

ARTICLE III.

THE PRESENT STATE OF LOGICAL SCIENCE.

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LOGICAL science is one of the oldest of the sciences, and yet seems still far from having completed its growth. More than two thousand years ago it had attained a distinctly scientific form, and has been most diligently cultivated through all the succeeding ages; and yet, not since the days of Aristotle has it experienced a more fostering care or a larger development than in the last half-century. It is to-day in its freshest vigor and promises to itself in the future its maturest life.

It claims to be the chiefest of the sciences as well as also the parent and lawgiver of them all,—“*ars artium et scientia scientiarum.*” On the ground of either of these claims,—as first and highest in nature and rank, or as, by its own right, lawgiver and judge over all the realms of knowledge,—there may reasonably be demanded of it, that it should be, in fact, the most perfect of all, and so the worthy exemplar of all. It has not yet shown itself able to meet this demand. Of a perfect science nothing less than this can be accepted, that it should first distinctly and firmly grasp its subject matter, and then unfold it, in exact method, to completeness, both in its intrinsic and also in its extrinsic attributes; observing everywhere the relationships of the parts to one another and to the whole in their organic connection and dependence.

It is proposed in the present discussion to show that the more prevalent logics of the present day, with all the fostering work that has been bestowed on the science in recent times, fall deplorably short of this standard of a perfect science. The neglect of the study, although in-

disputably the best of all means of intellectual discipline as well as the validating instrument and the surest guide in all scientific pursuits, may reasonably be attributed to this imperfection in the form in which it presents itself. But merely destructive criticism is not our present aim. On the contrary, our discussion will be conducted rather in the spirit and the interest of logical construction. Our method will be to take two leading works as the best representatives of the most recent logical literature, with free reference, however, to other writers in this field of study, and indicate the more important defects in their presentations of the science, with the obvious improvements which the examination may suggest as requisite to be made in the science for its greater perfection. The two works thus selected are believed to be the most authoritative expositions of logical thought in Great Britain and in Germany. The one is Professor Jevons' "Principles of Science: a Treatise on Logic and Scientific Method"; the other is the "Logik" of Professor Wilhelm Wundt, of the University of Berlin. They are both extensive treatises, filling two large octavo volumes, the first published in London in 1874, the other in Stuttgart in 1881-3.

I. THE PLACE OF LOGIC AMONG THE SCIENCES AND ITS DISTINCTIVE CHARACTER.

Sir William Hamilton had classed logic among the "nomological sciences," and defined it indifferently as "the science of the laws of thought as thought," or "the science of the formal laws of thought," or "the science of the laws of the forms of thought"; and Ueberweg had defined it as "the science of the regulative laws of human knowledge." Professor Wundt characterizes it as "a normative science." These views, if somewhat vaguely and obscurely presented, point in the right direction towards the true place of logic among the sciences. They distinguish it carefully from each of the two sciences with

which it is sometimes compared,—from psychology, or the science of the human mind, on the one hand, and ontology, or the science of the true and the real, on the other. Logic is not a subjective science, like psychology, nor objective, like ontology. It deals with the result of the fusion of the two,—with subject and object as legitimately fused in one,—with the resulting effect of the meeting of the activity of the subjective intelligence with its proper object, the true; in other words, with the product of the action of thought on the thinkable thing. It is thus a true nomological, a proper normative science, as it directs its view exclusively on a product of an active faculty exerting itself on its natural object, and presents the laws and forms by which this product is to be realized,—the norms which are the rules and the types of generic logical products.

Beyond all question, logical science, in any worthy unfolding of itself, must be thoroughly and perfectly mastered by this essential characteristic of its own nature and life. This is a vital condition of any successful treatment of it. The confession is to be made, that neither British nor German logic has consciously followed this indispensable condition; and not an inconsiderable part of its stumblings and its failings find their explanation just here. Psychological and ontological elements have been confusedly blended; purely subjective activities and purely objective realities have been indiscriminately mingled with proper logical forms, and the result has been error, mischief, offence.

