

Chapter III.

Of The Functions And Logical Value Of The Syllogism.

§ 1. We have shown what is the real nature of the truths with which the Syllogism is conversant, in contradistinction to the more superficial manner in which their import is conceived in the common theory; and what are the fundamental axioms on which its probative force or conclusiveness depends. We have now to inquire, whether the syllogistic process, that of reasoning from generals to particulars, is, or is not, a process of inference; a progress from the known to the unknown: a means of coming to a knowledge of something which we did not know before.

Logicians have been remarkably unanimous in their mode of answering this question. It is universally allowed that a syllogism is vicious if there be any thing more in the conclusion than was assumed in the premises. But this is, in fact, to say, that nothing ever was, or can be, proved by syllogism, which was not known, or assumed to be known, before. Is ratiocination, then, not a process of inference? And is the syllogism, to which the word reasoning has so often been represented to be exclusively appropriate, not really entitled to be called reasoning at all? This seems an inevitable consequence of the doctrine, admitted by all writers on the subject, that a syllogism can prove no more than is involved in the premises. Yet the acknowledgment so explicitly made, has not prevented one set of writers from continuing to represent the syllogism as the correct analysis of what the mind actually performs in discovering and proving the larger half of the truths, whether of science or of daily life, which we believe; while those who have avoided this inconsistency, and followed out the general theorem respecting the logical value of the syllogism to its legitimate corollary, have been led to impute uselessness and frivolity to the syllogistic theory itself, on the ground of the *petitio principii* which they allege to be inherent in every syllogism. As I believe both these opinions to be fundamentally erroneous, I must request the attention of the reader to certain considerations, without which any just appreciation of the true character of the syllogism, and the functions it performs in philosophy, appears to me impossible; but which seem to have been either overlooked, or insufficiently adverted to, both by the defenders of the syllogistic theory and by its assailants.

§ 2. It must be granted that in every syllogism, considered as an argument to prove the conclusion, there is a *petitio principii*. When we say,

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

it is unanswerably urged by the adversaries of the syllogistic theory, that the proposition, Socrates is mortal, is presupposed in the more general assumption, All men are mortal: that we can not be assured of the mortality of all men, unless we are already certain of the mortality of every individual man: that if it be still doubtful whether Socrates, or any other individual we choose to name, be mortal or not, the same degree of uncertainty must hang over the assertion, All men are mortal: that the general principle, instead of being given as evidence of the particular case, can not itself be taken for true without exception, until every shadow of doubt which could affect any case comprised with it, is dispelled by evidence *aliundè*; and then what remains for the syllogism to prove? That, in short, no reasoning from generals to particulars can, as such, prove any thing: since from a general principle we can not infer any particulars, but those which the principle itself assumes as known.

This doctrine appears to me irrefragable; and if logicians, though unable to dispute it, have usually exhibited a strong disposition to explain it away, this was not because they could discover any flaw in the argument itself, but because the contrary opinion seemed to rest on arguments equally indisputable. In the syllogism last referred to, for example, or in any of those which we previously constructed, is it not evident that the conclusion may, to the person to whom the syllogism is presented, be actually and *bona fide* a new truth? Is it not matter of daily experience that truths previously unthought of, facts which have not been, and can not be, directly observed, are arrived at by way of general reasoning? We believe that the Duke of Wellington is

mortal. We do not know this by direct observation, so long as he is not yet dead. If we were asked how, this being the case, we know the duke to be mortal, we should probably answer, Because all men are so. Here, therefore, we arrive at the knowledge of a truth not (as yet) susceptible of observation, by a reasoning which admits of being exhibited in the following syllogism:

All men are mortal, The Duke of Wellington is a man, therefore The Duke of Wellington is mortal.

And since a large portion of our knowledge is thus acquired, logicians have persisted in representing the syllogism as a process of inference or proof; though none of them has cleared up the difficulty which arises from the inconsistency between that assertion, and the principle, that if there be any thing in the conclusion which was not already asserted in the premises, the argument is vicious. For it is impossible to attach any serious scientific value to such a mere salvo, as the distinction drawn between being involved *by implication* in the premises, and being directly asserted in them. When Archbishop Whately says(56) that the object of reasoning is "merely to expand and unfold the assertions wrapped up, as it were, and implied in those with which we set out, and to bring a person to perceive and acknowledge the full force of that which he has admitted," he does not, I think, meet the real difficulty requiring to be explained, namely, how it happens that a science, like geometry, *can* be all "wrapped up" in a few definitions and axioms. Nor does this defense of the syllogism differ much from what its assailants urge against it as an accusation, when they charge it with being of no use except to those who seek to press the consequences of an admission into which a person has been entrapped without having considered and understood its full force. When you admitted the major premise, you asserted the conclusion; but, says Archbishop Whately, you asserted it by implication merely: this, however, can here only mean that you asserted it unconsciously; that you did not know you were asserting it; but, if so, the difficulty revives in this shape--Ought you not to have known? Were you warranted in asserting the general proposition without having satisfied yourself of the truth of every thing which it fairly includes? And if not, is not the syllogistic art *prima facie* what its assailants affirm it to be, a contrivance for catching you in a trap, and holding you fast in it?(57)

§ 3. From this difficulty there appears to be but one issue. The proposition that the Duke of Wellington is mortal, is evidently an inference; it is got at as a conclusion from something else; but do we, in reality, conclude it from the proposition, All men are mortal? I answer, no.

The error committed is, I conceive, that of overlooking the distinction between two parts of the process of philosophizing, the inferring part, and the registering part; and ascribing to the latter the functions of the former. The mistake is that of referring a person to his own notes for the origin of his knowledge. If a person is asked a question, and is at the moment unable to answer it, he may refresh his memory by turning to a memorandum which he carries about with him. But if he were asked, how the fact came to his knowledge, he would scarcely answer, because it was set down in his note-book: unless the book was written, like the Koran, with a quill from the wing of the angel Gabriel.

