

The Principles of Empirical or Inductive Logic. By JOHN VENN, Sc.D., F.B.S., Fellow and Lecturer in the Moral Sciences, Gonville and Caius College, Cambridge. London and New York: Macmillan & Co., 1889. Pp. xx., 594.

Mr. Venn has here published a selection from the lectures which for some years past he has been accustomed to deliver at Cambridge. The work is mainly a commentary on Mill, partly critical, partly reconstructive and supplementary, and it treats principally of the Inductive department of Logic. The reader is not to expect a complete systematic treatise; he is supposed to be already equipped with a knowledge of the ordinary text-books. In particular he will find no account of the processes of Immediate Inference and Syllogism, not even such scanty information as Mill gives about these subjects; though it is true that here and there some peculiar freshness of idea has tempted the author, as in the chapters on Terms and Propositions (especially Hypotheticals), to introduce discussions that a purely Inductive treatise might have dispensed with. The whole is written in a style of as great lucidity and animation as the subject admits of; and an excellent assortment of examples serves to sustain the interest and to diffuse that miscellaneous information which is really no unimportant use of these modern works on Logic.

The extraordinary variety of general conception and exposition that Logic has proved to be susceptible of is now pretty well known. The non-logical may scoff at this as a sign of chaotic uncertainty, but logicians will rejoice at it (with due sobriety) as a proof of vitality and healthy growth. Jevons's work included so much more than we are accustomed to call Logic, that he perhaps did well not to call it by that name; though for my own part I am always too thankful for a good book to be punctilious about its title. However, amongst the familiar distinctions that have been drawn with regard to the treatment of Logic that between the pure or formal department on the one hand, and on the other the department in which formal principles are applied either to persuasion, as in Rhetoric, or to scientific investigation, seems to be really valuable. Until recently, indeed, the department of Applied or Modified Logic, as it was called, had been so little developed that it was perhaps best treated (as by Hamilton) as little else than an appendix to the science, and it needed no more than an epithet to distinguish it from the main body of the subject. Now, however, the application of Logical principles to scientific procedure has become a study so much more interesting and extensive than the pure science (even including formal Induction) that many good uses would be served by giving it a separate name, and for this purpose the term 'Methodology' lies very conveniently at hand.

'Methodology' would for several reasons have been a better title for Mr. Venn's work than that which he has chosen to give it. Nor is the title it bears at all favourably recommended by the

reason he offers for it. "By the introduction of the term Empirical into the title," he says, "I wish to emphasise my belief that no ultimate objective certainty, such as Mill, for instance, seemed to attribute to the results of Induction, is attainable by any exercise of the human reason" (Preface). Whether Mill attributed any such certainty to the results of Induction might be disputed. But at any rate "Empirical," as used in philosophy, does not directly connote *uncertainty*; it is only connected with uncertainty by the argumentation (perhaps erroneous) of those who oppose Empiricism. But Mr. Venn is not one of them: he nowhere shows the slightest leaning to them; and, besides, he says that certainty is not attainable "by any exercise of human reason". Why, then, is an epithet intended to imply uncertainty peculiarly appropriate to Inductive Logic? Is there any advantage, speculative or practical, in stigmatising the results of induction as specially uncertain? That they are uncertain we know, for we are always trying to correct them, but only by better inductions. Another reason, and a much more important one, for calling this work 'Methodology' may be found in the scope of its discussions. If once we leave pure Logic and enter upon the general scientific methods of investigating Nature, there is no good ground for confining our treatise to strictly logical or merely qualitative methods. And therefore it is quite consistent with Mr. Venn's object to introduce chapters on physical and psychophysical Standards and Units and on the data of Geometry, including such particulars as the interpretation of the hyperbola, the Archimedean spiral, and the principles of the Differential Calculus. Very good, though this is not Logic. But what can be more ungrateful than to find fault with an author for being better than the promise of his title page, and instructive beyond our expectations?

