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PRESIDENTIAL ADDRESS.—WHAT IS LOGIC ?

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I.

It is a thorny subject to which I have the honour of inviting your attention this evening ; nevertheless, with the assistance which your kind attention will afford, I hope to succeed in driving a path or two through the thicket, of such breadth and in such directions as will render the general nature, principles, and outlines of the subject sufficiently clear and intelligible. I call the subject a thorny one, because in no other department or province of philosophy have the thorns so rankly sprung up and choked the good seed as in this province of Logic ; to an extent, indeed, which threatens to obliterate its connection with philosophy altogether, and so win it back into the howling and unchartered wilderness of quasi-scientific babble. A pretty predicament truly for Logic, in which, if in anything, must be found, what cannot but exist, the essential bond of kinship uniting all kinds and departments of knowledge.

By the thorns I mean, as you will readily surmise, the crop sown by the old hereditary enemy, antithesis, and counterfeit of philosophy, Empiricism ; and that, in this case as in others, under both its main forms, English on the one hand, German or Hegelian on the other. And it is high time that we should have this subject of Logic brought before us in its length and breadth. Nine years of practice, counting from the foundation of our Society, a Society called by the name of the first great systematiser of Logic, may well be followed, in the tenth, by a direct effort to bring the theory of Logic into distinct consciousness. We cannot be expected to acquiesce without a struggle in the metamorphosis of the Analytics of Aristotle into the Empirics of the nineteenth century. Only I fear I cannot promise you that our tenth year will see the fall of this our Troy, the empiricising views of Logic which I have signalised.

Logic has had a singular history. It so thrived and prospered on its Aristotelian basis, after the decay of Neo-Platonism and the establishment of Christian Theology, and before the advent of the positive sciences, that it seemed actually to have reduced the *omne scibile* under the dominion of its formulas, and thereby almost lost sight of its own nature and principles. It seemed to imagine that its task as an Organon or instrument of thought was virtually done, and that the further discovery of Truth could consist solely in the re-handling and re-arrangement of already acquired facts, by means of its dialectical disputations. Such goodly proportions did it attain in the later days of the Scholastic period, so portly and so dignified was its figure, that, if I may be pardoned for the simile, it grew unable even to see its knees, much less use them in advancing to a goal. It became, in fact, a confirmed invalid, confined to its bed by plethora, a sick man, whose name and inheritance became, on the advent of positive science at the era of the Renaissance, a subject of much interesting speculation. Not that its expectant heirs could afford to let it die. The very existence of the inheritance depended on the name, and the name on the life of the owner. What then was to be done? There was plainly but one course to take—to personate the owner, adopt his name, and give out that he was convalescent. This was done, and Empirical Logic came into being as the result.

Empirical Logic, as I have just noticed, has two main forms, English and Hegelian. Let us see briefly, in the first place, in what sense it is that these are to be called empirical as distinguished from analytical. This will lead us in the next place to see, how and why it is, that Logic in the true sense is necessarily analytical, and what is implied in its being so.

Now Logic becomes empiricism when it is confounded with reasoning as a whole, that is to say, with the whole action which aims at truth, and not distinguished as containing only the law or laws of that action. This confusion is common to both the English and Hegelian empiricism. Where they differ is, that the English school takes the aim of reasoning to be to discover truth or the laws of nature; while the Hegelian school takes its aim to be to create and be truth, or laws of nature.

Hence *Induction* is the watchword of the English school, induction being the great method of discovering matters of fact, whether particular or general, by the subsidiary means of observation and experiment. Its error, as I think I shall make plain farther on, lies in including too much in the data of what it conceives to be Logic. It takes objects already compared as its data; whereas the act of comparing, by which the supposed data of Inductive Logic are partly

formed, and which is therefore included in every one of those data, is itself a logical act or act of thought, but one which is thus left wholly out of the reckoning. English empiricism, therefore, excludes the specific act of thinking from its conception of Logic, by making what it calls Inductive Logic begin with data, in which that act is implicitly included and taken for granted; with this singular result, that it thereby reduces the so-called Inductive Logic to the rank of a register, or a system of rules for registering, the relations of already compared facts to one another.

One of the forms taken by English empiricism is that of mathematicising Logic. This is a mode or case of the fallacy just noted of taking objects already compared as the data of Logic. Numbers are objects already compared, as when we say $2 + 2 = 4$. But the act of forming numbers is itself a logical act, exercised in matters specially distinguished for a special purpose, namely, the act of distinguishing the abstract time or times of anything occurring to consciousness. It is a logical act because, as we shall see presently, it depends on the Postulates of Logic, the Laws of Identity, Contradiction, and Excluded Middle. And this act is included in, and required by, the comparing of numbers with one another, which is numeration or counting in the concrete, that is, mathematical dealing with numbers.

Nor is this true of number only. All *quanta*, spatial or geometrical as well as numerical, are objects already compared. The perception of equality between any two *quanta* supposes these already given as *quanta*, that is, as objects already compared with others and distinguished as *quanta*. But this previous act of comparing is a logical act, moving by the Postulates of Logic. It is then, logically or analytically speaking, prior to—at any rate it is a pre-requisite of—the perception of equality between *quanta*. Equality, therefore, is plainly not what is expressed by logical judgments in their logical character. You will know the mathematiciser of Logic by his adoption of the mathematical sign of equality, $=$, to indicate the copula, as in $A = B$. In brief, mathematics generally is a special mode of thought, and pre-supposes the laws by which all thought moves, simply in its character of thinking.

While English empiricism, then, is wrong in robbing Logic to enrich its pre-suppositions, thus reducing it to the rank of a method, sometimes of registering combined observations, sometimes of calculating combinations of abstract *quanta*, Hegelian empiricism merits its empirical character by an opposite error, that of allowing Logic no pre-suppositions at all. Purely preceptual data, as I hope to make evident presently, are in reality its necessary pre-supposition. These, however, the Hegelian school take up and, as it were, absorb

in acts of logical thought, as necessary features of its own nature, but belonging to it as products not as pre-suppositions of that nature. They empiricise Logic, first, by making it remove its neighbour's landmark, and include in itself what really belongs not to thought but to perception; and then by exhibiting the union of the two properties so constituted as at once the *minimum* of experience, and the creation, as process and product at once, of what they call real and concrete thought. Thus, the movement of thought being logical, the laws of nature, which are its process or product, appear in consequence as laws of a Creative Dialectic. "The Concept," says Hegel, "is that which determines itself, being absolutely self-identical Negativity."* Empiricism of this kind is diametrically opposite to the empiricism of the English school. It is not like that, the empiricism of a rough practical common sense, proud of disregarding what it considers useless speculative refinements, but rather the empiricism of some subtil thought-builder, who takes speculative refinements to be the aim and object of philosophy.

If it be said that, after all, this system of subtleties is as good as true, being at any rate irrefutable, the answer is that it is irrefutable only so long as the assumption on which it is founded remains undetected. Now the undistinguishable union of perception with thought appears as the *minimum* of experience only when we take experience to consist of a series of steps in time-sequence, as we do, for instance, in passing from subject to predicate in a judgment, whereby we *eo ipso* take its terms, whether abstract or concrete, as empirical, that is, unanalysed wholes or units, refusing to enquire by analysis into the composition of the terms taken severally. We thus exclude from consideration all relations between the terms but those of greater or less generality, that is, of Genus, Species, and Individual, which are relations belonging to logical thought or Conception. The assumption which underlies this method is, that Thought is the sole generator of experience; or again, otherwise stated, that the Concept (*Der Begriff*) is All that is. And this assumption, so far as Logic alone, and not Metaphysic, is concerned, may be expressed by saying, that Hegel substitutes Thought, which is one mode of Consciousness, for Consciousness in its entirety, as the evidence or subjective aspect of Reality.