Assuming that the proposition, The Duke of Wellington is mortal, is immediately an inference from the proposition, All men are mortal; whence do we derive our knowledge of that general truth? Of course from observation. Now, all which man can observe are individual cases. From these all general truths must be drawn, and into these they may be again resolved; for a general truth is but an aggregate of particular truths; a comprehensive expression, by which an indefinite number of individual facts are affirmed or denied at once. But a general proposition is not merely a compendious form for recording and preserving in the memory a number of particular facts, all of which have been observed. Generalization is not a process of mere naming, it is also a process of inference. From instances which we have observed, we feel warranted in concluding, that what we found true in those instances, holds in all similar ones, past, present, and future, however numerous they may be. We then, by that valuable contrivance of language which enables us to speak of many as if they were one, record all that we have observed, together with all that we infer from our observations, in one concise expression; and have thus only one proposition, instead of an endless number, to remember or to communicate. The results of many observations and inferences, and instructions for making innumerable

inferences in unforeseen cases, are compressed into one short sentence.

When, therefore, we conclude from the death of John and Thomas, and every other person we ever heard of in whose case the experiment had been fairly tried, that the Duke of Wellington is mortal like the rest; we may, indeed, pass through the generalization, All men are mortal, as an intermediate stage; but it is not in the latter half of the process, the descent from all men to the Duke of Wellington, that the *inference* resides. The inference is finished when we have asserted that all men are mortal. What remains to be performed afterward is merely deciphering our own notes.

Archbishop Whately has contended that syllogizing, or reasoning from generals to particulars, is not, agreeably to the vulgar idea, a peculiar *mode* of reasoning, but the philosophical analysis of *the* mode in which all men reason, and must do so if they reason at all. With the deference due to so high an authority, I can not help thinking that the vulgar notion is, in this case, the more correct. If, from our experience of John, Thomas, etc., who once were living, but are now dead, we are entitled to conclude that all human beings are mortal, we might surely without any logical inconsequence have concluded at once from those instances, that the Duke of Wellington is mortal. The mortality of John, Thomas, and others is, after all, the whole evidence we have for the mortality of the Duke of Wellington. Not one iota is added to the proof by interpolating a general proposition. Since the individual cases are all the evidence we can possess, evidence which no logical form into which we choose to throw it can make greater than it is; and since that evidence is either sufficient in itself, or, if insufficient for the one purpose, can not be sufficient for the other; I am unable to see why we should be forbidden to take the shortest cut from these sufficient premises to the conclusion, and constrained to travel the "high priori road," by the arbitrary fiat of logicians. I can not perceive why it should be impossible to journey from one place to another unless we "march up a hill, and then march down again." It may be the safest road, and there may be a resting-place at the top of the hill, affording a commanding view of the surrounding country; but for the mere purpose of arriving at our journey's end, our taking that road is perfectly optional; it is a question of time, trouble, and danger.

Not only *may* we reason from particulars to particulars without passing through generals, but we perpetually do so reason. All our earliest inferences are of this nature. From the first dawn of intelligence we draw inferences, but years elapse before we learn the use of general language. The child, who, having burned his fingers, avoids to thrust them again into the fire, has reasoned or inferred, though he has never thought of the general maxim, Fire burns. He knows from memory that he has been burned, and on this evidence believes, when he sees a candle, that if he puts his finger into the flame of it, he will be burned again. He believes this in every case which happens to arise; but without looking, in each instance, beyond the present case. He is not generalizing; he is inferring a particular from particulars. In the same way, also, brutes reason. There is no ground for attributing to any of the lower animals the use of signs, of such a nature as to render general propositions possible. But those animals profit by experience, and avoid what they have found to cause them pain, in the same manner, though not always with the same skill, as a human creature. Not only the burned child, but the burned dog, dreads the fire.

I believe that, in point of fact, when drawing inferences from our personal experience, and not from maxims handed down to us by books or tradition, we much oftener conclude from particulars to particulars directly, than through the intermediate agency of any general proposition. We are constantly reasoning from ourselves to other people, or from one person to another, without giving ourselves the trouble to erect our observations into general maxims of human or external nature. When we conclude that some person will, on some given occasion, feel or act so and so, we sometimes judge from an enlarged consideration of the manner in which human beings in general, or persons of some particular character, are accustomed to feel and act; but much oftener from merely recollecting the feelings and conduct of the same person in some previous instance, or from considering how we should feel or act ourselves. It is not only the village matron, who, when called to a consultation upon the case of a neighbor's child, pronounces on the evil and its remedy simply on the recollection and authority of what she accounts the similar case of her Lucy. We all, where we have no definite maxims to steer by, guide ourselves in the same way: and if we have an extensive experience, and

retain its impressions strongly, we may acquire in this manner a very considerable power of accurate judgment, which we may be utterly incapable of justifying or of communicating to others. Among the higher order of practical intellects there have been many of whom it was remarked how admirably they suited their means to their ends, without being able to give any sufficient reasons for what they did; and applied, or seemed to apply, recondite principles which they were wholly unable to state. This is a natural consequence of having a mind stored with appropriate particulars, and having been long accustomed to reason at once from these to fresh particulars, without practicing the habit of stating to one's self or to others the corresponding general propositions. An old warrior, on a rapid glance at the outlines of the ground, is able at once to give the necessary orders for a skillful arrangement of his troops; though if he has received little theoretical instruction, and has seldom been called upon to answer to other people for his conduct, he may never have had in his mind a single general theorem respecting the relation between ground and array. But his experience of encampments, in circumstances more or less similar, has left a number of vivid, unexpressed, ungeneralized analogies in his mind, the most appropriate of which, instantly suggesting itself, determines him to a judicious arrangement.