The first striking characteristic of the plan of Mr. Venn's book is the attempt with which it opens to assign fully the postulates of Logic. This has indeed been done to some extent by Prof. Bain in his well-known work; but Mr. Venn makes a more systematic effort to state the first principles of the science and the general condition of things that it takes for granted. He begins by showing how Logic presupposes the objective uniformity of the phenomenal world, its distinctness from the observer, its sameness for all observers, and its freedom from disturbance by the fact of logical treatment. Much of the very interesting discussion under these heads is indeed not peculiar to the needs of Logic, but belongs to the prolegomena of all science; and the same may be said of a good many disquisitions elsewhere in the course of the work; but to introduce them into logical treatises seems to be inevitable in the present condition of English philosophy. So little has been done by our representative thinkers to differentiate and construct Metaphysics and First Philosophy in harmony with their views

of the nature of knowledge, that we may be thankful for any essay that assists us to this end; and if such discussion cannot be had separately, it has more cohesion with Logic and Methodology than with any other department of thought.

A purely logical question is reached when Mr. Venn begins to discuss the character of Logic as objective or subjective or both. He decides that it is both, and according to his conception of the science he is no doubt entirely right. Methodology cannot be entirely objective (whether it may be wholly subjective we need not inquire). As Mr. Venn observes, "any attempt to confine ourselves to a bare statement or analysis of the facts of nature must be insufficient when what we are concerned with is *inference* about those facts; for inference turns almost entirely upon the distinction between what is known and what is unknown, and this distinction cannot be sought in the facts but in our appreciation of them" (p. 23). Pure Logic, however, it seems to me, may be regarded as having nothing directly to do with inference, but merely as stating the general forms of the relation and correlation of phenomena, with which all true inferences, the connexion of evidence and conclusion, must agree, and which Methodology shows us how to apply in order to test inferences. If so, this is a particular reason for carefully distinguishing Methodology from pure Logic and for treating the latter first.¹

Attention should be given to the suggestion at pp. 28, 37, of different standards of truth for different orders of assertion. The chapter concludes with a postulate of Logic in relation to Language, that "we must assume that our words have the same determinate meaning in the minds of all who use them" (p. 37). Upon which Mr. Venn observes that "it is absolutely necessary for scientific accuracy, and yet in practice so obviously untrue"; and this certainly raises a difficulty. It seems to me that we have here a postulate not belonging to Methodology, but to that ideal of scientific knowledge at which Methodology aims, and which the author treats of in ch. xxiv. Definition is surely a part of Methodology; but, coming to treat of Definition in ch. xi., Mr. Venn finds himself met by the doubt whether it can be of any use, since by the postulate a complete consent exists as to the meaning of all words! To avoid this difficulty he draws the distinction between Formal and Applied Logic: it is only, he says, in Formal Logic that definitions are obviously uncalled for and

¹ In a note to p. 22 Mr. Venn suggests that Mr. Spencer's well-known view does not much differ from his own, because that philosopher recognises the Science of Reasoning as subjective. But the term "Science of Reasoning," as used in *Principles of Psychology* (vol. ii., pp. 87-100), refers, I venture to say, neither to Methodology nor to Logic, but to a department of Psychology; and Mr. Spencer's difference from Mr. Venn upon this point is as clear as thought can make it.

useless. But if so, why lay the above postulate at the foundation of a work that is almost confined to Applied Logic? And what excuse can there be for urging this postulate (admitted to be obviously untrue) as a reason why a contradiction in terms is "not likely to occur except through lapse of attention or misapprehension of some kind"? (p. 297). Certainly without "misapprehension of some kind" a contradiction in terms can hardly occur; but how are we helped to avoid such misapprehension by assuming what is obviously untrue? Several other passages might be produced in which this postulate plays a very strange part.