As properly nomological, or normative, logical science, while it differences itself from psychology and ontology, co-ordinates itself with æsthetics, as the normative science of the products of the imagination or function of form, that is, the science of the beautiful or perfect in form as realized or to be realized in nature and art; and also with ethics, or the normative science of the workings of the free will on its proper object,—the good,—resulting in

the forms of right and duty. Logical science thus has its special character and its boundaries distinctly determined, so far as its essential movement is concerned. This is more exactly shaped by the proper object of its normative work,—human thought,—in its diversified forms and modifications.

II. THE NATURE OF THOUGHT AS THE SUBJECT MATTER OF LOGIC.

Logical science has, for the most part, accepted the view that it has to deal solely with thought,—with the product of the discursive intelligence, of the representative as distinguished from the presentative faculty of the human mind. The departures from this view have, in recent times at least, been unintentional or by mistake, or from inconsiderateness, perhaps, in the detailed elaboration of the science. The serious, not to say the fatal, defect in the construction of the science lies in the failure to determine at the outset precisely the nature of thought itself. It would be difficult to find a scientific statement in any logical treatise of what thought is. It seems never to have occurred to European logicians to found the science on any such formal exposition of the essence of thought, and to unfold from that its governing laws and its valid forms. They seem to have taken it for granted that everybody must know what thinking is, what thought is. They have not considered that loose popular notions, however familiar, lack the exactness in content and form required for scientific purposes. In fact, they have not attempted to evolve the science in any formal way from the essential nature of thought. Ulrici has indeed ventured on a definition; but his definition is wrong, and his exposition of the science does not grow out of the definition. Thought or knowledge is not, as he holds, essentially, fundamentally, and primarily, a result of differentiation. This process gives, at best, only a negation as the fundamental principle of knowledge. But, certainly, a negative

cannot be accepted as the primary form. I must know that a thing is, that it is real, that it has some property or characteristic, before I can distinguish or difference it from another thing. The view seems, indeed, utterly preposterous. The first thing known, most assuredly, must itself be known before it can be distinguished or differenced from some other thing which is not known. This process of distinguishing or of differencing is a merely instrumental process of perfecting the knowledge of an object by circumscribing or bounding it. How absurd to suppose I cannot think a field as to its reality and intrinsic qualities, until I have fenced it! Professor Wundt is wholly right in maintaining the contrary of this, when he shows that even the negative in thought rests on a positive. Distinguishing is, as to the knowledge of the thing itself in its essence, purely negative. It is concerned, not with essential attributes, but with the relations, the extrinsic attributes, of a thing. How preposterous to hold that the intrinsic properties can be known only after the extrinsic and only by means or on condition of these! Looking elsewhere, we fail to find in the logical literature of Europe any formal exposition of the essential nature of thought. Statements of laws and of rules, and enumerations of forms of valid thinking, indeed, imply a kind of unconscious conception of what thought is, so that one could interpret out of these statements and enumerations what conception of thought the writer must have had, or rather, what conception can harmonize these statements and enumerations; but the conception seems never to have risen to distinctness, so as of itself directly and consciously to shape the development of the science. We sometimes drop on a chance utterance which betrays the unconscious feeling. Sir William Hamilton, although noting divers characteristics of thought,—as that it is a “relative cognition,” “a mediate and a complex cognition,” “a cognition of one thing by the cognition of another,”—and accepting the phraseology of German

logicians, that in the judgment, which he recognizes as the primitive form of a complete thought, an object is determined by an attribute, forbears to make any formal definition of thought, or to build his logical superstructure on any formal statement, any distinct conception of its nature. Professor Jevons never turns his eye in this direction; his exposition, with much industrious application of logic to other sciences, is, in truth, wholly wanting in method and in scientific exactness of definition. It is, indeed, little more than a loose collection of observations more or less characterized by common sense. Professor Wundt, also, is unsatisfactory here. He takes up the concept as the germinant principle in thought; and the essence of the concept, he says, "consists in this: that it puts a plurality of ideas in relation to one another," while "the fixing of any relation between two concepts takes, in our thinking, the form of a judgment." How could any exposition of thought worthy of being recognized as scientific spring from such vague conceptions of its fundamental nature?

