

A Philosophical Essay

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Science and Speculation



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Author of "The History of Philosophy," etc.

REPRODUCED FROM AN ENGRAVING PRESENTED BY MR. G. H. LEWES TO HIS FRIEND,
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SCIENCE AND SPECULATION

PREFATORY NOTE

THE following is a reprint, under a new and—it is believed—appropriate title, of the Prolegomena to George Henry Lewes's *History of Philosophy* (3rd edition). It has only been necessary to make a few verbal alterations to fit the essay for separate publication; since, on the whole, it is a self-contained treatise, distinct from the History and representing the philosophy of modern science, as interpreted by Lewes himself.

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BY

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SCIENCE AND SPECULATION

I.—WHAT IS PHILOSOPHY?

§ 1. THEOLOGY, Philosophy, and Science constitute our spiritual triumvirate. The limits of their several dominions have been insensibly shifting, so that at various epochs in History they have been of very varied importance. For centuries the predominance of Theology was absolute and undisputed. Philosophy, meanwhile, grew apace, till at last it was enabled to assert an independent position; and while these two rivals struggled for supremacy, Science was also quietly and obscurely feeling its way to independence.

§ 2. The office of Theology is now generally recognised as distinct from that of Philosophy and from that of Science. Its ancient claim to authority over all regions of inquiry has long been felt to be untenable, and has been frankly relinquished. Although claiming to hold the keys of the highest Truth, it nevertheless no longer pretends to decide upon the lower, but confesses its inability to furnish Research with effective Methods, or Knowledge with available data. It restricts itself to the region of Faith, and leaves to Philosophy and Science the region of Inquiry. Its main province is the province of Feeling; its office is the systematisation of our religious conceptions.

This is the office not of one Theology, but of all. No matter what other functions the various Theologies may assume,

they invariably assume this, and give it pre-eminence. It is thus not only their common characteristic, but also their highest characteristic; and now that the course of human evolution has detached both Philosophy and Science from Theology, this systematisation remains its sole function.

§ 3. The office of Science is distinct. It may be defined as the systematisation of our knowledge of the order of phenomena considered as phenomena. It co-ordinates common knowledge. It explains the order of phenomena, by bringing them under their respective laws of co-existence and succession, classing particular facts under general conceptions.

§ 4. The office of Philosophy is again distinct from these. It is the systematisation of the conceptions furnished by Theology and Science. It is *ἐπιστήμη ἐπιστημῶν*. As Science is the systematisation of the various generalities reached through particulars, so Philosophy is the systematisation of the generalities of generalities. In other words, Science furnishes the Knowledge, and Philosophy the Doctrine.

Each distinct science embraces a distinct province of knowledge. Mathematics treats of magnitudes, and disregards all other relations; Physics and Chemistry concern themselves with the changes of inorganic bodies, leaving all vital relations to Biology; Sociology

concerns itself with the relations of human beings among each other, and with their relations to human beings in the past and in the future. But Philosophy has no distinct province of knowledge: it embraces the whole world of thought: it stands in the same relation to the various sciences as Geography stands to Topography. All the sciences subserve its purpose, furnish its life-blood. It systematises their results, co-ordinating their truths into a body of Doctrine.

Thus, while Theology claims to furnish a system of religious conceptions, and Science to furnish conceptions of the order of the world, Philosophy, detaching their widest conceptions from both, furnishes a Doctrine which contains an *explanation of the world and of human destiny*.

Although this may appear a novel definition, it will, on examination, be found to characterise the persistent function which in all times Philosophy has exercised. Moreover, it will be found applicable in special cases, such as the philosophy of Science, the philosophy of Religion, the philosophy of History, or the philosophy of Art. Thus, given a science with its generalities laboriously ascertained, the philosophy of that science will be the co-ordination of its highest truths, the methods by which those truths were reached, and the relation which both these bear to the truths and methods of other sciences. I formerly defined Philosophy "an attempt to explain the phenomena of the universe." This is too vague, and fails to mark the point of separation from Science and Theology; but, though vague, it expresses what has been the unconscious and persistent effort of philosophical speculation.