The phenomenon, or state of facts, upon which this fallacious interpretation has been put, is as follows:—Every possible object of consideration, down to the very simplest, is something concrete,

* "*Der Begriff ist als absolut mit sich identische Negativität das sich selbst Bestimmende.*" Wissenschaft der Logik. Zweiter Theil, Zweiter Abschnitt. Die Objectivität.

feeling and form, content and nexus, together. It is, therefore, susceptible of analysis, quite irrespective of what specifically it is, what the concrete object is, which we select for consideration. It is an union of attributes, *i.e.*, a concrete, independently of our selection; but it has also an unity, as compared with other concrete units, given to it by our selecting it for consideration. These two kinds of unity are quite distinct; and the distinguishing them, one from the other, is also matter of analysis. The second kind of unity we know to be conceptual, that is, due to our own act of thought in selecting an object for consideration. But what about the first? Is there anything to show that this unity also is due to a conceptual act? It is certainly not due to any conceptual act of ours, being in every case the pre-supposition of such acts, being found in the data upon which they supervene. To say that it is due to an act of conception exercised by the concrete unit itself, is not only an unsupported, but when we come to look at it closely, an unthinkable notion. We are therefore, left to analysis of the phenomena in both the cases mentioned; in the first case, to analysis of the phenomena as perceptual data of conception; in the second, to analysis of the act of conception as exercised upon, and therefore as distinguished from, the perceptual data. Now this second kind of analysis is that which gives us insight into the nature of Logic.

II.

But now, bearing these results in mind, let us approach the subject from a quite different direction. Let us ask ourselves what, after all, we mean by Logic; what we expect it to be, what we want with it, or ask it to do for us? Two questions, you see, are here put—first, what Logic is; secondly, what the good of it is. We thus approach it as something entirely new to us. Even its place and function in nature we call in question. In fact, these two questions embody two suppositions about it, which formed a very old subject of debate concerning it—Is Logic an Art or a Science? The answer to this debate was, it is well known, that Logic is both the one and the other, having the two functions or departments, *Logica Docens*, in which it is a science, and gives the theory of an art, and *Logica Utens*, in which it is an art following the precepts laid down by *Logica Docens* as a theory.

Now, with which of these are we concerned to-night—with both, or with neither? We are concerned partially with both, and with the relation between them; but we are also concerned with a third thing, namely, with the relation borne by both the one and the other

to the phenomena which come under their survey, and, as a special part or province of those phenomena, to the mental or psychological function of thinking, upon the existence and exercise of which they, as the Laws of that exercise, are dependent.

There is, in fact, a Theory of Logic, quite distinct from *Logica Docens* as the theory of *Logica Utens*. And it is to this Theory of Logic that we have recourse in obtaining an answer to the question of this evening. What is Logic? For this question obviously includes both What is *Logica Docens*? and What is *Logica Utens*? And in giving that answer to this larger question, concerning Logic as a whole, we are evidently referred to something which, in that point of view, lies beyond Logic; and that something can only lie in two directions, according as we distinguish Logic either from the object-matter with or upon which it operates, or from the agency or activity which it guides in moulding and re-moulding that object-matter. That which operates, that which is operated on, and the operation—these three are an exhaustive division of the whole phenomenon indicated by naming any one of them. It is only by treating the question in this comprehensive way that it is possible to obtain an answer to it which shall be in any degree satisfactory, the question itself being so wide and comprehensive.

Now, the very fact of the distinction, within Logic, of *Logica Docens* from *Logica Utens*, shows that Logic is bound up, on the one hand, with some practical mental activity, having a purpose in view, and, on the other, contains laws to which that activity is subject, and by obedience to which that purpose is obtained. This mental activity itself, then, cannot be disregarded in endeavouring to understand its purpose and its laws, which together constitute *Logica Docens* and *Utens*; which is only saying in other words, that the psychological relations of Logic must form an essential part of its whole theory. And on the other hand we have seen above, that this activity with its laws pre-supposes certain perceptual data, upon which it operates as its object-matter; and this forms the other complementary part of that above-mentioned something distinguished from Logic, which is requisite to our framing a theory of it, or giving an answer to the general question with which we began. We have, then, (1) an activity operating, (2) perceptual data operated on, and (3) the operation itself, the laws of which are logical.

So far, then, as we have gone at present, I think it is clear that Logic contains the laws or forms of thought or reasoning in application to phenomena, the laws or forms in or under which we think, as distinguished from perceiving. *Logica Docens* contains the systematic account of those laws or forms, under the three main heads of Conception, Judgment, and Inference, together with a

system of rules for their application; and *Logica Utens* consists in applying the same laws, forms, and rules, to test the validity of reasonings, whether in the different departments of science or in matters of every-day life and opinion, all reasoning being the application of thought to phenomena, and Logic in its use being the application of the laws of thought to test, correct, or confirm that process of thinking.

The Theory of Logic thus takes its rank as a department of that general subjective analysis of the phenomena of consciousness or experience, in their entirety, which I have been accustomed to call *Metaphysic*, a department which may be conveniently named *Meta-logic*; while Logic as a system or theory itself, that is, *Logica Docens*, which supplies the laws, forms, and rules for application by *Logica Utens*, takes rank side by side with the theoretical part of *Ethic* as the science of the laws regulating one of the two main branches of human, conscious, and volitional action, namely, that which is directed to the discovery of the True; the other branch, which belongs to *Ethic*, being that directed to the discovery and, through the discovery, to the actual and effective choice of the Good.

III.

The general position, scope, and nature of Logic being so far ascertained, we have next to examine it somewhat more in detail. We see, that what the name *Logic* primarily suggests and conveys as its meaning is that part of the whole which we have called *Logica Docens*; for this it is which contains that system of forms and rules of Concept, Judgment, and Syllogism, which compose, as it were, the body of logical doctrine or science. We seem at this point, or rather I ought to say we should seem, if I have been properly clear and distinct in my exposition hitherto, to stand on plain and intelligible ground, the outline, purpose, and general character of Logic, as a system by which thought is guided in the pursuit of truth, being brought into distinct view.

But it is precisely here, and in consequence of this being done, that the main *crux* in logical theory arises. Logic, we have seen, is a practical science; by which of course is meant one which conveys precepts for the conduct of reasoning processes, as distinguished from one which seeks merely to establish truths of fact about them or any other phenomena. *Θεωρητικῆς μὲν γὰρ τέλος ἀλήθεια, πρακτικῆς δ' ἔργον.* (Aristotle—*Metaphys. A Minor*, Cap. I., quoted in Mansel's Edition of Aldrich.) But, considered closely, is there such a thing as

a practical science at all? Is it not an impossibility, being a supposed union of contradictories in one and the same act, like the thought of a round square? This question was staved off for a time by saying that Logic was both Art and Science, and distinguishing *Logica Utens* as the Art, *Logica Docens* as the Science. But the question itself is not thereby solved. *Logica Docens* by itself is a practical science; and thus the question, whether a practical science is not a contradiction in terms, meets us when we consider *Logica Docens* by itself, and on its own ground.

The difficulty or apparent contradiction is this:—Science, seen in any of the conscious actions which go to constitute it, or as the conscious action of knowing, is a knowledge of something existing independently of that act of knowing; practice as a conscious action is choosing something which is both non-existent at the time and is not independent of that act of choice. The object of science must be thought of as necessary, and not contingent on the act which knows it; that of practice as not necessary, but contingent on the act which chooses it. Thus the one action necessarily excludes what the other necessarily involves; and therefore one and the same act cannot in all its parts, or in one and the same respect, bear both characters, that is, be science and practice at once. In other words, a science which is practice, or a practical science, is an impossibility.

This difficulty is not a mere subtlety of over-refinement. It meets us in a much more ordinary and common-sense form of statement, which is just as hard to encounter. I mean, in shape of the question, does Logic tell us how or what we ought to think, in order to think rightly, or does it tell us how or what we do and must think, supposing we think at all? Or again,—Are the Laws of Logic laws by which all thought invariably moves, or laws by which it ought to move, to attain its object, truth? Or again,—Are they laws or general facts of Nature which cannot be disobeyed, being facts, or are they commands or precepts given, like human laws, for a purpose, and capable like human laws of being violated?

It will not do, in solution of this difficulty, to identify reasoning generally with reasoning well, and to say that to reason illogically is virtually not to reason at all. This may be a mere subterfuge. We know well enough that there are processes of reasoning which are illogical, fallacious, and erroneous; in other words, that there is such a thing as bad reasoning as well as good. In fact, if there were not, if error in reasoning were an impossibility, why cultivate Logic at all? Our reasonings would then be all infallible, done for us and through us by Nature, and truth would be attained, by us

or by them, necessarily and inevitably, with the same unerring exactitude as the planets perform their revolutions, and the seasons recur in their circuits. The fact of error in thinking, and the constant possibility of its occurrence, are the very facts which give rise to the cultivation of Logic, and determine its function.

