things which have a certain attribute (or attributes) have or have not along with it, a certain other attribute (or attributes). The minor premise asserts that the thing or set of things which are the subject of that premise, have the first-mentioned attribute; and the conclusion is, that they have (or that they have not), the second. Thus in our former example,

All men are mortal, Socrates is a man, therefore Socrates is mortal,

the subject and predicate of the major premise are connotative terms, denoting objects and connoting attributes. The assertion in the major premise is, that along with one of the two sets of attributes, we always find the other: that the attributes connoted by "man" never exist unless conjoined with the attribute called mortality. The assertion in the minor premise is that the individual named Socrates possesses the former attributes; and it is concluded that he possesses also the attribute mortality. Or, if both the premises are general propositions, as

All men are mortal, All kings are men, therefore All kings are mortal,

the minor premise asserts that the attributes denoted by kingship only exist in conjunction with those signified by the word man. The major asserts as before, that the last-mentioned attributes are never found without the attribute of mortality. The conclusion is, that wherever the attributes of kingship are found, that of mortality is found also.

If the major premise were negative, as, No men are omnipotent, it would assert, not that the attributes connoted by "man" never exist without, but that they never exist with, those connoted by "omnipotent:" from which, together with the minor premise, it is concluded, that the same incompatibility exists between the attribute omnipotence and those constituting a king. In a similar manner we might analyze any other example of the syllogism.

If we generalize this process, and look out for the principle or law involved in every such inference, and presupposed in every syllogism, the propositions of which are any thing more than merely verbal; we find, not the unmeaning *dictum de omni et nullo*, but a fundamental principle, or rather two principles, strikingly resembling the axioms of mathematics. The first, which is the principle of affirmative syllogisms, is, that things which co-exist with the same thing, co-exist with one another: or (still more precisely) a thing which co-exists with another thing, which other co-exists with a third thing, also co-exists with that third thing. The second is the principle of negative syllogisms, and is to this effect: that a thing which co-exists with another thing, with which other a third thing does not co-exist, is not co-existent with that third thing. These axioms manifestly relate to facts, and not to conventions; and one or other of them is the ground of the legitimacy of every argument in which facts and not conventions are the matter treated of.(53)

§ 4. It remains to translate this exposition of the syllogism from the one into the other of the two languages in which we formerly remarked(54) that all propositions, and of course therefore all combinations of propositions, might be expressed. We observed that a proposition might be considered in two different lights; as a portion of our knowledge of nature, or as a memorandum for our guidance. Under the former, or speculative aspect, an affirmative general proposition is an assertion of a speculative truth, viz., that whatever has a certain attribute has a certain other attribute. Under the other aspect, it is to be regarded not as a part of our knowledge, but as an aid for our practical exigencies, by enabling us, when we see or learn that an object possesses one of the two attributes, to infer that it possesses the other; thus employing the first attribute as a mark or evidence of the second. Thus regarded, every syllogism comes within the following general formula:

Attribute A is a mark of attribute B, The given object has the mark A, therefore The given object has the attribute B.

Referred to this type, the arguments which we have lately cited as specimens of the syllogism, will express themselves in the following manner:

The attributes of man are a mark of the attribute mortality, Socrates has the attributes of man, therefore Socrates has the attribute mortality.

And again,

The attributes of man are a mark of the attribute mortality, The attributes of a king are a mark of the attributes of man, therefore The attributes of a king are a mark of the attribute mortality.

And, lastly,

The attributes of man are a mark of the absence of the attribute omnipotence, The attributes of a king are a mark of the attributes of man, therefore The attributes of a king are a mark of the absence of the attribute signified by the word omnipotent (or, are evidence of the absence of that attribute).

To correspond with this alteration in the form of the syllogisms, the axioms on which the syllogistic process is founded must undergo a corresponding transformation. In this altered phraseology, both those axioms may be brought under one general expression; namely, that whatever has any mark, has that which it is a mark of. Or, when the minor premise as well as the major is universal, we may state it thus: Whatever is a mark of any mark, is a mark of that which this last is a mark of. To trace the identity of these axioms with those previously laid down, may be left to the intelligent reader. We shall find, as we proceed, the great convenience of the phraseology into which we have last thrown them, and which is better adapted than any I am acquainted with, to express with precision and force what is aimed at, and actually accomplished, in every case of the ascertainment of a truth by ratiocination.(55)