Now, it is by no means because the essential character of thought is to the human mind so mysterious, so involved in cloud, so slippery, that it must defy all endeavor to discern it, to apprehend it, to expound it in scientific form. On the contrary, it is within reach; it is discernible, even to the untutored introspection; it is simple, and admits of easy, intelligible exposition. As this essential character of thought must exist in every thought, of whatever kind or form, however simple and familiar, we shall not fail to find it in any instance of thinking we may take, for example, the thought that "the sun is bright." What is the essential thing which the active faculty of thinking in the human mind does in this act? It simply asserts an identity between what is conceived as "sun" and what is conceived as "bright";—"sun" is in a part of its nature "bright";—"sun" is the same in respect of one of its attributes as "bright." There is here a positive act of a

thinking faculty, and this is all it does,—it identifies “the sun” as partially “bright.” Simple inspection affirms this to be all that enters into the essence of a thought,—conscious identification of a subject with an attribute. Logical writers here and there in manifold ways, inexactly sometimes, confess this, as Hamilton, when he says: “thinking” is “cognition under an attribute.” They declare it to be an “equation,” an “agreement,” an “accordance,” a “resemblance,” between subject and attribute. Their exposition of logical laws and forms, as already hinted, involves this view of the nature of thought. “Identity” is put forth by Professor Jevons as the ground and principle of scientific knowledge. “Science,” he says, “arises from the discovery of identity amid diversity.” “In every act or inference or scientific method, we are engaged about a certain identity, sameness, similarity, likeness, resemblance, analogy, equivalence, or equality between two subjects.” “Every proposition expresses the resemblance or difference of the things denoted by the terms.” “The principle of identity,” says Professor Wundt, “is the fundamental law of knowledge.” The different systems of symbolical logic alike assume identity as the essential principle of all thought. We are justified, then, in laying down this as the exact definition of thought: *Thought is the conscious identification of a subject with an attribute.*¹

It will, of course, be understood that it is a function of thought to difference as well as identify,—to deny as well as affirm. As a whole, it is the function of consciously identifying or differencing subject and attribute in any object on which it acts.

¹ In the BIBLIOTHECA SACRA for October, 1864, the writer of this article, for the first time, it is believed, formally recognized the faculty of thought as “essentially an identifying faculty.” Ten years afterwards Professor Jevons enounced the principle of identity as the fundamental principle of science in the somewhat indefinite way stated in the text.

III. THE FUNDAMENTAL LAWS OF THOUGHT.

The essential nature of thought being thus ascertained, it would seem that logical science should at once evolve out of this nature the governing laws of thinking. As professedly a nomological, a normative science, a science of laws, this would seem to be a first thing. Most strangely, European logicians generally have agreed in giving to this exposition of laws nothing more than a passing notice, as if it were but a matter of purely incidental interest and of little importance in any exact science of thought. They have generally agreed in setting forth three of these primary laws; while some have added a fourth, which, however, has confessedly no affinity to the others and has no right to be ranked with them. These fundamental laws they have simply assumed, assigning no ground why they should be accepted as laws and so authoritative in all thinking. Perhaps it never occurred to them that any grounding of these laws was either possible or really desirable; they simply assumed them. Logical science, of course, was left, in this way, to rest on sheer assumptions, for which the only plea or possible ground was: "they are self-evident"; "no man can question them." With no distinct conception of the nature of thought, or with no formal presentation of it to their consciousness, it was the best, or even all they could do. The all-significant questions: Why are these statements, put forth thus arbitrarily by this and that thinker in the progress of the history of logic, to be accepted as laws of thought? Whence have they their authority? How do they, so far as observed, validate all thinking? Are these all the laws of thought? Is the enumeration an exhaustive one, so that there can be no others of this order?—these vital questions, which present themselves in the study of the nature of thought, pass unanswered.