On the other hand, the idea that we can reason illogically, can reason disobeying the laws of Logic all the time, seems to suppose a complete divorce between the laws of reasoning and those of Logic, a divorce which on its part is unthinkable. For if the laws of Logic are not also laws of reasoning in the wide sense, meaning laws of thought in its entirety, what are they, and of what can they be laws? The activity or function of thinking is that in which they inhere, and which they are said to govern. They constitute its nature as an operation of thought. What is it without them? What are they without it? It seems, then, that thought or reason is incapable of being illogical; and yet we have just seen the very opposite appearance assume an equally imposing aspect of certainty. We thus have before us the very same *cruz* as before. Reasoning practically can and very often does violate the laws of Logic, and yet, as a matter of fact, reasoning is constituted reasoning solely by fulfilling those laws.

I dwell upon this point because I think it is seldom seen quite in its true light, or brought out in its full significance, by writers on Logic. Mansel devotes some pages to it, both in his *Prolegomena Logica* and in the Introduction to his edition of Aldrich's *Rudimenta*, but accomplished logician as he is, and instructive as his writings always are, his remarks on this point cannot, I think, be considered entirely satisfactory. And yet the point is one which gives more insight into the nature and functions of Logic than any other point connected with it, and not of Logic only, but of the practical sciences generally, and of the human agent, whose nature is the ground or field in which the union of the practical with the speculative, of practice with science, takes place. But now for a few words as to the solution of this apparent contradiction.

The point of the difficulty lies in the fact that practice, being a step forwards into the unknown future, pre-supposes alternatives, and with them the possibility of error, while reasoning, being a forward movement in obedience to fixed and irreversible law, which offers no alternatives, apparently excludes the possibility of error. It seems, therefore, that one and the same forward movement, or conscious action, cannot possibly bear both characters at once. Now this is undeniably true, so long as we take the action in question as an undivided, or rather undistinguished whole. But there is nothing to show that a conscious action may not be so distinguishable into parts

or elements, inseparable from each other, as to be knowledge of truth in one part, or in respect to one element of it, and to be initiation of event in another part, or in respect of another element, and yet retain its unity as a conscious action, being the union of the very parts or elements which are so distinguished, and which exist within it in mutual reference to each other, as parts of a single whole. To show this, it would be necessary to point out what the parts or elements so distinguishable in it are, and make their positive reality evident.

But to what quarter are we to look for a ground of distinction applicable to a single conscious action of thought? What is it which constitutes it an action of thought? Its obeying the laws of Logic. To that quarter then, we must first look, though this alone will not give us the full solution. Are the so-called laws of Logic alike? By no means. There are in fact two quite different classes to which what we call Laws of Logic belong. There are first the Postulates or Axioms of Logic, the so-called three Laws of Identity, Contradiction, and Excluded Middle; and secondly there are the laws which govern the various modes and forms of Judgment, and of Syllogism. Of these two classes, the former is the foundation of the latter; the former are Laws of Nature, constitutive of thought as thought, laws which cannot be, and as a fact never are, disobeyed in thinking; the latter are Institutions, founded on the former, but still institutions which have the nature of precepts, established for the purpose both of premonishing thought in seeking truth, and of criticising and correcting it, when it professes to embody its attainment in definite statements.

All concrete thinking or reasoning, then, without exception is subject to, and moves forwards only by obeying, the Postulates of Logic; but it does not at the same time necessarily move forwards by obeying or moulding itself into those forms of conception, judgment, and syllogism, which have been selected and established by Logic as closely and obviously conformable to the Postulates. It does not spontaneously take those forms at all;—the reason of this we shall come to presently;—nor need it do so in order to be good and valid reasoning; it is not from obedience to them, but from obedience to the Postulates, that its validity is derived. Still this does not solve the difficulty, for we have seen that, although these laws are laws of Nature which cannot be disobeyed, yet some concrete thinking or reasoning is illogical, fallacious, and erroneous, and is shown to be so by its *not* obeying these very laws. How can this be, if the so-called reasoning is reasoning at all? If these laws are not violated when we reason wrongly, what do we mean by reasoning wrongly? Something is violated by it;—what is it, if not the Postulates?

What is violated is the harmony of two or more results of concrete reasoning with each other, or with other results of reasoning, all the lines of concrete reasoning severally moving forwards by obedience to the Postulates. The harmony of different lines of reasoning with each other in their results, which is one expression for Truth in reasoning, is then violated, or rather not attained at all; and this non-attainment is shown by the fact of the results when brought together being self-contradictory, that is, being impossible in combination without violating the Postulates. When we come to a result in concrete reasoning which contradicts another result, one of these must be wrong. Why? Because we cannot, *and do not*, think them both together. To think them both together, that is, as both true together, or in combination, *would* violate the Postulates, were it possible. But it is impossible; and this impossibility is the necessity of the Postulates, as Laws of the Nature of Thinking. They are a test of truth in concrete reasoning, just because they never are or can be violated.

Truth itself is not a test, but an aim. We realise a harmony to some extent in every step of our advance in concrete reasoning, a step in advance towards an ultimate harmony, or harmony of harmonies, which is an Ideal, that is, Truth. But the harmony itself, or the fact of moving towards a harmony, is no test of truth, any more than the Ideal, or Truth itself, is. It is the proximate aim, as Truth is the ultimate aim, of the movement in reasoning. And both harmony and truth require testing, to distinguish the real and lasting from the apparent and evanescent. This test is found only in the avoidance of contradiction in the results, so that one apparent harmony does not contradict another. If they do, one must be, *and is*, given up. Which of the two is given up, and which retained, is then determined by an examination of the two lines of reasoning which either have led to them, or may now be followed in support of them.

This may be illustrated by the parallel case of mathematic. The laws of Arithmetic are not violated when I add up a column of figures wrong. In saying for instance, $7 + 17 = 23$, I come to an erroneous result, but its necessary error consists in their necessary inviolability. I am confused in my units; which is shown by the fact, that I cannot think out distinctly 17 added to 7 without seeing that 23 is one of the many cases of contradiction to the only true sum, namely, 24. Every number, not 24, is forbidden by the laws of arithmetic.

But you will say, this test is merely negative, destructive of false results, but not productive of true ones. The true result is not produced, but merely left standing, by the application of the test. What produces, in reasoning, any result at all; and how do the Postulates of Logic concur to its actual production? What is reason-

ing as a positively productive, or as it is sometimes called, *synthetic* process? These questions can only be answered by reference to the system of functions to which thought or reasoning belongs. And the answer to them will also supply the second and completing part of the solution of our original *crux*, by showing the parts or elements, in the conscious action of practical reasoning, from which error springs, and by distinguishing these from those which are necessary to it as reasoning simply. We have just had a distinction of parts pointed out in the laws of logic, which reasoning obeys; we shall now see a corresponding distinction pointed out in the reasoning function which obeys them. Combining the two distinctions, we shall then see at once the full answer to what I called the *crux*, the question, namely, How reasoning can be reasoning and erroneous at once, or how any reasoning can as reasoning be erroneous?

Let us then consider reasoning as a productive or synthetic process, and in connection with other functions of the conscious agent. We shall then see, on the one hand, the relation in which thinking stands to its data, the perceptual matter which it remoulds into the form of concept and judgment, and on the other the motive power by which that remoulding is effected. When we speak of thought as synthetic or moving forwards, what we mean is, that it is impelled to give a new shape to data which are already in consciousness, by the desire of discovering the relations between them, and so reducing them to harmony. It is this desire which makes thought a volitional as well as conscious action. This side of the nature of thought or reasoning may be called its psychological, as distinguished from its logical, character. It is that which it possesses as the action of a real conscious being or agent.