§ 5. Such is the relative position of each of the three great spiritual powers at the present time. These positions were not always thus sharply defined, but the history of thought exhibits a continuous development in these directions. Theology at first was absolute and autocratic, not only furnishing religious doctrine, but dictating generalities to Philosophy, and explanations of all but the commonest phenomena to Science. Philosophy served as a handmaid to Theology, until she grew strong enough to think for herself. Science kept timidly aloof from all questions on which Theology had pronounced, and submitted to a peremptory order to be silent when her conclusions were unacceptable. Fortunately for Humanity, this creeping servitude was incompatible with the continued exercise of reason. As discoveries extended, as more and more phenomena were satisfactorily reduced to order, the widening reach of Inquiry embraced problem after problem, until now all the facts within human ken are assumed to be reducible to order on the scientific Method. With the growing strength came a growing courage, and timidity gave place to a proud self-reliance. Theology was first quietly yet firmly excluded from Cosmology, its explanations of the world being set aside as myths; then it was excluded from Biology; and now even Sociology is claimed as amenable to scientific Methods, because all social phenomena are seen to be under the dominion of law. History shows a curious reversal of the principle of accommodation. Just as Science was formerly compelled to accommodate its conclusions to Theology, no matter at what cost of consistency, with what sophistical excuses, so Theology is now

compelled to accommodate its dicta to the conclusions of Science, by utterly distorting the meaning of words. After having for centuries pursued its researches under the denunciation of Theology, and under the burden of a fear, terrible to delicate consciences, of approaching heresy when it was seeking truth, Science has at length ceased its timorous and futile efforts to reconcile its conclusions with anything but its own principles.¹ The problem is no longer: Given a doctrine of indisputable authority, how to reconcile the conclusions of Experience with its dicta; the problem is: Given certain indisputable conclusions of Experience, how to reconcile the dicta of an ancient doctrine with these irresistible conclusions.²

§ 6. The conflict was inevitable, and was foreseen from the first. Inevitable, because the two powers are characterised by two different Methods, that of Theology being the Subjective, that of Science the Objective. These Methods will have to be considered more particularly in a future section; for the present, I merely call attention to the fact of their opposition, and to the fact that

¹ In 1864 was seen a memorable protest, on the part of scientific men, against every attempt to control their researches. In spite of the theological pressure, which is so powerful in England, our leading savans openly and *indignantly* refused to sign a declaration of dependence.

² A somewhat analogous inversion has taken place in the social problem. Formerly the problem was: Given the welfare and advantages of the Few, how best to reconcile with these the welfare of the Many; it now is: Given the welfare of the Many, how best to secure the advantages of the Few. The new Astronomy transferred the centre of the world from the small Earth to the mighty Sun; the new Sociology transfers the centre of social life from the small group of Idlers to the mighty mass of Workers.

Philosophy occupying an intermediate position has necessarily employed both Methods by turns. When it was in alliance with Theology, it adopted the Subjective Method: this was during its ontological phase. When the advance of Science furnished it with more and more material, Philosophy gradually detached itself more and more from Theology, without, however, consciously and completely adopting the Objective Method: this was its psychological phase. Finally, the all-embracing progress of Science has forced Philosophy frankly to adopt the Objective Method: this is its present phase, the Positive Philosophy.

The history of Philosophy is the narrative of its emancipation from Theology and its final constitution through the transformation of Science.

§ 7. The annals are red with the flames of persecuting wrath at every attempt Philosophy made to assert independence. Naturally enough. No autocrat can be lenient to a powerful pretender; and the more reasonable the pretender's claim, the more hateful will be its assertion. Philosophy, in turn, was equally intolerant of its rival Science, and allied itself with its ancient persecutor to persecute the new pretender.

Aloof from the strife of polemics and personal irritations, the wise, calm spirits of our day resign themselves to the Triumvirate, defining for each its separate province, and trusting in a harmony of combined effort which hitherto has been impossible. It is time that the great perturbations should cease, and the only struggles be carried on within the limits of each domain: theologians in controversy with theologians, savans with savans, philosophers with philosophers. The three powers

have always hitherto been in a state of conflict or of armed peace. The problem of our age is, how to change this conflict into a concourse, to unite the independent and dissident efforts in dependent and harmonious efforts. This problem may be solved by the transformation of Science into Philosophy, and by the transformation of Philosophy into Religion. But whether we reject or accept that solution, the systematisation of our religious conceptions and all its practical applications must be a distinct office from the systematisation of our conceptions of the order of phenomena; and the harmony of the two can only be effected by a Doctrine which combines the generalities of both. The future of Philosophy is in this task of reconciliation.