A true method here prescribes that, immediately on

setting forth the essential nature of thought as its comprehensive and universal principle, logical science should present as subordinate laws such phases of this general principle as might be requisite for the more convenient application of it to the divers occasions of our thinking. The considerate inspection of thought discovers to us at once four such phases of it, giving us four fundamental laws, involved in the very nature of thought, and therefore of the highest validity and authority; four laws which are co-ordinate and complementary, forming a body of laws of all thinking as exhaustive in their rank and order as they are necessary to every true act of thought, and which, as observed, give to all thought unquestionable certitude. If the essence of all thought be as stated, then, in the first place, obviously, I must, if I think at all, in my thinking identify or difference some subject with some attribute. This is the so-called law of "disjunction." It is positive in its character. In the next place, in my thinking I must not do anything else than identify or difference subject with attribute. This is the so-called law of "exclusion," sometimes defectively understood and misleadingly named the law of "excluded middle." It is prohibitory in character. These two laws form the first pair or duad of the fundamental laws of thought. By obvious mistake they have sometimes been regarded as one; they differ as positive and prohibitory. In the third place, in actual thinking I must identify with the subject only an attribute belonging to it or difference from it an attribute not belonging to it. This is the so-called law of "identity." It is positive. In the fourth place, in thinking, I must not identify the different nor difference the same,—that is, I must not identify a subject with an attribute not belonging to it nor difference from it an attribute belonging to it. This is the law of "contradiction." It is prohibitory, and might more properly, as Hamilton suggests, be called the law of "non-contradiction."

Nothing could be more natural, more clear, more simple, more exact and complete, more indispensable for validating the specific forms of thought, more logically satisfactory every way, than this evolution of these fundamental laws of thought from its essential nature. The laws are not arbitrary assumptions; they have a legitimate parentage. They are seen at once to be born with a right to rule; to be authoritative over all thinking. They are, moreover, as seen in the light of this origin, intelligible and have a significance; whereas, without such a view of their genesis out of the very essence of thought, they are scarcely explicable, and the reason for any formal announcement of them is not readily perceived. Neither Professor Jevons nor Professor Wundt gives any satisfactory exposition of the significance and authoritativeness of these cardinal principles of thought.

IV. THE GENERIC FORMS OF THOUGHT.

From the nature of thought, giving rise to the four fundamental laws which it prescribes for all valid thinking, we are conducted at once to the number, nature, and relationship of the possible forms of legitimate thought. As to the number of these generic forms, which evidently has been the fruit of simple observation or of inductive generalization from actual experience, logicians may be said to be agreed. They enumerate three and only three, — the Notion or Concept, the Judgment, and the Reasoning. In regard to their origin, their proper nature, their specific forms, their relationship to one another, there is much variance. Failing to grasp the nature of thought and the significance and bearing of the fundamental laws of thought, it was a natural result that their expositions should be variant, lacking generally in method, in clearness, in correctness, in completeness. It is not presuming too much, perhaps, to say that their variances would be harmonized, their mistakes corrected, and their expositions be made more intelligible by the application of this

principle and these laws of all thinking. It is remarkable that logicians have agreed in placing the notion or concept first in order of their treatment. Hamilton does this, while giving clear intimations that the judgment should have the precedence. Professor Jevons has little or nothing to say of the genesis of concepts,—terms, as he designates them,—or of their proper nature as forms of thought. He contents himself with the enumeration of classes of logical terms and the modes of expressing and symbolizing them. Professor Wundt expends great labor on the nature and varieties of our “ideas” or the presentations of objects to our apprehensive nature, and the manifold ways in which they can be united. One form of this union of our presentative ideas he identifies as the concept, “the essence of which,” he says, “consists in this, that it puts a plurality of ideas in relation to one another,” and its “formation proceeds necessarily in inner connection with the development of the apperceptive thought-process.” His long and tiresome wanderings in the wilderness of ideas; his observations, and his groupings into classes on casual resemblances, under no principle of method that gives any assurance of an exhaustive survey, lead to nothing of any proper scientific value. In truth, the nature of the concept is left in an obscurity and haze more impenetrable than that which shrouds the loosest popular conception. In those systems of logic which place the concept at the beginning and at the foundation no truly scientific exposition is possible.

As might be reasonably anticipated, the treatment of the judgment by these logicians is equally unsatisfactory. In all his more formal statements, Professor Jevons reduces the judgment to a mere act of comparison. He fails to recognize any organic connection between the concept and the judgment as to their genesis or their nature. Even the pregnant hint of Sir William Hamilton, which escapes Hamilton himself in his development of the science, is turned to no account: “both concepts and reason-

ings may be reduced to judgments," as they "are, in fact, strictly only modifications" of it.