In this character, that is, simply as the volitional conscious action of a real agent, and apart from its logical character, it is subject to two Laws, which are sometimes classed, though in my opinion not with strict accuracy, as logical. One is the Law of *Parcimony*; the other the Law of *Ratio Sufficiens Cognoscendi*. The former attaches to it simply as action, and corresponds to the law of movement in the line of least resistance in mechanics. It means, that, in desiring harmony in our thought, we always desire it on the easiest terms, or in the simplest form possible: *Frustra fit per plura quod fieri potest per pauciora*. The latter, or law of *Ratio Sufficiens Cognoscendi*, attaches to thought as action upon given data, and what it expresses is, that the nexus between them must be real, that is, found and capable of being pointed out in the data themselves, whereby one may be regarded as involving, or being a reason for, another. *Assert nothing without a reason why you assert it*—may be taken as its formula. It is plain, I think, that these laws express the nature of the reasoning process,

simply as conscious volitional action, aiming indeed at truth, but irrespective of its logical character as a self-sifting, and therefore a self-validating or self-justifying action, since they supply of themselves no test of true or false, no test as to whether the harmony, which may be attained by the action in any case, is real or only apparent. They express the nature of reasoning as a tentative process simply, which in any case it is; they do not, like the Postulates, attach to it both as a tentative and as a conclusive process. In short they belong to it as existing *de facto*, but not as *de jure*.

The two psychological laws now mentioned are a sufficient account of what is called the synthetic or constructive process or character of reasoning. No *a priori* forms of the understanding or the reason are employed or required to build up experience, as an experience of a real world. I obtain perception of real concrete solid objects, and of a connected world of such objects, by putting together different perceptions, and perceptions of different kinds, in the only way in which they will harmonise one with another, without bringing one partial harmony into contradiction with another. It is thus, for instance, that perceptions of colour and perceptions of hardness are harmonised into a perception of a single concrete visible and tangible object. Such an object is the interpretation, on the easiest terms, of a multitude of visual and tactual perceptions, constantly varying, and varying in constantly corresponding relations with each other. Until we have so interpreted the perceptions and their perceptual relations, we have no category or concept of Substance. That idea is their product, not their generator. We construct our knowledge of the real world tentatively, out of perceptual data belonging to what are sometimes called feelings of internal and external sensibility.

Synthetic reasoning, then, is tentative. The word *tentative* contains the solution of the whole question. At least, it puts us on the track which leads immediately to the illuminating light. What are the data which reasoning is the tentative effort to harmonise? They are those of mere sensation, perception, and spontaneous association or redintegration of sensations or perceptions. Percepts given by non-volitional channels, and percepts renewed in ever-changing groups by non-volitional channels—these are the data or matter upon which thinking operates; and thinking arises in the consciousness which we suppose occupied by this non-volitionally given matter, at the moment when desire arises to harmonise any portion or portions of what is so given. At that moment we are said to give attention to the data for the purpose of knowing them; attention being an exercise of volition, and that volition being a volition for the purpose of reducing the data into an order which they have not as data simply.

Below this point our consciousness is filled with non-volitional or spontaneously offered percepts, not indeed unconnected, but confusedly connected with one another; above it a change to order begins, and our consciousness becomes filled with percepts moulded into concepts, concepts connected into judgments, and judgments connected into reasonings; the whole state or process, so far as it is above the point in question, being described by universal usage as one of thought or reasoning. The spontaneous processes of perception and redintegration below the point do not cease, so as to make way for the substitution of the volitional process of reasoning above it; but they continue to exist as its feeders, supplying it with its data, and being perpetually moulded, as it were, into its tissue.

Now we see whence error comes into reasoning, and why it is inevitable. It comes from the data which, at any given moment of tentative reasoning, are supplied to thought by the non-volitional content or current of consciousness. It may be that these data consist, either wholly or in part, of concepts or ideas already formed by previous reasonings. This does not prevent them being real data of further reasoning. It is sufficient for their function as data, that they should be supplied from sources which are ultimately perceptual in their nature, and through channels which, at the moment of the reasoning, are spontaneous or non-volitional. Confused perception and confused imagination are thus the only ultimate source whence error springs, but springs inevitably, in our tentative reasonings, or attempts to bring the data of perception into harmony with one another.

Thus in the above instance of wrong addition, the numbers 7 and 17 are the data, and these it is of which my perception or imagination is confused. I confuse, say, 7 with 6, or 17 with 18. The error has its source, not in the reasoning part of the process, the act of addition of units, but in the confusion of one imagined group with another, which, for my purpose, ought not to be in consciousness at all. It is to avoid this confusion that rules or methods of arithmetic are given, such as writing down the figures in columns, with units under units, tens under tens, and so on, and then adding each column severally, and carrying the excess, if any, to the next highest column. To such rules as these in arithmetic correspond, in Logic, the forms of subject and predicate; universal and particular, affirmative and negative, propositions; place of the middle term in syllogisms; and the various rules for dealing with these, such as the *Dictum de omni et nullo*, the rules about antecedent and consequent in hypothetical syllogisms; and so on, throughout the whole of *Logica Docens*.

The moment, then, which distinguishes spontaneous from voluntary redintegration is the moment which marks the transition from perception to thought, the modification of perceptual forms of consciousness

into conceptual and logical forms. Voluntary attention to the perceptual data for the purpose of knowing them, or perceiving their relations to one another, of whatever kind these relations may be, is the real act by which the transition and modification are effected. I say to the *perceptual* data, because I wish to put aside the case in which the data consist of, or contain, already formed concepts. Concepts may be among the data of a given act of thought, because they may be supplied from the stores of memory by spontaneous redintegration, and attention may even be employed to bring them back into consciousness by setting the trains of association at work to which they belong. But these cases do not throw light upon the origin of the reasoning process, meaning thereby not its historical origin, but its nature and connections when considered as reduced to its simplest instances, or lowest terms. If concepts are taken among the data of reasoning processes, the same question again recurs concerning their formation into concepts, and the enquiry is not thereby advanced. The moment of the formation of concept, and the moment of origin of the reasoning process, are one and the same. This moment is that of transition from percept to concept, not merely from one concept to another. The data, therefore, must be taken, in regard to the question before us, as purely perceptual.

Psychologically, then, we see that this moment of the origin of reasoning is a moment of voluntary attention, a moment of passing from spontaneous to voluntary redintegration. But what is it logically? What is the logical *differentia*, or character which marks the reasoning, or voluntary redintegration, which it initiates, as logical? How is it the origin of Logic as well as reasoning? This is the real core of the question which I am attempting to answer this evening, What is Logic? The answer is, that the act of attention operates in and by the Postulates of Logic. They are the law of its operation. It acts or takes place in no other way than that of which they are the briefest and simplest expression. Thus: I attend to a percept, singling it out for reference to or comparison with others; this percept let us call *A*. Now in this act what is contained? First, that *A* is *A*, and *A* alone—which is the First Postulate, or Postulate of Identity. But why, you will say, make a Postulate of so obvious and trivial a circumstance? The reason is, that *psychologically* we cannot retain *A* unaltered in consciousness for a moment. Even in stating the proposition, *A* is *A*, the first *A* is a thing of the past when we utter the second. What we gain, therefore, by the proposition is the statement that the first *A* is what we mean by *A*, whenever we say it. We arrest, thereby, a moment of consciousness in thought, that is, *logically*, notwithstanding that *psychologically* it has gone from us never to return.

The second Postulate, *A isn't Not-A*, is involved in the first, being involved in the same severing and arresting act of attention. By *A* is meant, not merely *A* alone, but *A excluding everything else*. The opposite aspect, so to speak, of Identity is expressed thereby, the difference of *A* from everything else but itself. This is called the Law or Postulate of Contradiction.

The third Postulate is likewise contained in the other two, both severally and conjointly. *Everything is either A or else Not-A*. There is no third alternative. This is called the Law or Postulate of Excluded Middle. It is clear that it merely accentuates or ascertains the meaning of the two former Postulates, expressing the exhaustiveness of the division marked by *A* and *Not-A*.

These Postulates are Laws of Nature, so far as they express the nature of the act of attention for the purpose of knowing; and they are Postulates or ultimate Canons of Logic as a practical science, so far as they may be appealed to as a test of reasoning, or laid at the foundation of other logical forms and rules. They are the whole fulcrum and leverage of the act of thought, so far as thought is a logical process, and they are so because they are laws of the nature of the act of thinking as a psychological process. No logical reason can be given for their logical validity, because all logical reasoning is built upon and pre-supposes them. The fact that they are laws of the psychological process of attention and reasoning is no evidence of their logical validity. All we gain by appealing to that fact is to show the absence of any possible rivals to them as ultimate laws of reasoning, and thereby at the same time to bring them into harmony with what we have, for the purpose of the enquiry, excluded from them, that is, with the *de facto* world of natural realities; a momentary exclusion based ultimately on the distinction between knowing and being, between our knowledge of reality and the reality known thereby.