The skill of an uneducated person in the use of weapons, or of tools, is of a precisely similar nature. The savage who executes unerringly the exact throw which brings down his game, or his enemy, in the manner most suited to his purpose, under the operation of all the conditions necessarily involved, the weight and form of the weapon, the direction and distance of the object, the action of the wind, etc., owes this power to a long series of previous experiments, the results of which he certainly never framed into any verbal theorems or rules. The same thing may generally be said of any other extraordinary manual dexterity. Not long ago a Scotch manufacturer procured from England, at a high rate of wages, a working dyer, famous for producing very fine colors, with the view of teaching to his other workmen the same skill. The workman came; but his mode of proportioning the ingredients, in which lay the secret of the effects he produced, was by taking them up in handfuls, while the common method was to weigh them. The manufacturer sought to make him turn his handling system into an equivalent weighing system, that the general principle of his peculiar mode of proceeding might be ascertained. This, however, the man found himself quite unable to do, and therefore could impart his skill to nobody. He had, from the individual cases of his own experience, established a connection in his mind between fine effects of color, and tactual perceptions in handling his dyeing materials; and from these perceptions he could, in any particular case, infer the means to be employed, and the effects which would be produced, but could not put others in possession of the grounds on which he proceeded, from having never generalized them in his own mind, or expressed them in language.

Almost every one knows Lord Mansfield's advice to a man of practical good sense, who, being appointed governor of a colony, had to preside in its courts of justice, without previous judicial practice or legal education. The advice was to give his decision boldly, for it would probably be right; but never to venture on assigning reasons, for they would almost infallibly be wrong. In cases like this, which are of no uncommon occurrence, it would be absurd to suppose that the bad reason was the source of the good decision. Lord Mansfield knew that if any reason were assigned it would be necessarily an afterthought, the judge being *in fact* guided by impressions from past experience, without the circuitous process of framing general principles from them, and that if he attempted to frame any such he would assuredly fail. Lord Mansfield, however, would not have doubted that a man of equal experience who had also a mind stored with general propositions derived by legitimate induction from that experience, would have been greatly preferable as a judge, to one, however sagacious, who could not be trusted with the explanation and justification of his own judgments. The cases of men of talent performing wonderful things they know not how, are examples of the rudest and most spontaneous form of the operations of superior minds. It is a defect in them, and often a source of errors, not to have generalized as they went on; but generalization, though a help, the most important indeed of all helps, is not an essential.

Even the scientifically instructed, who possess, in the form of general propositions, a systematic record of the results of the experience of mankind, need not always revert to those general propositions in order to apply that experience to a new case. It is justly remarked by Dugald Stewart, that though the reasonings in

mathematics depend entirely on the axioms, it is by no means necessary to our seeing the conclusiveness of the proof, that the axioms should be expressly adverted to. When it is inferred that AB is equal to CD because each of them is equal to EF, the most uncultivated understanding, as soon as the propositions were understood, would assent to the inference, without having ever heard of the general truth that "things which are equal to the same thing are equal to one another." This remark of Stewart, consistently followed out, goes to the root, as I conceive, of the philosophy of ratiocination; and it is to be regretted that he himself stopped short at a much more limited application of it. He saw that the general propositions on which a reasoning is said to depend, may, in certain cases, be altogether omitted, without impairing its probative force. But he imagined this to be a peculiarity belonging to axioms; and argued from it, that axioms are not the foundations or first principles of geometry, from which all the other truths of the science are synthetically deduced (as the laws of motion and of the composition of forces in dynamics, the equal mobility of fluids in hydrostatics, the laws of reflection and refraction in optics, are the first principles of those sciences); but are merely necessary assumptions, self-evident indeed, and the denial of which would annihilate all demonstration, but from which, as premises, nothing can be demonstrated. In the present, as in many other instances, this thoughtful and elegant writer has perceived an important truth, but only by halves. Finding, in the case of geometrical axioms, that general names have not any talismanic virtue for conjuring new truths out of the well where they lie hid, and not seeing that this is equally true in every other case of generalization, he contended that axioms are in their nature barren of consequences, and that the really fruitful truths, the real first principles of geometry, are the definitions; that the definition, for example, of the circle is to the properties of the circle, what the laws of equilibrium and of the pressure of the atmosphere are to the rise of the mercury in the Torricellian tube. Yet all that he had asserted respecting the function to which the axioms are confined in the demonstrations of geometry, holds equally true of the definitions. Every demonstration in Euclid might be carried on without them. This is apparent from the ordinary process of proving a proposition of geometry by means of a diagram. What assumption, in fact, do we set out from, to demonstrate by a diagram any of the properties of the circle? Not that in all circles the radii are equal, but only that they are so in the circle ABC. As our warrant for assuming this, we appeal, it is true, to the definition of a circle in general; but it is only necessary that the assumption be granted in the case of the particular circle supposed. From this, which is not a general but a singular proposition, combined with other propositions of a similar kind, some of which *when generalized* are called definitions, and other axioms, we prove that a certain conclusion is true, not of all circles, but of the particular circle ABC; or at least would be so, if the facts precisely accorded with our assumptions. The enunciation, as it is called, that is, the general theorem which stands at the head of the demonstration, is not the proposition actually demonstrated. One instance only is demonstrated: but the process by which this is done, is a process which, when we consider its nature, we perceive might be exactly copied in an indefinite number of other instances; in every instance which conforms to certain conditions. The contrivance of general language furnishing us with terms which connote these conditions, we are able to assert this indefinite multitude of truths in a single expression, and this expression is the general theorem. By dropping the use of diagrams, and substituting, in the demonstrations, general phrases for the letters of the alphabet, we might prove the general theorem directly, that is, we might demonstrate all the cases at once; and to do this we must, of course, employ as our premises, the axioms and definitions in their general form. But this only means, that if we can prove an individual conclusion by assuming an individual fact, then in whatever case we are warranted in making an exactly similar assumption, we may draw an exactly similar conclusion. The definition is a sort of notice to ourselves and others, what assumptions we think ourselves entitled to make. And so in all cases, the general propositions, whether called definitions, axioms, or laws of nature, which we lay down at the beginning of our reasonings, are merely abridged statements, in a kind of short-hand, of the particular facts, which, as occasion arises, we either think we may proceed on as proved, or intend to assume. In any one demonstration it is enough if we assume for a particular case suitably selected, what by the statement of the definition or principle we announce that we intend to assume in all cases which may arise. The definition of the circle, therefore, is to one of Euclid's demonstrations, exactly what, according to Stewart, the axioms are; that is, the demonstration does not depend on it, but yet if we deny it the demonstration fails. The proof does not rest on the general assumption, but on a similar assumption confined to the particular case: that case, however, being chosen as a specimen or paradigm of the whole class of cases included in the theorem, there can be no ground for making the assumption in that case which does not exist