If Professor Jevons misses the exact significance of the logical judgment and its organic relationship to the comprehensive function of thought, Professor Wundt strikes directly at the very life of the judgment in his formal definition that it is "an analysis of a composite idea into its elements." A wider departure from the prevalent views of logicians, as well in their more formal definitions as in their looser explications generally, could hardly be conceived. This act of thought hitherto had been treated as a unifying act,—an act of synthesis; this new definition makes it just the contrary,—a separating, analytic act. Consistently with this, Professor Wundt affirms in so many words that "the copula is in no way a necessary constituent of the judgment." This unqualified affirmation is put forth in the face of his historical statement that "scholastic logic, since Boethius at least, has represented subject, predicate, and copula as essential constituents of the judgment." It is reasonably to be inferred from this that Professor Wundt has proposed to himself an entirely new construction of logical science, while yet not moved by a properly destructive or even adversely critical spirit. He has certainly failed of any properly thorough scientific treatment. Observation, however extensive or accurate, will not of itself suffice for scientific construction; nor, any more, will generalizations, however far they may be carried, if without rational ground or aim. Facts, accurately and thoroughly apprehended, definitions of subject-concepts and determinations of attribute-concepts on their discerned logical base respectively, and a method of development in reference to a true rational aim or end, must concur in order to a true science. We can satisfactorily to ourselves account, in part at least, for Professor Wundt's failure. Besides his omission to grasp at the start the essential nature of thought and its fundamental laws, and consequently the organic relationship

necessarily existing between the products of the same function, here in his exposition of the judgment it is plain that, in the first place, like some other logical writers, he has followed too closely the grammatical forms as the exact counterparts of logical forms, the modes of expression as the exact and full embodiments of thought; and that, in the next place, he has substituted a merely incidental and prelusive or inchoative element for the essential and vital principle of thought. In the logical judgment there is ever this prelusive analysis,—the object of which we think is in our thinking first analyzed or resolved; it is regarded as having attributes, one or more, and, although originally single in the apprehensive consciousness, it is now in the thought regarded as a dual,—a dual of subject and attribute. But this is merely inchoative; there is no proper judgment till the thinking activity unites the two,—subject and attribute,—in a true identity, total or partial.

Directly opposed to this view of the judgment as essentially an analytical process is the view of Ueberweg, who yet is indefinite and vague in his exposition. He defines the judgment as “the consciousness of the objective validity of a subjective union of conceptions whose forms are different from, but belong to, each other.”

The treatment of the third form of thought—the Reasoning—must necessarily, with such radical mistakes in regard to the judgment, be blind and stumbling; for this third form is correctly presented by Professor Jevons and Professor Wundt as a derivative from the judgment. Most obviously, the nature and validity of this derivative movement of thought can be properly understood only in the clear light of the judgment and the concept. If these forms of thought are erroneously or imperfectly apprehended, the treatment of the reasoning as a mere derivative from them must, of course, be uncertain.

We are enabled now, in the light of this adverse criticism of the European treatment of the forms of thought.

to present in a word the true scientific genesis, as also the peculiar nature of these logical forms and the organic relationship subsisting between them. The primitive act of thought appears in the judgment,—as “the sun is bright,” “the sun shines.” The essential principle or life of this act of thought is found in the copula or the assertive constituent. The essence is conscious identification of subject and predicate. But there can be no identification without a present subject and predicate,—that is, without terms or concepts. By no means, however, does it follow, as Professor Wundt seems to assume, that these must exist before the judging act; or that there must be two separate objects already apprehended in the mind, as Professor Jevons seems to assume in his representation of the judgment as a comparison. The simple truth is that the three constituents of the judgment are proper members of one organic whole, of which the copula expresses the living, the vital essence, and the terms are organic members coming to be at the same time with the body—the full judgment—of which they are members. A concept is a product of thought; it emerges in the simplest act of thinking. “Sun,” “sun bright,” are not thought cognitions; they are simply percepts, apprehensions of the mind, presentative ideas, till the judgment identifies them in positive affirmation. More exactly still, “the sun” is presented to the mind through and in the attribute “bright”; the object to the apprehensive sense is “something bright,” a “bright thing.” In reflecting on this object thus apprehended, the mind first resolves this presentative cognition into the dual of subject and attribute,—“this thing” and “bright,”—and at the same time recognizes the two as one; and thus the judgment emerges, “this thing is bright.” The terms—subject and attribute—and the copula come to be together as parts of one organic whole. The terms or concepts do not exist before the judging act, as the members of a living organism cannot exist before the common life begins; they