The Postulates of Logic thus stand at the head and source of all reasoning processes, in the wide sense of the term reasoning. Without them there is no Conception; there is no Judgment; there is no Inference; which are the three functions giving origin to the three main departments of Logic, with their subdivisions and doctrines. The *A* of the Postulates stands for any percept whatever, modified into a concept by the act of attention in order to know it. In attending to it for that purpose, I select it from the perceptual context in which it has occurred, and wait to see what will be suggested, after my selection, either out of its own content as a percept, or out of the perceptual context in which it occurs, as predicable of it. Thus it is only as a concept, or arrested percept, that it enters into a judgment, and it is only as the subject of a judgment that it acquires a definite

content as a concept, its perceptual content becoming its conceptual predicate. Comparison, which is the perception of similarity and dissimilarity in percepts purposely attended to, is thus involved in every logical judgment which predicates one content of another, whether affirmatively or negatively, and thus it is that a first beginning of classification is made. Classification in its entirety, as the process and result of grouping similars with similars, and apart from their dissimilars, thus rests on the application of the Postulates of Logic.

At the same time it is clear that, though the conscious act of attention which singles out a percept for the purpose of knowing it and so modifies it into a concept, is governed by the Postulates, and cannot take place without bringing the selected percept under them, yet the Postulates in no way dictate the choice which it makes. The choice is dictated by something in the content offered by the non-volitional process, either of perception or spontaneous reintegration of something which operates as a motive for our attending to it. The Postulates are completely indifferent to the particular percept or content selected, or about to be selected, in the act of attention. In fact, the Postulates of Logic, though essentially involved in the act of choice *as an action*, are completely indifferent to the alternatives which it contains, and completely non-essential to it as a choice of *this* rather than *that*. They are like a balance which is essential to the act of weighing, but indifferent to the decision, whether *A* or *B* is the heavier. Thus one and the same single act of attention for the purpose of knowing is liable to error on the part of its content, and exempt from error on the part of its logical place in thought; which place it takes in virtue of its operating through the Postulates. That single act itself has two inseparable but distinguishable elements, one being derived from its perceptual content, the other being the rudiment and foundation of its logical form.

The solution, then, of our original *crux* is briefly this. An act of concrete reasoning consists psychologically of two parts in close connection with each other, one spontaneous the other volitional, one supplying its perceptual data, the other dealing with them under the law of the Postulates. Whenever the reasoning as a whole is erroneous, the error arises from the spontaneously supplied data, and not from the volitional action, which, so far as it is simply an application of the Postulates, is infallible. At the same time it is this latter part of the whole action in which its *differentia* as reasoning consists, and which gives the character of a reasoning to the whole.

IV.

Turning in the next place to the derivative or institutional part of Logic, founded on the Postulates, the first thing to be noted is, that it is selected and instituted for a definite purpose, this purpose, the aim which makes *Logica Docens* a practical science, being that of serving (1) as a preventive in initiating, and (2) as a test in criticising reasonings, whether our own or those of others. The same forms and rules must serve for both the purposes, and in both the cases mentioned. The latter consideration at once restricts our selection very considerably. Men generally must agree in recognising the forms and rules to be chosen, as being the forms and rules which they find most serviceable in their own reasonings with themselves.

But this restriction would again be practically removed, and an almost indefinite amplitude be restored to the body of Logic, or logical doctrine, if the purpose of reasoning itself were conceived as any other than that of attaining a knowledge of Truth, that is, of the general and particular facts of Nature. If, for instance, Disputation, and victory in disputation, were regarded as ends in themselves, or as the ultimate ends of reasoning, then it would follow that Logic would be regarded as an armoury, to be filled, as completely as possible, with weapons of the highest attainable precision and widest attainable range. All possible distinctions and all possible combinations of logical ideas and modes of thought would be sought out, named, and classified, and the elaboration of this system regarded as contributing to the perfection of the science. This was, I believe, to a very great extent, the case towards the close of the Scholastic period, and yet this very perfection of the system is generally, and in my opinion truly, held to indicate the decline of Logic as a system conducive to the ascertainment of truth.

It is, of course, a question of the greatest delicacy and difficulty to strike the true medium between too much and too little in so complicated a matter; nor am I about to make any attempt to do so. Some principles, however, which should guide the selection may perhaps be suggested. The first consists in requiring the immediate and obvious dependence of the forms and rules to be selected on the Postulates. Another is disregard of differences arising from specialities of the object-matter of the reasoning. And thirdly may be mentioned disregard of forms and rules, suggested solely by grammatical forms and modes of language. Speech and writing are the servants of thought, and should be employed without suffering them to dictate the form which thought should take. The employment of diagrams falls under the same principle. In every case the eye of

thought should be fixed upon the thought itself, asking what we mean in using this phrase or that, this diagram or that; and whether what we really mean by one phrase or diagram is the same or not the same with what we really mean by another.

In considering what I have called the body of Logic, that is, the selected rules and forms which it incorporates in *Logica Docens*, the first province is formed by the application of the Postulates to the perceptual data, and embraces conception and concepts (1) in their relation to perception and percepts, (2) in the relation of concepts to one another. Its main subdivisions treat (1) of the comprehension and extension of concepts; (2) of singular and universal terms; (3) of what may be called the logical categories, or heads of predicables, which are four according to Aristotle, *Genus, Definition, Property, Accident*; five according to Porphyry, *Genus, Difference, Species, Property, and Accident*; (4) of logical division and definition; and (5) of the opposition of concepts. Of these I can touch only on the first this evening, and that but cursorily.

Judgment, we have seen, is employed in the first formation of concepts. But until judgment has completed the formation of a concept by predication of a content, there is nothing in the judgment to distinguish it from a mere act of attention for the purpose of knowing, or from the Postulates *per se*. We cannot understand what judgment is, without taking it in contradistinction from the completed concepts which are its own products. Concepts are thus the condition of our understanding concrete judgments; and it is concrete judgments, or in other words, affirming or denying predicates having a content of subjects having a content, that form the second province of Logic, inference from judgments being the third.

The first province, then, that of Conception, contains, first and foremost, the relation of concepts to their perceptual data; secondly, and consequently, the relations of classes of concepts to each other. Concepts spring, as we have seen, from percepts, and their truth or accuracy is verified by an appeal to percepts again. Appealing to experience means appealing to percepts in the last resort. The great change wrought by conception in percepts is, that the resulting concepts are general terms. All concepts, as such, are general; all percepts, as such, are singular or individual. When, for instance, in a perceived object I fix my attention upon what we afterwards call an attribute, for the purpose of knowing it, say, the attribute of its red colour, I hold that single instance of red fast in thought, abstracting from the other attributes of the object; and what follows is, that similar instances of redness group themselves spontaneously with it in consciousness. The name which I give it, *red*, then signifies all the instances as well as this one, and not only all instances in the

past; but its signification is prospective also, that is, includes all future and all possible instances of it, if such there should really be.

The word *red* thereby acquires two quite distinct meanings, primary and secondary, but both of them general in a wide sense. Primarily it means the whole class of shades or modifications of a special colour sensation, similar *inter se*, the whole gamut of shades of red; that is, it means *redness generally*, which is commonly called its *comprehension*. Secondarily it means the whole class of occurrences or instances in which any of these shades occur, one of which we have supposed to be the percept originally attended to; that is, it means *red objects collectively, qua red*, which is commonly called its *extension*. In the first meaning the concept *red* is a strictly general or universal, in the second a collective or aggregative term. But both its meanings are derived solely from perception, and retained only so long as it is held applicable to percepts again. Percepts are facts, concepts are modes of taking them, or thoughts about facts.