in every other; and to deny the assumption as a general truth, is to deny the right of making it in the particular instance.

There are, undoubtedly, the most ample reasons for stating both the principles and the theorems in their general form, and these will be explained presently, so far as explanation is requisite. But, that unpracticed learners, even in making use of one theorem to demonstrate another, reason rather from particular to particular than from the general proposition, is manifest from the difficulty they find in applying a theorem to a case in which the configuration of the diagram is extremely unlike that of the diagram by which the original theorem was demonstrated. A difficulty which, except in cases of unusual mental power, long practice can alone remove, and removes chiefly by rendering us familiar with all the configurations consistent with the general conditions of the theorem.

§ 4. From the considerations now adduced, the following conclusions seem to be established. All inference is from particulars to particulars: General propositions are merely registers of such inferences already made, and short formulæ for making more: The major premise of a syllogism, consequently, is a formula of this description: and the conclusion is not an inference drawn *from* the formula, but an inference drawn *according* to the formula: the real logical antecedent, or premise, being the particular facts from which the general proposition was collected by induction. Those facts, and the individual instances which supplied them, may have been forgotten: but a record remains, not indeed descriptive of the facts themselves, but showing how those cases may be distinguished, respecting which, the facts, when known, were considered to warrant a given inference. According to the indications of this record we draw our conclusion: which is, to all intents and purposes, a conclusion from the forgotten facts. For this it is essential that we should read the record correctly: and the rules of the syllogism are a set of precautions to insure our doing so.

This view of the functions of the syllogism is confirmed by the consideration of precisely those cases which might be expected to be least favorable to it, namely, those in which ratiocination is independent of any previous induction. We have already observed that the syllogism, in the ordinary course of our reasoning, is only the latter half of the process of traveling from premises to a conclusion. There are, however, some peculiar cases in which it is the whole process. Particulars alone are capable of being subjected to observation; and all knowledge which is derived from observation, begins, therefore, of necessity, in particulars; but our knowledge may, in cases of certain descriptions, be conceived as coming to us from other sources than observation. It may present itself as coming from testimony, which, on the occasion and for the purpose in hand, is accepted as of an authoritative character: and the information thus communicated, may be conceived to comprise not only particular facts but general propositions, as when a scientific doctrine is accepted without examination on the authority of writers, or a theological doctrine on that of Scripture. Or the generalization may not be, in the ordinary sense, an assertion at all, but a command; a law, not in the philosophical, but in the moral and political sense of the term: an expression of the desire of a superior, that we, or any number of other persons, shall conform our conduct to certain general instructions. So far as this asserts a fact, namely, a volition of the legislator, that fact is an individual fact, and the proposition, therefore, is not a general proposition. But the description therein contained of the conduct which it is the will of the legislator that his subjects should observe, is general. The proposition asserts, not that all men *are* any thing, but that all men *shall* do something.

In both these cases the generalities are the original data, and the particulars are elicited from them by a process which correctly resolves itself into a series of syllogisms. The real nature, however, of the supposed deductive process, is evident enough. The only point to be determined is, whether the authority which declared the general proposition, intended to include this case in it; and whether the legislator intended his command to apply to the present case among others, or not. This is ascertained by examining whether the case possesses the marks by which, as those authorities have signified, the cases which they meant to certify or to influence may be known. The object of the inquiry is to make out the witness's or the legislator's intention, through the indication given by their words. This is a question, as the Germans express it, of hermeneutics. The operation is not a process of inference, but a process of interpretation.

In this last phrase we have obtained an expression which appears to me to characterize, more aptly than any other, the functions of the syllogism in all cases. When the premises are given by authority, the function of Reasoning is to ascertain the testimony of a witness, or the will of a legislator, by interpreting the signs in which the one has intimated his assertion and the other his command. In like manner, when the premises are derived from observation, the function of Reasoning is to ascertain what we (or our predecessors) formerly thought might be inferred from the observed facts, and to do this by interpreting a memorandum of ours, or of theirs. The memorandum reminds us, that from evidence, more or less carefully weighed, it formerly appeared that a certain attribute might be inferred wherever we perceive a certain mark. The proposition, All men are mortal (for instance) shows that we have had experience from which we thought it followed that the attributes connoted by the term man, are a mark of mortality. But when we conclude that the Duke of Wellington is mortal, we do not infer this from the memorandum, but from the former experience. All that we infer from the memorandum is our own previous belief, (or that of those who transmitted to us the proposition), concerning the inferences which that former experience would warrant.