begin with that and in it. The concepts do not exist in nature; they are only in thought. In fact, we have here exemplified, in the logical treatises referred to, the common and most pernicious error of attributing to external objects the properties and relations belonging only to thought. The concept, then, as member, comes to be only in and with the judgment. In the light of this genesis of the concept, its nature, its legitimate forms, its valid treatment every way, may be precisely determined. In like manner the valid forms of reasoning can be determined in the most rigorously exact method. Thus, it is possible to develop a logical science in the most natural, most intelligible way, with a simplicity and clearness, and at the same time a scientific exactness and precision, most admirable, as well as most helpful to all training of thought. We attain, thus, in fact, a beautiful science and an effective discipline.

V. SUBORDINATE MOVEMENTS OF THOUGHT.

Passing from the great generic forms of thought to the subordinate processes, we notice that, for the most part, the old methods and expositions are still retained. It is unnecessary to give them any further consideration here, except to indicate some particulars in which old errors of some importance have failed of correction. Among these, the most serious and the most harmful is the treatment of what is known as the process of induction. Of this process, Professor Jevons, in his "Elementary Lessons in Logic," says: "The greater part, if not, as some philosophers think, the whole of our knowledge, is due to inductive reasoning." He proceeds to define it thus: "Induction will be the mode by which all the materials of knowledge are brought to the mind and analyzed." In his "Principles of Science" he presents it as "the inference of general from particular truths," and as "the inverse operation from deduction." He had set forth the "substitution of similars" as "the one supreme rule of infer-

ence," which is, in fact, but a clumsy and inexact statement of the principle of identity; and thus comes to think that all inferential knowledge is acquired by induction and is then utilized by deduction. It is quite a novel view to recognize induction as in any respect an analytic process, as he represents. Analysis can at best be considered only as a mere incidental movement, in some cases, perhaps, necessary in order to a true inductive movement, or helpful to it, the essence of which he evidently regards as consisting in the derivation of general truths from particulars. A perfect induction is possible, he holds, "only after examination of all the possible cases or instances to which the conclusion can refer." "If, as usually happens, it is impossible to examine all cases, . . . the induction is called imperfect." The inexactness of this teaching is decisively, although in all probability unintentionally, exposed in the "Principles of Science," in the remarks on "Geometrical Reasoning," where it is shown that certainty in general results is attained in inferences from a single observed fact. He accepts and illustrates J. S. Mill's canons of induction, of which it is sufficient here to say that not one of these canons touches the inductive movement itself in any allowable notion of its nature.

By Professor Wundt, induction is apprehended as a composite mental process which cannot be brought to the scheme of a definite syllogistic form. In sum, European logic is utterly adrift in regard to the real nature of induction. The name is on everybody's lips; everybody accepts it as denoting an intelligible act; everybody, in fine, recognizes the movement in facts of constant experience. A place for it in any logical scheme, however, it has been impossible for logicians to find. Its nature is, in consequence, diversely and, of course, in part at least, erroneously represented; its validity and its utility in testing and acquiring knowledge, accordingly, could not be formulated.

It would seem, nevertheless, that a right understanding

and a true doctrine of induction lie at the very door of logical investigation. Logical concepts are, in their very nature, quantitative, differing in this characteristic from the judgment, into which quantity cannot enter, since it is an absolutely single and positive act. And there can be only two conceivable movements in logical quantity of the same order, as there are but two conceivable relationships in it,—the one, the movement between the whole and the parts; the other, that between one part and other parts. These are necessary relationships, and are likewise co-ordinate and complementary. From the earliest times, logical deduction has been treated as a movement in the former of these two relationships. The integrity of the science demanded the other movement as an exact, necessary, co-ordinate movement. The universal interpretation put on the name, the universal signification given it, involves this conception of the nature of the movement as a movement from one part to another. The movement admits a full, accurate, perfectly scientific explication from this conception. There cannot remain a doubt as to its place and significance in logical science. The European logic is thus found to be maimed and halting in its relation to induction,—a form of thought admitted to be of prime necessity to the advance of knowledge; it is thereby so far robbed of its proper symmetry and completeness, of its beauty and usefulness as a science.