There are no names for the percepts as such. To indicate them as percepts we must either give them what are called *proper names*, or prefix a demonstrative pronoun, or some equivalent of one, to a concept-name, as *this redness*, *that red object*. Their names are, as it were, reflected back upon them, from the mirror of conception, which their own rays have first struck. The application of a concept-name to a percept or group of percepts gives what is called its *denotation*; the percepts are denoted by it. And the percepts denoted may belong either to its comprehension or to its extension; that is to say, in the instance before us, they may be either one, more, or all the shades of *redness*, or they may be one, more, or all the instances of *red objects qua red*. But the name itself, in order to be applicable, must have a meaning; and this meaning, as distinguished from what its application denotes, is called its *connotation*. Its connotation, therefore, consists of its *comprehension*. Members of the extension of a concept-name, in regard to which that name is not strictly general but collective or aggregative, are at once denoted and connoted by it; that is, in the present case, denoted as objects, connoted *qua red*. Their existence, ὄτι ἔστιν, is denoted, and their nature, τί ἐστίν, is connoted, by the same word.

When we come to the case of concrete objects consisting of combinations of abstract percepts, of which we have taken redness as an instance, say, for instance, oranges, to keep to the class of red or at least ruddy objects already introduced, we find the same phenomena meeting us again, but in a more complex way. The concept *orange* has then for its extension and denotation all oranges whatever and wherever; and for its comprehension and connotation a certain combination or union of all the general concepts expressing

the abstract perceptual qualities or attributes which are combined in each particular orange; say, for instance, to make a selection for brevity, redness, sweetness, solidity, and roundness. The greater complexity of this case is shown by the circumstance, that the conceptual combination of these concepts is not a combination of the whole comprehension of them severally taken. As combined in the concept *orange*, it is only some shades of redness, some kinds of sweetness, some modes of solidity and roundness, that the combination includes. Many things are red, sweet, solid, and round, besides oranges. It is only, to speak figuratively, the *common intersection* of these general concepts, considered as brought together and superposed, which constitutes the general concept *orange*.

Why, and how is this? The reason is, that our conceptual combination is artificial, or instrumental to a knowledge of nature as it really is, and that nature presents us with combinations of qualities, as, in the present instance, with the combination of the qualities named, in the perceptual objects denoted by the concept-name *orange*. In every orange taken as a concrete percept, the redness, the sweetness, the solidity, the roundness, are combined into a single thing, called a real orange, in a way quite different from the imaginary conceptual superposition and intersection of the concepts, red, sweet, solid, round. When I perceive an orange, I perceive that natural combination or interpenetration of qualities, each present in one singular or individualised mode only; when I conceive one, what I conceive is a case or instance belonging to the extension of the concept *orange*, which concept is formed by the common intersection of the comprehension of the concepts, *red, sweet, solid, round*. I perceive the thing as it exists, as nature has made it; but I can understand it only by (1) analysing it into percepts, (2) conceiving these as general terms or concepts, and (3) combining these latter, so as to exclude all those modes of them which are not found in natural combination with the others.

The natural or perceptual combination of qualities in a concrete object, as in an orange, should be distinguished by a name, and perhaps may be best called the *Intension* of the object, as opposed to the comprehension of the concrete concept of it, *orange in general*; some singular or individual mode of the intension being possessed by every member of the extension of the concept. An individual concrete thing is thus a whole of intension, as opposed to the concept which gives the general name of the thing, and which is either a whole of comprehension or a whole of extension. Intension, in fact, in the complex or more concrete case, takes the place of the simple perceptual quality or attribute, *e.g., red*, with which we began in the simple or abstract case. I need hardly remark, that the perceptual

unity, or whole of intension, differs *toto cœlo* from the conceptual unity or whole either of comprehension or of extension, that is to say, from a whole which is marked either by a strictly general and universal, or by a collective term. I mean, that it cannot in any sense be called a general or universal term.—I trust I may be pardoned if I add, that I believe the distinction now drawn out between the *Intension*, *Extension*, and *Comprehension* of logical terms, will be found somewhat more consonant to the general usage and nomenclature of logicians than that which, I regret to say, is contained in a certain passage of my *Philosophy of Reflection*, although the view upon which both are founded remains substantially the same. What is distinctive of my view is its reference of the term *Intension* to the perceptual content of logical terms, as distinguished from their conceptual content, whether in comprehension or extension; *intension* and *comprehension* being usually taken as synonymous.

V.

Time warns me to leave untouched the many other matters belonging to the first province of Logic, and hasten to the second, the province of Judgment. Propositions are statements of judgments; a proposition is an assertion either affirmative or negative, that is to say, is the expression in words of the action or process of either joining or disjoining, in thought, two terms, both being in some way present to consciousness. Those who consider thought to be the only ultimate mode of consciousness are here in an embarrassment, which is especially obvious in the case of negative judgments;—how can thought disjoin what only thought puts together, and that in one and the same undivided moment? It would seem that they must hold, that to contain a contradiction is an essential attribute of truth, not to contain one being impossible. In this embarrassment we are entangled, if we adopt the Hegelian conception of thought as the sole generator of its content. It is true that Hegel avowedly accepts contradiction as the basis of his system; but then his notions of what contradiction is are peculiar; and the sense in which he accepts it is not the same as that in which I charge him with it.

Apart from this unfounded conception, the essential point concerning judgments is the nature of the nexus between their terms, not as facts or objects in nature, but as terms of judgment, that is, as either joined or disjoined in thought. In the case of categorical judgments this nexus is called the *copula*, and is expressed by the words *is* or *is not*. The copula itself is thus either affirmative or negative. And, if we start from the basis already shown to be the

basis of judgments, we shall see that what the judgment expresses by its copula is the coalescence or non-coalescence of its terms, when the former of the two, which is called the Subject, is held fast by attention with the view of seeing what it will immediately suggest. If this experience compels their union, we affirm the latter, that is, the suggested term, which is called the Predicate, of the first or suggesting term, which is the Subject of the judgment. If the experience forbids their union, by showing an incompatibility between them, as for instance, if *round* suggests, but will not coalesce with *square*, we deny the predicate of the subject.

If on the other hand it neither compels nor forbids it, our judgment remains in suspense, but the experience gives ground for judgments of a special kind, namely, judgments of possibility and greater or less probability, which come under the head of Modal Judgments. This plainly brings into the constitution of the judgment considerations founded on differences in the content of the terms compared, as distinguished from the simple connection or non-connection of the terms with one another, which is expressed by the copula as affirmative or negative. Modal judgments, therefore, are really two judgments in the guise of one, a judgment of connection or non-connection, and a judgment of the degree of certainty attending the assertion of it. As modals they are distinguished into judgments of fact simply, of probability or contingency, of possibility, of impossibility and necessity. The basis of the whole, however, remains the same, namely, the simple categorical assertory judgment of the fact of connection between two terms. And accordingly any modal judgment may be expressed as a categorical, by throwing the expression for its degree of certainty out of the copula into the predicate; as, for instance: Injured men are probably vindictive; The clock has certainly struck twelve.

A simple categorical affirmative proposition thus expresses the coalescence of one term with another in thought, these terms being, not simple percepts, but concepts. More strictly, then, the copula asserts their connection or partial identity in thought, because of their coalescence in perception. Simple connection is thus the meaning of the copula; not equality; not identity; not existence. The reason is, that, Logic being a sifting and testing process, the judgments and propositions admitted into its forms must be *minima* of thought, the very lowest and simplest forms which can be found, not forms which pre-suppose and involve anything already known. To express existence by the copula, we must first know what the term *existence* means. Propositions expressing existence, therefore, form a special class called existential propositions. Again, propositions expressing equality or identity are not simple but double

propositions, convertible, two propositions in one. It is only a relation of greater or less in quantity, only a relation of partial identity in kind, that the logical copula can express. And this it does by a simple and direct application of the Postulate of Identity, *A is A*, to concrete percepts, turned by thought itself into concepts. *A* stands originally for any percept; and *A is A* only; well then,—*What is A?* Analyse your percept. State one of its features to begin with. We thus get *A is B*, yet without ceasing to be *A*. And *A is B* is the type of all simple categorical affirmation. In order to express the existence of the Subject, or its equality, or its identity, with the Predicate, the existence, equality, or identity, must be thrown out of the copula into the predicate; as, *A is Equal-to-B*.