This view of the nature of the syllogism renders consistent and intelligible what otherwise remains obscure and confused in the theory of Archbishop Whately and other enlightened defenders of the syllogistic doctrine, respecting the limits to which its functions are confined. They affirm in as explicit terms as can be used, that the sole office of general reasoning is to prevent inconsistency in our opinions; to prevent us from assenting to any thing, the truth of which would contradict something to which we had previously on good grounds given our assent. And they tell us, that the sole ground which a syllogism affords for assenting to the conclusion, is that the supposition of its being false, combined with the supposition that the premises are true, would lead to a contradiction in terms. Now this would be but a lame account of the real grounds which we have for believing the facts which we learn from reasoning, in contradistinction to observation. The true reason why we believe that the Duke of Wellington will die, is that his fathers, and our fathers, and all other persons who were contemporary with them, have died. Those facts are the real premises of the reasoning. But we are not led to infer the conclusion from those premises, by the necessity of avoiding any verbal inconsistency. There is no contradiction in supposing that all those persons have died, and that the Duke of Wellington may, notwithstanding, live forever. But there would be a contradiction if we first, on the ground of those same premises, made a general assertion including and covering the case of the Duke of Wellington, and then refused to stand to it in the individual case. There is an inconsistency to be avoided between the memorandum we make of the inferences which may be justly drawn in future cases, and the inferences we actually draw in those cases when they arise. With this view we interpret our own formula, precisely as a judge interprets a law: in order that we may avoid drawing any inferences not conformable to our former intention, as a judge avoids giving any decision not conformable to the legislator's intention. The rules for this interpretation are the rules of the syllogism: and its sole purpose is to maintain consistency between the conclusions we draw in every particular case, and the previous general directions for drawing them; whether those general directions were framed by ourselves as the result of induction, or were received by us from an authority competent to give them.

§ 5. In the above observations it has, I think, been shown, that, though there is always a process of reasoning or inference where a syllogism is used, the syllogism is not a correct analysis of that process of reasoning or inference; which is, on the contrary (when not a mere inference from testimony), an inference from particulars to particulars; authorized by a previous inference from particulars to generals, and substantially the same with it; of the nature, therefore, of Induction. But while these conclusions appear to me undeniable, I must yet enter a protest, as strong as that of Archbishop Whately himself, against the doctrine that the syllogistic art is useless for the purposes of reasoning. The reasoning lies in the act of generalization, not in interpreting the record of that act; but the syllogistic form is an indispensable collateral security for the correctness of the generalization itself.

It has already been seen, that if we have a collection of particulars sufficient for grounding an induction, we need not frame a general proposition; we may reason at once from those particulars to other particulars. But it is to be remarked withal, that whenever, from a set of particular cases, we can legitimately draw any

inference, we may legitimately make our inference a general one. If, from observation and experiment, we can conclude to one new case, so may we to an indefinite number. If that which has held true in our past experience will therefore hold in time to come, it will hold not merely in some individual case, but in all cases of some given description. Every induction, therefore, which suffices to prove one fact, proves an indefinite multitude of facts: the experience which justifies a single prediction must be such as will suffice to bear out a general theorem. This theorem it is extremely important to ascertain and declare, in its broadest form of generality; and thus to place before our minds, in its full extent, the whole of what our evidence must prove if it proves any thing.

This throwing of the whole body of possible inferences from a given set of particulars, into one general expression, operates as a security for their being just inferences, in more ways than one. First, the general principle presents a larger object to the imagination than any of the singular propositions which it contains. A process of thought which leads to a comprehensive generality, is felt as of greater importance than one which terminates in an insulated fact; and the mind is, even unconsciously, led to bestow greater attention upon the process, and to weigh more carefully the sufficiency of the experience appealed to, for supporting the inference grounded upon it. There is another, and a more important, advantage. In reasoning from a course of individual observations to some new and unobserved case, which we are but imperfectly acquainted with (or we should not be inquiring into it), and in which, since we are inquiring into it, we probably feel a peculiar interest; there is very little to prevent us from giving way to negligence, or to any bias which may affect our wishes or our imagination, and, under that influence, accepting insufficient evidence as sufficient. But if, instead of concluding straight to the particular case, we place before ourselves an entire class of facts--the whole contents of a general proposition, every tittle of which is legitimately inferable from our premises, if that one particular conclusion is so; there is then a considerable likelihood that if the premises are insufficient, and the general inference therefore, groundless, it will comprise within it some fact or facts the reverse of which we already know to be true; and we shall thus discover the error in our generalization by a *reductio ad impossibile*.

Thus if, during the reign of Marcus Aurelius, a subject of the Roman empire, under the bias naturally given to the imagination and expectations by the lives and characters of the Antonines, had been disposed to expect that Commodus would be a just ruler; supposing him to stop there, he might only have been undeceived by sad experience. But if he reflected that this expectation could not be justifiable unless from the same evidence he was warranted in concluding some general proposition, as, for instance, that all Roman emperors are just rulers; he would immediately have thought of Nero, Domitian, and other instances, which, showing the falsity of the general conclusion, and therefore the insufficiency of the premises, would have warned him that those premises could not prove in the instance of Commodus, what they were inadequate to prove in any collection of cases in which his was included.

The advantage, in judging whether any controverted inference is legitimate, of referring to a parallel case, is universally acknowledged. But by ascending to the general proposition, we bring under our view not one parallel case only, but all possible parallel cases at once; all cases to which the same set of evidentiary considerations are applicable.