Passing to narrower and more special assumptions, Mr. Venn takes up in ch. ii. the Law of Causation; and, tracing its history, he observes, after a brief notice of the Aristotelian doctrine, that in the modern conception of the law three stages of development may be discovered. There is first the popular conception, which does not distinguish between coexistence and succession, but is content with discovering any apparent connexion of things that enables one to be inferred from another. When dealing with sequences this primitive sort of thought singles out one antecedent and one consequent as signs of each other (pp. 52, 53). At the second stage the logician comes and endeavours to improve upon this popular view so as to make it suit his purpose. It might perhaps be questioned whether, until the influence of philosophical reflection has been felt, the popular mind is capable of any such conception as a general law of causation (or of connexion in general); but this may be waived. The logician's device for improving the conception is, says Mr. Venn, to insist (1) upon rejecting uniformities of coexistence; (2) upon enumerating *all* the elements of the antecedent, or all that can be considered relevant; and (3) upon the *closeness* of the sequence of cause and effect. Thus modified, the law takes the form it has in Mill. But it is still open to objections, for, in fact, in applying the law all antecedents are not enumerated, far from it; and by failing to enumerate the consequences as fully as the conditions, the unsatisfactory doctrine of a Plurality of Causes is admitted. This, says Mr. Venn, shows the essentially practical character of the conception of causation at the second stage of its development. At the final stage, "speculative interest gets the upper hand," and leads us to be thorough in introducing all the antecedents and all the consequents in any case of causation. We thus get rid of the Plurality of Causes; but on the other hand the law becomes entirely useless, since all the antecedents never recur, and if they did recur it would be impossible for the human mind to estimate their number and extent. Even if we yield to these considerations so far as to require the enumeration only of those antecedents that lie at hand, estimating them, however, with scientific accuracy, it will be necessary to regard the effect as strictly immediate, that is, no more than an initial tendency. So

that the attempt to attain to speculative consistency leads to a result that is practically of no value.

This discussion seems to me to illustrate again very happily the desirability of distinguishing Pure Logic from Methodology. In Pure Logic practical interest is at a minimum, and therefore a strict statement of the law of causation will present it with no difficulty but that of finding actual examples to aid the exposition. Then Methodology will find its true occupation in discussing the modifications of strict logical principle that may be necessary in the investigation of various departments of nature or of human life: in what circumstances it may be better to insist upon a less or more complete enumeration of antecedents or of consequents; when to be content with a merely hypothetical selection of causes as a basis for deduction and verification; when to recognise or reject a plurality of causes. This, indeed, is a practical inquiry, but not in any sense of 'practical' that is opposed to speculative; it is, on the contrary, essential to all speculation outside the abstract sciences; and it is surely only in this sense that it can be suggested that "speculative interest" has not "the upper hand" in Mill's *Logic*.

But, of course, it is the fate of lectures on such a subject as this to become disproportionately critical: criticism is their function. And this must explain why Mr. Venn seems to have a sort of quarrel with the Law of Causation, treating it to some dyslogistic phrases as belonging to "popular science," or "first-class popular thought": meaning apparently that the law is only qualitatively determined. But granting that quantitative determination belongs to the ideal of science, to deny the name of science to everything else, or to qualify it as "popular" (as if for consumption at the Polytechnic), is an idol of the mathematician's den. Besides, if a quantitative law is demanded, why not discuss along with Mill's law the interpretation of Causation as Conservation of Energy, which has been given by Prof. Bain, and accepted in his last corrected edition by Mill himself? The omission to do so is the more remarkable since in ch. iv. Mr. Venn has pointed out the ways in which Conservation supplements and extends Causation. A pedantic logician might, indeed, have objected to any appeal to quantitative considerations; but in a work on Methodology, like the one before us, that is far from avoiding mathematical topics, its constructive value would have been greatly increased by treating of Causation in its fullest meaning. This would have led to considerable modifications of ch. xvii. on the Inductive Methods; and it would have been a task to which Mr. Venn's powers and training are wonderfully adapted. Even the criticism of Causation must then have become more valuable, as directed against the doctrine in its least vulnerable shape. But his desire to take the Law of Causation down a peg or two appears still more surprisingly in the next chapter.