We have already seen that the terms of judgments belonging to the second province of Logic are not simple percepts, but concepts. This is a most important point. Judgment is a continuation of the very same process by which, as we have seen, percepts are modified into concepts. And that is why predication, which expresses the connection of concepts, expresses also the coalescence of percepts, and necessarily speaks either in order of comprehension or in order of extension; or rather I should perhaps say, *speaks* in forms which include both, but always *intends* either in one order or in the other. Thus when we say *Men are rational*, what we mean is either: the comprehension of the concept *man* comprises something which also belongs to the comprehension of the concept *rational*, in other words, All men possess some mode of rationality; or: The extension of the concept *man* is comprised in the extension of the concept *rational*, in other words, All men are in the number of rational beings.

The ordinary phrase, *Men are rational*, clearly suggests the order of extension, and carries that meaning obviously on the face of it. Consequently Logic, which for its purposes is bound to adopt ordinary forms of speech, adopts along with them and explicitly uses the order of extension in categorical predication. This introduces quantification of terms and propositions into Logic, as, All men, Some men, This man; All mortals; Some mortals; This mortal; the concept *man* or *mortal* being supposed to remain unmodified all the time; which is really impossible, since every group of men or mortals differs also in point of comprehension and extension from other groups, and is thus in reality a new or modified concept.

A door is thereby opened to enriching Logic with a complicated mass of pernicious lumber, under pretext of developing it to its full limits as a science; as if its true aim were to construct a Labyrinth for the stowage of Statistics, and not, what it really is, to minimise its structures to the very lowest point consistent with efficiency in premonishing and criticising thought. As, for instance, by the naive

confession of Logicians themselves is the case with the Five Subaltern Moods in Figs. I, II, and IV,—(to quote lines which have since become famous on quite different grounds):—

“Quinque subalterni, totidem generalibus orti,
Nomen habent nullum, nec, si bene colligis, usum.”

Its most pernicious effect, however, is perhaps this, that it leads us to forget, that in all cases we are speaking of concepts, as, in the instance before us, of men only *qua* human, and thereby to neglect the essential maxim of substituting the Definition for the concept-name, in all serious reasoning. For always, whether we speak in order of extension, or in order of comprehension, we are speaking of concepts, and therefore whatever statement we make, the *intension* of the individuals spoken of, that is, their perceptual analysis as percepts, whether abstract or concrete, is what ultimately decides the truth or falsity of the statement. In this sense it is, that the truth of logical judgments depends ultimately on experience; this term properly meaning immediate perception. But it does not depend on experience in the sense which English empiricists put upon that word, meaning thereby the concrete objects of common-sense experience, thought as the particulars covered by the extension of a logical concept, and taken in that character as ultimate data; to the exclusion of the process by which perceptions, which are the really ultimate data, have been worked up and moulded into the concrete objects of ordinary life.

This latter process, which is always a reality, after as well as before the first formation of concrete objects in knowledge, and which has undoubtedly had besides a separate as well as real existence, in the infancy both of individuals and of the race, is necessarily governed by logic, being a process of thought; and thus it is that logical laws, which are laws of experience in its entirety, are not based upon experience in the English empiricist's sense; but that, on the contrary, experience in that sense is based upon them, as one of the forms which thought takes in moulding the ultimate data given by experience in its true sense of immediate perception. Experience in the empiricist's sense is the product not the generator of logic. Thought embodies the results of experience so far as it has at any time gone; nor will any but an empiricist profess that the judgment, *Men are rational*, implies that all the individuals, who have belonged and who will belong to the extension of the concept *Man*, have been examined, and found to possess the attribute of *rationality*. It is not so that logical judgments are passed, or logical terms formed; it is by means of perceptual analysis of perceptual data immediately

experienced, and moulded into conceptual form by acts of attention, on the part of those who frame or pronounce them, to those perceptual data.

A word or two must be said on the other forms of judgment and proposition selected by Logic, and first of the hypothetical, which is the only other main form of them, side by side with the categorical. A categorical proposition speaks of a single thing or event, its Subject, and states its intrinsic nature, by stating what it is or is not; a hypothetical proposition speaks of a relation between two things or events, and states what is or takes place outside one of them, the Antecedent, on the supposition of the Antecedent being or taking place; as, *If A is B then C is D*. There is thus no difference but one of form between the two classes of propositions; in fact, any statement which can be made in the one way can be made also in the other; it is simply a matter of convenience, both classes utilising forms of speech which are at once popular, exhaustive, and expressive of *minima* of thought. Things and Relations are an exhaustive division of experience. The interdependence of elements of experience is brought explicitly forward in hypotheticals, by assuming one distinct from another to begin with. And this interdependence is taken by them simply as a fact, parallel to the fact of intension or inseparability of elements in percepts, and is not assumed to rest on any law of *Ratio Sufficiens*, Causality, or Uniformity, in Nature.

Moreover, it is important to remark that the interdependence spoken of is taken, in hypothetical propositions, as dependence only, that is as one-sided, not reciprocal. Were it reciprocal, it would not be a *minimum* of thought. It would then answer to convertible propositions in categoricals, which are really two propositions cowering grammatically under the cloak of one, as we have already seen.

To these two main forms of judgment two others are added, subordinate to each respectively, the Disjunctive and the Hypothetico-disjunctive. The former is adopted for the purpose of stating an exhaustive division of the possible predicates of a thing or an event, taken as the Subject of the proposition; the latter for that of stating an exhaustive division of alternative Consequents of a given Antecedent. The alternatives must belong to the consequent not to the antecedent, as otherwise the proposition would be double, that is, virtually not one but two. Between them these four forms sweep, as it were, the whole area of experience open to judgment, and sweep it in a sufficiently minute and exhaustive manner, without in any way depending, for their constitution as judgments, upon any particularities in the content of the experience.

VI.

Passing over the subordinate matters belonging to the second province, I proceed to the third and last. The third province of Logic embraces reasoning in its narrower sense of Inference. As the essential and cardinal feature of Conception is the reference of concepts to percepts; and that of Judgment is the copula in categorical propositions, and the relation expressed by the form, *If—then*, in hypothetical; so the essential and cardinal feature of Inference is the Middle Term in categorical syllogisms, and the nexus expressed by the Canons relating to antecedent and consequent in hypothetical syllogisms.

It must, however, be premised, that inference itself is of two kinds, mediate and immediate, an immediate inference being one which depends either upon the immediately perceived equivalence of the terms compared, or upon their immediate subordination to the Postulates; and Syllogism embraces mediate inferences only. As an example of the first kind of immediate inference may be taken the equality of *B* to *A* as inferred from that of *A* to *B*; the perception of equality being double or reciprocal, as requiring the magnitude of two terms to be perceived at once; and as an example of the second, the proposition, *No plants are animals*, as inferred from the proposition, *No animals are plants*. What we have, then, in an immediate inference is always a perception of what may be called opposite sides, or aspects, of one and the same thing. But only those pairs of opposite aspects are immediate inferences, one from the other, which involve no prior reasoning to establish the thing, or the relation, of which they are the opposite aspects, terms, or members. For where this is required, the prior reasoning supplies a reason or ground, usually in the shape of a definition, which mediates the inference and makes it possible; as, if I know that *A* is father of *B*, I also know that *B* is son of *A*, but only because I have previously framed the conception of fatherhood, and established its definition as a relation between persons. In other words, immediate inferences, strictly so called, must be ultimate as well as immediate. It is with these cases only that we are not concerned in syllogism, since they fall back into the province of perception governed solely and immediately by the Postulates of Logic.

Mediate inference, drawn by way of syllogism, is that with which the third province of Logic is chiefly concerned; being concerned with the ground or reason for the assertion of a judgment, different from either term of the judgment itself. The *Questio* or Conclusion of a syllogism is always a categorical or a disjunctive judgment; and

categorical syllogisms exhibit the reason for passing this judgment in the form of a middle term or concept. The terms of the conclusion then coalesce with one another, because each coalesces with one and the same term, or (in order of extension) with one and the same part of that term. Thus, to take our former instance, we assert that *Men are rational*; Why? Because (1) they act from anticipation of consequences, and (2) so to act is to be rational. The middle term here is *acting from anticipation of consequences*. General propositions proved in this way can be used in turn as the major premisses of syllogisms; and thus the regress in search of middle terms, in proof of one major premiss after another, means continued analysis of one concept, or general term, after another, until the whole field of object-matter, relevant to the original question, has been explored and reduced to logical division, classification, and definition.