§ 8. In the early editions of my *History* the word Philosophy carried a more restricted meaning than is assigned to it in the preceding paragraphs. It was used as synonymous with Metaphysics, or more specially with Ontology. That restricted use of the word was forced on me by the practice of all previous historians, and I stated why it was forced upon me, and in what sense the word was to be understood. In vain. The old vague, indissoluble associations could not be escaped. The reader quickly forgot my explanation, and interpreted the word in his vague sense, instead of in my restricted sense. The large latitude in which the word has come to be used all over Europe has obliterated all special meaning, and this notably in England, where, as Hegel sarcastically remarks, microscopes and barometers are dignified as "philosophical instruments," Newton is styled a philosopher, and even parliamentary

proceedings are sometimes said to be philosophical.¹ In presence of such looseness of expression what was the historian to do? Obviously, he could only declare the sense in which the word was used in other histories of Philosophy, and abide by that. Had I not fixed a precise meaning to the word, I must have written a History of Knowledge, not a History of Philosophy.

My explanation was of little avail. The object of my work being to show the essential futility of Philosophy, in the restricted sense of that word, I was supposed to have intended a crusade against Philosophy in the wider sense; and readers who no more believed in Ontology than I did were startled by my attacks on it under the name of Philosophy. After this experience I cannot place much reliance on the security of any definition; but for the sake of attentive readers I have stated what position Philosophy holds in relation to Theology and Science; and to avoid equivoque I shall use the words Metaphysical Philosophy, or Ontology, and sometimes simply Metaphysics, to designate inquiries on the Subjective Method into the ultimate essence of things.

§ 9. Unhappily there is no uniformity even in the use of the term Metaphysics. Sometimes it means Ontology. Sometimes it means Psychology. Sometimes it means the highest generalities of Physics. The first of these inquiries I hold to be utterly futile, hopelessly beyond human ken. But the second and third are legitimate inquiries, which take their place in human knowledge whenever they are pursued on the Objective Method, and only deserve

¹ Hegel: *Geschichte der Philosophie*, i. 72. Compare also Hamilton, *Metaphysics*, i. 63.

reproof when pursued on the Subjective Method, upon which *all* problems are insoluble. As I have shown at some length elsewhere,¹ all problems are legitimate which admit Verification of their premisses and conclusions; and no Verification is possible except on the Objective Method.

§ 10. In the arrangement of Aristotle's treatises, those which succeeded the Physics were called τὰ μετὰ τὰ φυσικὰ βιβλία—indicating that they were to be studied *after* the Physics, either because their topics were evolved from physical inquiries, or because their topics were beyond physical inquiry. The equivoque still continues. Metaphysics may concern itself with the last conclusions of Physics, dealing with these results as its elements; or it may concern itself with inquiries beyond the region of Experience, entirely removed from Verification, transcending Sense, and drawing its data from a higher source. Obviously, in proportion as it seeks its elements in the relations of sensible phenomena it forms one branch of legitimate inquiry, and the only question then is as to the validity of the Method it employs. In proportion as it seeks its elements in the relations of supersensible phenomena it separates itself from Experience, ceases to be amenable to the ordinary canons of Research, and grounds its existence on the possession of a peculiar criterion—a direct and immediate knowledge of the Absolute.

The confusion of these two distinct conceptions is very common, and is the source of much perplexity. Those who hold the doctrine of the relativity of knowledge may admit without incon-

sistency many principles which are metaphysical in the sense of transcending Experience in their generality, although founded on Experience and conformable with it: such, for example, are causality and inertia. There is a large admixture of such Metaphysics, in all philosophical Physics; and in this sense we may call Metaphysics the *prima philosophia*. But Experience is here the source and pattern: the Objective Method with its rigorous tests of Verification rules as absolutely here as in every other department of positive inquiry. The Unknown is only a prolongation of the Known, and is trusted only so far as it is in strict conformity with the Known. The Invisible is but the generalisation of the Visible.

Those who hold that, over and above the conceptions furnished through Experience, the mind brings with it certain conceptions antecedent to and independent of Experience, who hold that, over and above our relative knowledge, we have absolute knowledge, *reverse* this procedure from the Known and Visible to the Unknown and Invisible; and starting from what their rivals declare to be not simply the Unknown but the Unknowable, they deduce from it certain conclusions which they present as ontological truths capable of guiding us in discovering the relations of phenomena. Let Descartes be heard on this point: "Perspicuum est optimam philosophandi viam nos sequuturos, si ex ipsius Dei cognitione, rerum ab eo creatarum explicationem deducere conemur, ut ita scientiam perfectissimam, quæ est effectuum, per causas acquiramus."¹ The fallacy lies in concluding that because, in Mathematics

¹ Aristotle, chap. iv.