The Hypothetical Reasoning, or Syllogism, is another movement of thought which is, for the most part, erroneously treated by European logicians. The treatment of this movement of thought is very illustrative of the blind leaning, on the part of logicians, on the mere verbal forms in the expression of thought. They have, in fixing its name on the movement and, for the most part, in interpreting its nature and validity, determined their whole view from this verbal form. The so-called law of reason and consequent, represented by some logicians as the

fourth fundamental law of thought, owes its recognition as such a law to this unauthorized servitude to mere outward form. In truth, the major premise in the hypothetical syllogism is no more hypothetical than the major premise in any simple categorical syllogism. The hypothetical form is adopted only through the defectiveness of language, which could not otherwise embody a proposition of which the terms are judgments treated as concepts. With this view, the exposition of its forms, its nature, its validity, and its uses, is simple and truly scientific. The general oversight of the quantity of comprehension or intension is, perhaps, at bottom chargeable with this erroneous view so prevalent in logical treatises.

VI. THE CATEGORIES OF PURE THOUGHT.

Logical science might be considered as having discharged its proper office when it has expounded the nature, the laws, and the forms of thought. But the science seems to be called, just at this stage of philosophical discussion, to another service. It is a service which is most urgently demanded, and yet one which no other department of philosophy or science is likely to render. It is a characteristic of recent philosophy and science that it professes to be grounded on fact, to start only from experience. But with this ostentatious profession everywhere, general truths or principles are freely taken up and applied, with apparently no thought of the need of any other ground or warrant than that they meet the supposed requirements of the particular science. It is only necessary that they be not self-contradictory. A right conception of logic effectually dissipates all these so-called *a priori* assumptions, by whatever name they are known, — “innate ideas,” “native cognitions,” “*a priori* notions,” “ideas of reason,” “first truths,” “original principles,” “intuitions,” etc., etc. They are sheer groundless assumptions, unworthy of philosophical thought, and should be utterly rejected, so far as they are of the sub-

jective side of knowledge and assume to be forms of thinking. The fundamental law of thought, known as the law of exclusion, by a single blow strikes them all down beyond recovery. So far as they participate in the other element of all realized thought or knowledge, and are assumed to introduce real being,—the objective content of thought,—the principle of applied logic rejects them all, since thought or knowledge can act only on what is presented to the apprehensive nature in legitimate ways and modes. All knowledge is, indeed, grounded on faith or trust in the reality and the legitimacy of this apprehensive nature,—faith in our perceptions and our intuitions, as well as also in the operations of the reflective faculty. These furnish to thought its sole object and make up the sole content of all actual, genuine thought. The subjective element in all knowledge is supplied solely in legitimate processes of thought. The enunciation of Professor Wundt is beyond all controversy: that “absolute certainty in knowledge involves, first, actual content from experience and, secondly, a legitimate form of thought. Thought without content is a zero; and thought that has not the genuine character of thought is not thought at all.” This is all, and whatever in philosophical speculation or scientific exposition is more than this comes from error and is fatal to truth.

We have, however, to recognize the truth that thinking itself is a matter of experience; it is a real; and any act of thinking may be presented in proper intuition to our apprehensive nature, and so become itself object of thought. In such intuition of an act of thinking we may discern, together with the more essential character—identity—two other involved subordinate attributes—the categories of quantity, and modality or necessity. We have thus, by observation of any act of thinking, the three highest categories of pure thought. Now, it is precisely these categories which embrace the most of the so-called *a priori* principles of knowledge which are of

any philosophical value. From this exposition of their origin and ground it appears that they are not at all *a priori* principles, that is, principles assumed simply because self-evident or unquestionable. They are *a priori* only in the sense that, as intrinsic attributes of thought, they must belong to all true thought and characterize it. They are attained simply by observation, just as the attributes of the sun,— by inspection.

There are two other classes of categories to which logical science naturally leads up our thought, widely to be distinguished in their intrinsic character from one another and from those of pure thought, as already named. The three may be thus designated:

First class: The great generic attributes of pure thought—identity, quantity, and modality or necessity.

Second class: Those of mere thing.

Third class: Those of thought-thing.