But categorical syllogisms with their middle terms are not the only way of proving categorical conclusions. Hypothetical syllogisms also conclude with categorical or with disjunctive judgments, as for instance: If there is a three days' frost, the ice bears; but to-day there has been a three days' frost, therefore to-day the ice bears. What is it in this syllogism which answers to the middle term in categorical? Plainly it is the simple fact, that a three days' frost is followed by ice that bears, without any ground or reason for that fact being assigned. There is, indeed, nothing of a reason in the syllogism but the bare fact of the dependence of ice on frost, embodied in one of its Canons, namely:—Affirm the antecedent, and you must affirm the consequent. For the reason or ground of the dependence we must look elsewhere, that is, elsewhere than to this or any other hypothetical syllogism. The major premiss of the hypothetical syllogism is what really requires proof, that premiss stating the fact of dependence as a general truth, the minor merely stating that a particular instance of the antecedent term really occurs. Hypothetical syllogisms are thus precluded, by their form, from establishing any of those relations of dependence which they assume in their major premisses. One hypothetical syllogism cannot give the ground or justification for another, as is the case with categorical syllogisms.

We are thus thrown back ultimately upon categorical syllogisms in all reasoning directed to establish the grounds or reasons for inferences. To show, for instance, the ground or reason for a three days' frost being followed by ice that bears, would take us into the analysis of the phenomena concerned, by finding answers to the questions: What we mean by ice bearing, by frost, by the action of freezing in producing ice, and so on. That is to say, it would take us into an enquiry, the steps of which can be accurately expressed

only by a succession of categorical syllogisms employing middle terms. The reason of this fact itself is evident. It is, that the reason or ground of any fact, event, or connection of facts or events, must lie in their nature or *whatness*, and not in the mere circumstance that they exist or take place, or are as a fact connected with one another.

Not that in categorical syllogisms, or in their middle terms, we arrive at anything beyond or deeper than simple matters of fact, that is to say, at anything immediately perceived as a reason or ground, as well as a fact; which would involve the contradiction of a conceptual character, or "second intention," being immediately perceived. What we arrive at by the regressive analysis of a chain of syllogisms is the constant feature or features constituting things or events, or the constant set of circumstances, sifted out from others, under which they exist or take place; which analytical sifting gives us the law or laws of their existence or occurrence, and enables us to predict their occurrence in future cases. The features or circumstances so discovered in regressive analysis are what we call conditions, either proximate, intermediate, or ultimate, of the phenomena in question; that is to say, are conditions as distinguished from causes; this latter term always implying the contradiction of an immediate perception of the fact of conditioning *per se*, or in other words, of the causal character of that which we discover to be the condition of something else. The term *condition* expresses the fact of a perceivable relation between two or more things; the term *cause* expresses a non-perceivable character in a single thing.

What I have just said brings me, in conclusion, to the last point which I propose to mention, a point closely connected with what was noticed at the outset, that the aim or purpose of Logic was not simply to reason, nor even to reason well, but to test the validity of reasoning, by a return upon itself, and a reference to its own laws. What I have now to mention may be regarded as a consequence, or if you will an allied form of that earlier statement. It is this, that Logic in its processes, syllogism included, is not directly engaged in discovering facts or laws of Nature; that is to say, is not a Method of Discovery. Logic is Thought engaged, not in following the Proteus-changes of Nature, but in watching its own steps in following them. In every syllogism it asks *what we mean* by this or that objective thought of our own, and finds the answer always in experience, that is to say, in immediate perceptions of our own. The objects thought of, and their objective laws, which we call Nature, are no doubt the ultimate object-matter of the process; but then again, we know that they are so only through and by our own objective thoughts and perceptions. We cannot, in Logic, assume any fact or law of

Nature, not even the Law of Causation, or the law of Uniformity, without a warrant in our own objective thought. In other words, we cannot logically make such a law the ultimate basis of logical thought. This would be to fall into the well known fallacy of *a priori* speculation, a fallacy of which Kant and German Idealists are far indeed from being the only persons guilty.

You see, I doubt not, to what point I am tending. Induction is a Method of Discovery, and one which is founded, sometimes avowedly, on the assumption of the Law of Uniformity. A method of discovery involves starting with some hypothesis as your guide, were it only the most abstract and general of all hypotheses, the law of uniformity. Discovery without hypothesis is not method but simple analysis, perceiving and noting what is offered, without any guiding determination on the part of the percipient. It follows that Induction, though perfectly valid as a reasoning process, is not Logic, nor any part of Logic. *Inductive Logic* is a *Round Square*. For the inductive reasoner must appeal to the analysis of experience governed by the Postulates of Logic to furnish his ultimate basis of induction, the Law of Uniformity. Inductive reasoning, in thus taking its ultimate hypothesis from experience guided by Logic, does not thereby become Logic, but remains simply reasoning belonging to some science, or other branch of knowledge, according to the kind of object-matter with which it deals. Nor does the fact, that inductive methods can be classified and reduced to a general system or theory, suffice to show the identity of that general theory with Logic, which is a theory or system of a special kind. Precisely the same must be said of deductive reasoning and deductive logic, wrongly so called. Both induction and deduction are Methods of Reasoning; Logic is analytic simply, its laws, which are necessarily involved in both, resting solely on the Postulates, which are themselves not merely Postulates, but Axioms, discovered by immediate perception, and involved in every exercise of purposive attention.

Nor can the inductive reasoner by any possibility establish his requisite basis of hypothesis by the method of induction itself. Induction is legitimated as a method of discovering particular laws of nature solely by bringing them under the Law of Uniformity, established in the way above indicated. And it is plain that induction cannot by itself establish the Law of Uniformity, because the only way to do so is by way of syllogism, and no induction pure and simple can be thrown into the form of a valid syllogism. The fact that it cannot is demonstrable by the attempt, and failure of the attempt, to do it; a demonstration virtually given by Aristotle himself.

Aristotle exhibits induction pure and simple in syllogistic form,

thereby showing its invalidity as a syllogism. He defines it as "proving the major term of the middle by means of the minor,"* instead of proving the major of the minor by means of the middle; that is, in other words, proving the major premiss of a syllogism, without travelling beyond the terms of the syllogism itself. Suppose, for instance, we have this syllogism in *Barbara* :

All compound bodies are liable to dissolution,
All oysters are compound bodies,
∴ All oysters are liable to dissolution.

The major term here is *liable to dissolution*, the minor *oysters*, and the middle *compound bodies*. Changing this into an inductive syllogism, the major, *liable to dissolution*, would be proved of the middle, *compound bodies*, instead of being proved of the minor, *oysters*; and the new or inductive syllogism would run as follows :

All oysters are liable to dissolution,
All oysters are compound bodies,
∴ All compound bodies are liable to dissolution.

And what this would apparently prove would be the major premiss of the former syllogism; but this it would prove only by the assumption, that *oysters* and *compound bodies* are at the least convertible terms, an assumption not only quite unwarranted by observation, but, what is here more to the purpose, inconsistent in the place where it stands, with the logical laws of predication and syllogism.

All that this inductive syllogism can prove is that some compound bodies, namely, oysters, are liable to dissolution. In other words, we have not moved a step farther than the point at which we stood with our major and minor premisses taken separately. No third truth, and certainly not the major premiss of the original syllogism, results from them. Consequently, by throwing pure and simple Induction into logical form, we have shown that it apparently yields new truth only by the violation of logical law, and therefore forms no part of Logic, however valuable and valid it may be as a mode of reasoning resting on hypothesis supplied from elsewhere. Induction at any rate must therefore abandon its claim to share our sick man's inheritance. Let us hope that this abandonment will not be without its beneficial effects, but that it may even contribute its quota to revive the drooping energies of the sick man himself, *in propria persona*.

* Mansel's rendering. See his account of the Aristotelian Induction in the Appendix to his edition of Aldrich, in which he in turn refers to Hamilton. What I am now doing is merely drawing the conclusion necessitated by this account of the process. The passage of Aristotle referred to is Anal. Prior., Book II., chap. 23.