When, therefore, we argue from a number of known cases to another case supposed to be analogous, it is always possible, and generally advantageous, to divert our argument into the circuitous channel of an induction from those known cases to a general proposition, and a subsequent application of that general proposition to the unknown case. This second part of the operation, which, as before observed, is essentially a process of interpretation, will be resolvable into a syllogism or a series of syllogisms, the majors of which will be general propositions embracing whole classes of cases; every one of which propositions must be true in all its extent, if the argument is maintainable. If, therefore, any fact fairly coming within the range of one of these general propositions, and consequently asserted by it, is known or suspected to be other than the proposition asserts it to be, this mode of stating the argument causes us to know or to suspect that the original observations, which are the real grounds of our conclusion, are not sufficient to support it. And in proportion

to the greater chance of our detecting the inconclusiveness of our evidence, will be the increased reliance we are entitled to place in it if no such evidence of defect shall appear.

The value, therefore, of the syllogistic form, and of the rules for using it correctly, does not consist in their being the form and the rules according to which our reasonings are necessarily, or even usually, made; but in their furnishing us with a mode in which those reasonings may always be represented, and which is admirably calculated, if they are inconclusive, to bring their inconclusiveness to light. An induction from particulars to generals, followed by a syllogistic process from those generals to other particulars, is a form in which we may always state our reasonings if we please. It is not a form in which we *must* reason, but it is a form in which we *may* reason, and into which it is indispensable to throw our reasoning, when there is any doubt of its validity: though when the case is familiar and little complicated, and there is no suspicion of error, we may, and do, reason at once from the known particular cases to unknown ones.(58)

These are the uses of syllogism, as a mode of verifying any given argument. Its ulterior uses, as respects the general course of our intellectual operations, hardly require illustration, being in fact the acknowledged uses of general language. They amount substantially to this, that the inductions may be made once for all: a single careful interrogation of experience may suffice, and the result may be registered in the form of a general proposition, which is committed to memory or to writing, and from which afterward we have only to syllogize. The particulars of our experiments may then be dismissed from the memory, in which it would be impossible to retain so great a multitude of details; while the knowledge which those details afforded for future use, and which would otherwise be lost as soon as the observations were forgotten, or as their record became too bulky for reference, is retained in a commodious and immediately available shape by means of general language.

Against this advantage is to be set the countervailing inconvenience, that inferences originally made on insufficient evidence become consecrated, and, as it were, hardened into general maxims; and the mind cleaves to them from habit, after it has outgrown any liability to be misled by similar fallacious appearances if they were now for the first time presented; but having forgotten the particulars, it does not think of revising its own former decision. An inevitable drawback, which, however considerable in itself, forms evidently but a small set-off against the immense benefits of general language.

The use of the syllogism is in truth no other than the use of general propositions in reasoning. We *can* reason without them; in simple and obvious cases we habitually do so; minds of great sagacity can do it in cases not simple and obvious, provided their experience supplies them with instances essentially similar to every combination of circumstances likely to arise. But other minds, and the same minds where they have not the same pre-eminent advantages of personal experience, are quite helpless without the aid of general propositions, wherever the case presents the smallest complication; and if we made no general propositions, few persons would get much beyond those simple inferences which are drawn by the more intelligent of the brutes. Though not necessary to reasoning, general propositions are necessary to any considerable progress in reasoning. It is, therefore, natural and indispensable to separate the process of investigation into two parts; and obtain general formulæ for determining what inferences may be drawn, before the occasion arises for drawing the inferences. The work of drawing them is then that of applying the formulæ; and the rules of syllogism are a system of securities for the correctness of the application.

§ 6. To complete the series of considerations connected with the philosophical character of the syllogism, it is requisite to consider, since the syllogism is not the universal type of the reasoning process, what is the real type. This resolves itself into the question, what is the nature of the minor premise, and in what manner it contributes to establish the conclusion: for as to the major, we now fully understand, that the place which it nominally occupies in our reasonings, properly belongs to the individual facts or observations of which it expresses the general result; the major itself being no real part of the argument, but an intermediate halting-place for the mind, interposed by an artifice of language between the real premises and the conclusion, by way of a security, which it is in a most material degree, for the correctness of the process. The minor,

however, being an indispensable part of the syllogistic expression of an argument, without doubt either is, or corresponds to, an equally indispensable part of the argument itself, and we have only to inquire what part.

It is perhaps worth while to notice here a speculation of a philosopher to whom mental science is much indebted, but who, though a very penetrating, was a very hasty thinker, and whose want of due circumspection rendered him fully as remarkable for what he did not see, as for what he saw. I allude to Dr. Thomas Brown, whose theory of ratiocination is peculiar. He saw the *petitio principii* which is inherent in every syllogism, if we consider the major to be itself the evidence by which the conclusion is proved, instead of being, what in fact it is, an assertion of the existence of evidence sufficient to prove any conclusion of a given description. Seeing this, Dr. Brown not only failed to see the immense advantage, in point of security for correctness, which is gained by interposing this step between the real evidence and the conclusion; but he thought it incumbent on him to strike out the major altogether from the reasoning process, without substituting any thing else, and maintained that our reasonings consist only of the minor premise and the conclusion, Socrates is a man, therefore Socrates is mortal: thus actually suppressing, as an unnecessary step in the argument, the appeal to former experience. The absurdity of this was disguised from him by the opinion he adopted, that reasoning is merely analyzing our own general notions, or abstract ideas; and that the proposition, Socrates is mortal, is evolved from the proposition, Socrates is a man, simply by recognizing the notion of mortality as already contained in the notion we form of a man.