Ch. iii. treats of Coexistences, and endeavours to present a "rival" law over which the law of Causation can claim no "such decided superiority" as it is too commonly assumed to have. Mr. Venn begins with a quotation from Mill (bk. iii., ch. 22, § 4), which, as he justly says, amounts to alleging "a definite failure on the part of Nature" to supply a general law of Coexistence from which we might make methodical inductions just as we do from the law of Causation. But to find the grounds of Mill's complaint we must refer back to the discussion of Causation (ch. 5, § 9), where we read: "Since everything that occurs is determined by laws of causation and collocations of the original causes, it follows that the coexistences that are observable amongst effects cannot be themselves the subject of any similar set of laws distinct from laws of causation". Hence "the coexistences of phenomena can in no case be universal, unless the coexistences of the primeval causes to which the effects are ultimately traceable can be reduced to an universal law; but we have seen that they cannot". The only independent coexistences invariable enough to be called laws are those that obtain "between different properties of the same natural agent". Now, since Mr. Venn, however much he may criticise statements of the law of Causation, does not, I believe, dispute the fact of it, he would have done well to begin his investigation of Coexistences by trying to refute the above argument. He would then probably have saved himself a good deal of pure speculation. The gist of his endeavour is to establish a parallelism between the stages in the development of the law of Causation described above, and corresponding ways, which he suggests, of regarding relations of Coexistence. The first stage is common to the two laws, since the primitive mind, as long as it can find some ground of inference, does not distinguish between connexions of succession and those of coexistence. Then, just as Hume, Herschel and Mill refined upon the popular view of Cause, so there may be suggested a second stage in the development of a law of Coexistence. The chief difficulty, according to Mr. Venn, is that "when the *time* variable is omitted, as in coexistences, it becomes mere tautology to talk of introducing all the elements" (p. 76). We may say: A (all antecedents) has been followed by *x*, therefore it will be again; but if we say: A (all coexistents) includes *x*, therefore it will again—this is mere repetition.¹ The formula of the second stage must therefore be framed thus: "If all the coexistent elements, *except one—viz.*, the one which occupies the place corresponding to that of effect—be repeated, then this one also will necessarily be secured" (p. 77).

The degree of trust due to this formula in Mr. Venn's own judgment is not easy to determine; for at p. 80 he says it is "of

¹ In the seventh line from the foot of p. 76 there seems to be a misprint: the first *x* should, I presume, be A.

much about the same cogency and value" as the corresponding stage of the Law of Causation; whereas at p. 77 we read that "when over-refined these Laws of Coexistence seem of distinctly less value than those of Sequence when similarly reformed". It is a serious objection, he says, that to attempt to omit one fact or attribute from a total coexistence raises the difficulty of determining its individuality and circumscription amidst the tangle of its infibulations with the rest. Still, in a popular way, this may be evaded, as in the following instances: in a pear the qualities will always be much the same; a man standing before a wicket with a bat in his hand implies a bowler, though we may not be able to see him; and a breakfast-cup of coffee most likely contains some milk and sugar (p. 78). But clearly none of these instances exhibits a coexistence independent of causation: the pear is a 'natural kind' (of which more presently); the batsman implies a bowler only if we assume that he acts upon ordinary motives and is not a lunatic; the adulteration of coffee with milk and sugar is an effect of the prevalent taste, though some take it black with cognac, and others omit the sugar. Whatever the certainty of these laws, therefore, not one of them is an example of that uniformity of pure coexistence which Mill complained of Nature for not having provided.

In the third and final stage to which the Law of Coexistence may be carried by insisting upon the most rigid scientific interpretation of it, the above-mentioned difficulty of individualising attributes becomes so great, that it is necessary to abandon the attempt to treat of coexistent attributes, and to fall back upon the molecular and mechanical constitution of any body or system (p. 79). Then, however, we arrive at coexistences that determine one another with as much precision as cause and effect. Thus, action and reaction being equal and opposite, if in a pile of bricks we know the pressures experienced by all *except one*, we also know the pressure upon that one; and similarly with regard to gravitation. But as to this, it may be suggested, that whilst the statement of the law of action and reaction is in terms of Coexistence, the interest of it in Methodology is connected with Causation, and refers to such points as these: that to state only the action of any cause is to give only half the effect; and that to alter the number or positions of any bodies in a mechanical system is to change their mutual pressures in such and such ways. And as to the molecular constitution of bodies, should biologists or chemists succeed in discovering it with the utmost precision, they will only be the more bent upon discovering the causes to which such constitution may be traced. In other words, the scientific mind will never be satisfied with coexistences (not merely geometrical) that seem to be independent of causation; though the limitations of human reason may compel us to put up with such things. On the whole, it seems that no formula of Coexistence has the slightest chance of rivalling the law of Causation, especi-