The second class are given solely by experience; it is beyond the competency of thought to generate them. They may be presented, however, in the simple act of thought; for in every such act a thinker, a thinking being, a real, active being, is revealed to our inner apprehension. The two species of attributes here are (1) reality, as distinguished from mere imagination or conception—mere formality; and (2) activity, as it is by virtue of that characteristic that the real impresses us and enters into our apprehension. Only actual experience can furnish the subordinate classes of the real and the active. But logical disjunction determines us to correlate with this positively real and active, as actually given to us in experience, the non-real and the non-active. If the real and the active be the sole being, this not-real and not-active must be simply zero. The other alternative gives us what is real but not-active. The real and active we may then recognize as spirit; the real and non-active we may designate as matter. Matter, again, may be essentially non-active, or only transiently and incidentally inert;

it may be pure inertness, and so the opposite of spirit or essential activity, or it may be only energy potentialized, that is, energy reduced from an active condition, from a true *vis viva*, to a mere potency. Further, inasmuch as any object given in experience must be given and, therefore, actually apprehended as a part, true logical induction at once carries us to another part or other parts, and, likewise, to a whole. A part cannot be given to us as a part, obviously, except as implying some other part. A particular place, thus, given to us as real in the experience of any real object, involves, by a true law of thought, a real whole of place; and a particular duration given us as real in the experience of any action or motion, in the same way, involves a real whole of duration. We thus legitimately attain the realities of space and time.

The third class of categories named are neither of pure thought nor of pure thing, neither purely subjective nor purely objective. They combine the two natures. It is one of the most fundamental and harmful fallacies in speculation to treat them with one part of this twofold nature left out. This class consists of the categories of substance and cause. The real, as before observed, does not subsist in nature as literally substance and property. The real thing is but a unit; it is only in thought that this unit becomes a dual—substance and property. Just so, the active thing in nature exists only as single active power; it is only in thought that it comes to be resolved into the dual of cause and effect. It is from this thought-element in the conceptions of substance and property, and of cause and effect, that the character of necessity recognized in these two relationships arises. "Our senses," says Reid most truly, "testify only what is, and not what must necessarily be." To foist into the existences or the sequences of nature this mere thought characteristic is another exemplification of a common but baneful fallacy already indicated.

On the other hand, we need as well to guard in our

thought, in all our speculation and scientific exposition, the equally fundamental truth, that objective being or reality, in any of its forms, can by no possibility originate in thought, for thought possesses no such function. Thought cannot directly create these realities, and none of the operations of thought can legitimately give rise to them. They must be given or presented through the apprehensive nature.

Through the ministry of a sound logic, thus, of a logic which excludes from thinking everything but its own work of identifying or differencing subject and attribute in its manifold applications and modifications, while claiming to itself, as its own prerogative, the character of necessity, and, perhaps, best and most successfully, by beginning with the act of thinking itself as a reality for its presented object or *datum*, philosophy can enter the objective world and construct a legitimate philosophy of real thought and of actual being,—a true ontology,—that, being grounded on principles which are beyond all question, and proceeding in a true logical method, shall be recognized to be a solid, impregnable, ever-during fortress of truth.

It is to be stated that Professor Jevons and Professor Wundt have both entered very largely into the applications of logic, so far as the enumeration, the particular character, and the methods of the sciences are concerned. A great part of their respective treatises is directed to this work. But all this lies outside of the particular design of the present discussion, which is limited to the consideration of logical science in itself.

It should be stated, further, that both treatises notice the symbolical or algorithmic schemes of logic. They both repudiate the old formulastic scheme, which constituted the great body of the scholastic logic. Hamilton had already most fully demonstrated the deceptiveness and clumsiness of this scheme. The symbolical or algorithmic system is treated with favor. But we apprehend

it as altogether too cumbrous and clumsy to be serviceable in actual thinking. Its range, too, is very limited; so limited, indeed, that it can come into no worthy comparison with the symbolism in mathematical science. There are divers of these schemes, and more or less extended and applied. They are all liable to the surreptitious admission of some fallacious movement of thought, such, for instance, as the illegitimate transference of the quality of the copula to the predicate, to be detected in some of them. They show ingenuity; they are interesting as studies; they may be of some profit as simple exercises, serve as a pleasant pastime to minds of this bent. For the sound, vigorous thinker they promise little service.