After the explanations so fully entered into on the subject of propositions, much further discussion can not be necessary to make the radical error of this view of ratiocination apparent. If the word man connoted mortality; if the meaning of "mortal" were involved in the meaning of "man;" we might, undoubtedly, evolve the conclusion from the minor alone, because the minor would have already asserted it. But if, as is in fact the case, the word man does not connote mortality, how does it appear that in the mind of every person who admits Socrates to be a man, the idea of man must include the idea of mortality? Dr. Brown could not help seeing this difficulty, and in order to avoid it, was led, contrary to his intention, to re-establish, under another name, that step in the argument which corresponds to the major, by affirming the necessity of *previously perceiving* the relation between the idea of man and the idea of mortal. If the reasoner has not previously perceived this relation, he will not, says Dr. Brown, infer because Socrates is a man, that Socrates is mortal. But even this admission, though amounting to a surrender of the doctrine that an argument consists of the minor and the conclusion alone, will not save the remainder of Dr. Brown's theory. The failure of assent to the argument does not take place merely because the reasoner, for want of due analysis, does not perceive that his idea of man includes the idea of mortality; it takes place, much more commonly, because in his mind that relation between the two ideas has never existed. And in truth it never does exist, except as the result of experience. Consenting, for the sake of the argument, to discuss the question on a supposition of which we have recognized the radical incorrectness, namely, that the meaning of a proposition relates to the ideas of the things spoken of, and not to the things themselves; I must yet observe, that the idea of man, as a universal idea, the common property of all rational creatures, can not involve any thing but what is strictly implied in the name. If any one includes in his own private idea of man, as no doubt is always the case, some other attributes, such for instance as mortality, he does so only as the consequence of experience, after having satisfied himself that all men possess that attribute: so that whatever the idea contains, in any person's mind, beyond what is included in the conventional signification of the word, has been added to it as the result of assent to a proposition; while Dr. Brown's theory requires us to suppose, on the contrary, that assent to the proposition is produced by evolving, through an analytic process, this very element out of the idea. This theory, therefore, may be considered as sufficiently refuted; and the minor premise must be regarded as totally insufficient to prove the conclusion, except with the assistance of the major, or of that which the major represents, namely, the various singular propositions expressive of the series of observations, of which the generalization called the major premise is the result.

In the argument, then, which proves that Socrates is mortal, one indispensable part of the premises will be as follows: "My father, and my father's father, A, B, C, and an indefinite number of other persons, were mortal;" which is only an expression in different words of the observed fact that they have died. This is the major

premise divested of the *petitio principii*, and cut down to as much as is really known by direct evidence.

In order to connect this proposition with the conclusion Socrates is mortal, the additional link necessary is such a proposition as the following: "Socrates resembles my father, and my father's father, and the other individuals specified." This proposition we assert when we say that Socrates is a man. By saying so we likewise assert in what respect he resembles them, namely, in the attributes connoted by the word man. And we conclude that he further resembles them in the attribute mortality.

§ 7. We have thus obtained what we were seeking, a universal type of the reasoning process. We find it resolvable in all cases into the following elements: Certain individuals have a given attribute; an individual or individuals resemble the former in certain other attributes; therefore they resemble them also in the given attribute. This type of ratiocination does not claim, like the syllogism, to be conclusive from the mere form of the expression; nor can it possibly be so. That one proposition does or does not assert the very fact which was already asserted in another, may appear from the form of the expression, that is, from a comparison of the language; but when the two propositions assert facts which are *bona fide* different, whether the one fact proves the other or not can never appear from the language, but must depend on other considerations. Whether, from the attributes in which Socrates resembles those men who have heretofore died, it is allowable to infer that he resembles them also in being mortal, is a question of Induction; and is to be decided by the principles or canons which we shall hereafter recognize as tests of the correct performance of that great mental operation.

Meanwhile, however, it is certain, as before remarked, that if this inference can be drawn as to Socrates, it can be drawn as to all others who resemble the observed individuals in the same attributes in which he resembles them; that is (to express the thing concisely) of all mankind. If, therefore, the argument be admissible in the case of Socrates, we are at liberty, once for all, to treat the possession of the attributes of man as a mark, or satisfactory evidence, of the attribute of mortality. This we do by laying down the universal proposition, All men are mortal, and interpreting this, as occasion arises, in its application to Socrates and others. By this means we establish a very convenient division of the entire logical operation into two steps; first, that of ascertaining what attributes are marks of mortality; and, secondly, whether any given individuals possess those marks. And it will generally be advisable, in our speculations on the reasoning process, to consider this double operation as in fact taking place, and all reasoning as carried on in the form into which it must necessarily be thrown to enable us to apply to it any test of its correct performance.

Although, therefore, all processes of thought in which the ultimate premises are particulars, whether we conclude from particulars to a general formula, or from particulars to other particulars according to that formula, are equally Induction; we shall yet, conformably to usage, consider the name Induction as more peculiarly belonging to the process of establishing the general proposition, and the remaining operation, which is substantially that of interpreting the general proposition, we shall call by its usual name, Deduction. And we shall consider every process by which any thing is inferred respecting an unobserved case, as consisting of an Induction followed by a Deduction; because, although the process needs not necessarily be carried on in this form, it is always susceptible of the form, and must be thrown into it when assurance of scientific accuracy is needed and desired.

§ 8. The theory of the syllogism laid down in the preceding pages, has obtained, among other important adhesions, three of peculiar value: those of Sir John Herschel,(59) Dr. Whewell,(60) and Mr. Bailey;(61) Sir John Herschel considering the doctrine, though not strictly "a discovery," having been anticipated by Berkeley,(62) to be "one of the greatest steps which have yet been made in the philosophy of Logic." "When we consider" (to quote the further words of the same authority) "the inveteracy of the habits and prejudices which it has cast to the winds," there is no cause for misgiving in the fact that other thinkers, no less entitled to consideration, have formed a very different estimate of it. Their principal objection can not be better or more succinctly stated than by borrowing a sentence from Archbishop Whately.(63) "In every case where an inference is drawn from Induction (unless that name is to be given to a mere random guess without any

grounds at all) we must form a judgment that the instance or instances adduced are *sufficient* to authorize the conclusion; that it is *allowable* to take these instances as a sample warranting an inference respecting the whole class;" and the expression of this judgment in words (it has been said by several of my critics) is the major premise.