ally when we remember that, by Mr. Venn's own showing in ch. iv., the law of Causation is immensely reinforced by the law of the Conservation of Energy. By what alliance will he redress the balance in favour of Coexistence?

Passing on to enumerate the chief classes of laws of Coexistence, Mr. Venn mentions (1) Natural Substances; (2) Natural Kinds; (3) what may be called Social Groupings, as in the arrangement of a law court or of the players at cricket; (4) Geometrical Properties. The causation of substances, at least of elements, is still, no doubt, obscure enough. As to natural kinds, we now have a general theory of their causation. Mr. Venn, indeed, says that Mill regarded them as uncaused; and in his early editions (of which I have no copy at hand) he may have done so; he was, perhaps, a little slow in assimilating the doctrine of evolution: but in the last corrected editions he says of organised beings that "there is reason to believe that none of their properties are ultimate, but all of them derivative, and produced by causation" (bk. iii., ch. 22, § 6).¹ As to social groups, they are clearly causal. In geometrical properties, indeed, we have abundant derivative laws of coexistence obtained by Deduction; and being properties of pure space (or of the spatial relations of matter), they can have nothing to do with Causation, which is concerned only with matter and motion in the concrete; but where there is no connature there is no rivalry.

The fourth chapter deals with the Uniformity of Nature, a phrase which, as the author points out, covers a good deal besides Laws of Causation and Coexistence. He first particularises Rhythmic Series, such as day and night and the seasons; and he considers these, though ostensibly sequent, to be best classed with coexistence (p. 101): so eagerly would he rob Causation to pay Coexistence. And yet his reason for it is that these rhythms have not "the causal characteristic of rigid regularity. But surely they are rightly treated by Mill as the progressive effects

¹ There are other passages in which Mr. Venn has the same remark upon Mill's doctrine of Natural Kinds. Indeed, his references to that author are, in several instances, inaccurate. At p. 279 he says, "the names of simple sensations, which, strictly speaking, possess denotation only, may yet, according to Mill, yield a kind of definition": whereas Mill expressly says that "the only names that are unsusceptible of definition" are those of the simple feelings, though the attributes founded on them and the things in which they inhere may be defined (i., 8, 2). At p. 470, he attributes to Mill the view that geometrical surfaces and lines are "a sort of entities that can exist apart"; whereas Mill says (ii., 5, 1), "nothing remains but to consider geometry as conversant with such lines, angles and figures as really exist; and the definitions, as they are called, must be regarded as some of our first and obvious generalisations concerning those natural objects". At p. 555 he says that Mill used the expression "fabled heaven" on his wife's tombstone; whereas the true phrase is "the hoped-for heaven," and the context would not bear "fabled" (cp. Prof. Bain's *J. S. Mill*, p. 167, note).