I quite admit that the major is an affirmation of the sufficiency of the evidence on which the conclusion rests. That it is so, is the very essence of my own theory. And whoever admits that the major premise is *only* this, adopts the theory in its essentials.

But I can not concede that this recognition of the sufficiency of the evidence--that is, of the correctness of the induction--is a part of the induction itself; unless we ought to say that it is a part of every thing we do, to satisfy ourselves that it has been done rightly. We conclude from known instances to unknown by the impulse of the generalizing propensity; and (until after a considerable amount of practice and mental discipline) the question of the sufficiency of the evidence is only raised by a retrospective act, turning back upon our own footsteps, and examining whether we were warranted in doing what we have provisionally done. To speak of this reflex operation as part of the original one, requiring to be expressed in words in order that the verbal formula may correctly represent the psychological process, appears to me false psychology.⁽⁶⁴⁾ We review our syllogistic as well as our inductive processes, and recognize that they have been correctly performed; but logicians do not add a third premise to the syllogism, to express this act of recognition. A careful copyist verifies his transcript by collating it with the original; and if no error appears, he recognizes that the transcript has been correctly made. But we do not call the examination of the copy a part of the act of copying.

The conclusion in an induction is inferred from the evidence itself, and not from a recognition of the sufficiency of the evidence; as I infer that my friend is walking toward me because I see him, and not because I recognize that my eyes are open, and that eyesight is a means of knowledge. In all operations which require care, it is good to assure ourselves that the process has been performed accurately; but the testing of the process is not the process itself; and, besides, may have been omitted altogether, and yet the process be correct. It is precisely because that operation is omitted in ordinary unscientific reasoning, that there is any thing gained in certainty by throwing reasoning into the syllogistic form. To make sure, as far as possible, that it shall not be omitted, we make the testing operation a part of the reasoning process itself. We insist that the inference from particulars to particulars shall pass through a general proposition. But this is a security for good reasoning, not a condition of all reasoning; and in some cases not even a security. Our most familiar inferences are all made before we learn the use of general propositions; and a person of untutored sagacity will skillfully apply his acquired experience to adjacent cases, though he would bungle grievously in fixing the limits of the appropriate general theorem. But though he may conclude rightly, he never, properly speaking, knows whether he has done so or not; he has not tested his reasoning. Now, this is precisely what forms of reasoning do for us. We do not need them to enable us to reason, but to enable us to know whether we reason correctly.

In still further answer to the objection, it may be added that--even when the test has been applied, and the sufficiency of the evidence recognized--if it is sufficient to support the general proposition, it is sufficient also to support an inference from particulars to particulars without passing through the general proposition. The inquirer who has logically satisfied himself that the conditions of legitimate induction were realized in the cases A, B, C, would be as much justified in concluding directly to the Duke of Wellington as in concluding to all men. The general conclusion is never legitimate, unless the particular one would be so too; and in no sense, intelligible to me, can the particular conclusion be said to be drawn from the general one. Whenever there is ground for drawing any conclusion at all from particular instances, there is ground for a general conclusion; but that this general conclusion should be actually drawn, however useful, can not be an indispensable condition of the validity of the inference in the particular case. A man gives away sixpence by the same power by which he disposes of his whole fortune; but it is not necessary to the legality of the smaller act, that he should make a formal assertion of his right to the greater one.

Some additional remarks, in reply to minor objections, are appended.(65)

§ 9. The preceding considerations enable us to understand the true nature of what is termed, by recent writers, Formal Logic, and the relation between it and Logic in the widest sense. Logic, as I conceive it, is the entire theory of the ascertainment of reasoned or inferred truth. Formal Logic, therefore, which Sir William Hamilton from his own point of view, and Archbishop Whately from his, have represented as the whole of Logic properly so called, is really a very subordinate part of it, not being directly concerned with the process of Reasoning or Inference in the sense in which that process is a part of the Investigation of Truth. What, then, is Formal Logic? The name seems to be properly applied to all that portion of doctrine which relates to the equivalence of different modes of expression; the rules for determining when assertions in a given form imply or suppose the truth or falsity of other assertions. This includes the theory of the Import of Propositions, and of their Conversion, *Æquipollence*, and Opposition; of those falsely called Inductions (to be hereafter spoken of)(66), in which the apparent generalization is a mere abridged statement of cases known individually; and finally, of the syllogism: while the theory of Naming, and of (what is inseparably connected with it) Definition, though belonging still more to the other and larger kind of logic than to this, is a necessary preliminary to this. The end aimed at by Formal Logic, and attained by the observance of its precepts, is not truth, but consistency. It has been seen that this is the only direct purpose of the rules of the syllogism; the intention and effect of which is simply to keep our inferences or conclusions in complete consistency with our general formulæ or directions for drawing them. The Logic of Consistency is a necessary auxiliary to the logic of truth, not only because what is inconsistent with itself or with other truths can not be true, but also because truth can only be successfully pursued by drawing inferences from experience, which, if warrantable at all, admit of being generalized, and, to test their warrantableness, require to be exhibited in a generalized form; after which the correctness of their application to particular cases is a question which specially concerns the Logic of Consistency. This Logic, not requiring any preliminary knowledge of the processes or conclusions of the various sciences, may be studied with benefit in a much earlier stage of education than the Logic of Truth: and the practice which has empirically obtained of teaching it apart, through elementary treatises which do not attempt to include any thing else, though the reasons assigned for the practice are in general very far from philosophical, admits of philosophical justification.