of more or less permanent causes; their whole methodological interest is causal; their explanation as derivative laws is obtained by appealing to causation. As Mr. Venn says, however, such cycles are neither necessary (for the causes might alter) nor ultimate; so that they seem not to deserve mention amongst the postulates of Logic as a special class of Uniformities. He next brings forward the Conservation of Energy, and shows how it supplements the ordinary law of Causation by more readily interpreting continuous changes; by assimilating the different forms that causes may take, electrical, chemical, &c.; and by providing for quantitative determination. Here the only criticism needed is that, as this law is not an Uniformity distinct from Causation, it would have been better treated of under that head. Mr. Venn then mentions the Statistical Uniformities which he has more fully discussed in his admirable work on Chance. And, finally, he advances a principle of Continuity to cover a miscellany of cases in which things remain without sensible change of position or nature for some considerable time; his example is a felled tree which the woodman expects to find next morning much as he left it. This expectation, he says, cannot "without extreme violence" be grounded on Causation; for causation, according to Mill, only applies to changes, and the phenomenon in question is the absence of appreciable change. But if I rightly understand Mill's meaning here, it is, that causation only applies to changes as distinguished from the absolute *origins* of primeval causes, not as distinguished from the duration of things subject to change. The law that every change has a cause implies what Prof. Bain would call the "material obverse," that where there is no change (in changeable matter) there has been no cause for it. How long a felled tree will lie without appreciable change depends upon the quality of its wood, the climate, and other causes of change; and it is upon his knowledge of these causes and the rate at which they operate that the woodman's expectations rest. If on his way home he should hear that an army of white ants was marching that way, he would be glad to sell the log pretty cheaply for ready money.

The above list of Uniformities might have been extended by adding the principles of Contradiction and Excluded Middle, the axioms of Mathematics, Mill's axiom of the Syllogism, the Persistence of Matter, and the commensurability of Times and Spaces: all which are Uniformities of Nature.

I see with dismay how long this review is growing, how little progress has been made with the volume in hand, and what an erroneous impression on the whole the reader must have of the impression the volume makes upon me. In vain have some critics warned the rest of us that fault-finding is the baser part of our trade: we feel an irresistible impulse that way, like those swine of the Gadarenes. In reality every chapter of the book is both entertaining and highly instructive; but it is impossible

to show this upon a scale corresponding with the foregoing objections without risking an action under the law of copyright. Some idea, however, of the remaining contents may be briefly given. After a chapter on the Subjective Foundations of Induction, Mr. Venn takes up Language, Terms and Propositions. The whole treatment of these subjects is remarkably fresh and suggestive. The chief apparent omission is some discussion of Mill's division of Propositions according to Equality, Coexistence, Sequence, &c. We next come to Definition and Division; and chapter xiii., on Classification, seems to me the best in the book. Chapter xiv. is on the process of Induction. Chapter xv., on the relation of the Syllogism to Induction, contains some very disputable matter. Then, after a luminous discussion of Hypotheses, we are brought to the Inductive Methods. Here there are excellent remarks on the shortcomings of the usual device for symbolically representing the phenomena investigated with their circumstances by means of letters, and important criticisms upon Mill's 'Joint Method,' with other points of interest. We next find chapters on Standards and Units physical and psychical, on Geometrical Data, and on Explanation. The work concludes with chapters, somewhat in the nature of appendices, on a Universal Language, on the extension of our powers of Observation, on the Ideal of Science, and on Speculation and Action. This last chapter treats chiefly of some of the ways in which a scientific investigator, especially when dealing with the laws of human society, may by his own conduct so modify the facts as to frustrate his conclusions. Toward the close of it the author suggests a general *Practic*, or theory of the *form* of Art, corresponding to Mill's Teleology, or system of the ends of Art.

CARVETH READ.

Knowing and Being. By JOHN VEITCH, LL.D., Professor of Logic and Rhetoric in the University of Glasgow. Edinburgh and London: William Blackwood & Sons, 1889. Pp. viii., 323.

This book, consisting of lectures given by the author to his advanced students last winter, is a criticism, or rather an attack upon what, "for lack of a better word," Prof. Veitch (like several other people) calls the "Neo-Kantian" way of looking at things (p. 11); and it is an attack of the most vigorous and vehement kind. If one did not know the writer's point of view, it might be difficult to understand this vehemence. But Prof. Veitch sees all things in Hamilton, and naturally feels himself uncomfortable amid a generation that knows not his master. He is evidently aggrieved that T. H. Green did not deal with the "Natural Realists" but only with the Sensationalists (cp. pp. 101 ff.). But Green was speaking to a generation that had been influenced by Mill. Prof. Veitch cannot expect to find his own position criticised