¹ Descartes: *Princip. Philos.* ii. § 22.

and all deductive operations, we unfold the particulars contained implicitly in the generalities, we should therefore always seek particulars in this way. But the procedure is only justifiable when the generalities are proved to be indisputably true, and when the particulars deduced are by Verification shown to be really as well as verbally contained in them. Now, what are the chief objects of absolute knowledge, the generalities from which ontologists deduce? They are God, Freedom, Immortality, Causality, Existence: the noumena of which all the manifold experiences are phenomena.¹ That it is possible to *infer* these, no one denies; but their value as inferences opens an interterminal discussion. The ontologists claim to *know* them directly, immediately, certainly. Their opponents affirm—and endeavour psychologically to prove—that such knowledge is impossible, and that, if possible, it would be infertile, because incapable of being applied to the problems of phenomena except through Experience; infertile, because it can only be a comparison of ideas with ideas, never of ideas with facts; and thus stumbles over the old sceptical objection—*τίς κρινεῖ τὸν ὑγιεινόν*. Suppose, for example, that antecedently to all Experience we know the general law of Causality, it is only through Experience we can enrich this knowledge. We may know that every effect has a cause; this knowledge we may have brought with us into our phenomenal life; but what concerns us is, to know the particular cause of each particular effect, and, if we can ascertain that, the general axiom may be disregarded; if we cannot

ascertain that, the general axiom is powerless.

§ 11. The valid objection against Metaphysics is not so much against the subjects of inquiry as against the Method of inquiry; if the Method were legitimate, its results would be legitimated. I shall consider this Method by-and-bye; for the present I invoke the unequivocal verdict of History, which pronounces it to be the prolonged impotence of two thousand years and all its results, as shifting as the visionary phantoms of reverie. When we are awake, says Aristotle, we have a world in common; when we dream, each has his own. Kant aptly applies this to metaphysicians; “when we find a variety of men having various worlds, we may conclude them to be dreaming.” It is because the majority of thinking men have been convinced that inquiries conducted on the Metaphysical Method are but as dreams, that they have everywhere in Europe fallen into discredit. Once the pride and glory of the greatest intellects, and still forming an important element of liberal culture, the present decadence of Metaphysics is attested no less by the complaints of its few followers than by the thronging ranks of its opponents. Few now believe in its large promises; still fewer devote to it that passionate patience which is devoted by thousands to Science. Every day the conviction gains strength that Metaphysics is condemned, by the very nature of its Method, to wander for ever in one tortuous labyrinth, within whose circumscribed and winding spaces weary seekers are continually finding themselves in the trodden tracks of predecessors who could find no exit.

Metaphysical Philosophy has been ever in movement, but the movement

¹ ἔστιν ἐπιστήμη τις ἣ θεωρεῖ τὸ ὄν ἢ τὸ ὄν καὶ τὰ τούτῳ ὑπάρχοντα καθ' αὐτό.—Aristotle: *Met.* iii. 1.

has been circular; and this fact is thrown into stronger relief by contrast with the linear progress of Science. Instead of perpetually finding itself, after years of gigantic endeavour, returned to the precise point from which it started, Science finds itself, year by year, and almost day by day, advancing step by step, each accumulation of power adding to the momentum of its progress; each evolution, like the evolutions of organic development, bringing with it a new functional superiority, which in its turn becomes the agent of higher developments. Not a fact is discovered but has its bearing on the whole body of doctrine; not a mechanical improvement in the construction of instruments but opens fresh sources of discovery. Onward, and for ever onward, mightier and for ever mightier, rolls this wondrous tide of discovery. While the first principles of Metaphysical Philosophy are to this day as much a matter of dispute as they were two thousand years ago,¹ the first principles of Science are securely established, and form the guiding lights of European progress. Precisely the same questions are agitated in Germany at the present moment that were agitated in ancient Greece; and with no more certain Methods of solving them, with no nearer hopes of ultimate success. The History of Philosophy presents the spectacle of thousands of intellects—some the greatest

¹ "C'est la honte éternelle de la philosophie de n'avoir pas jusqu'à présent mis au jour un résultat positif, un principe une fois pour toute reconnu et universellement admis. Bien mieux, il n'y a pas même un résultat négatif, une défaite complète, irrévocable d'une doctrine si réfutée qu'elle soit." — Delbœuf: *Essai de Logique Scientifique*, Liège, 1865, p. 10. Compare Kant: *Prolegomena zu einer jeden künftigen Metaphysik*, passim.

that have made our race illustrious—steadily concentrated on problems believed to be of vital importance, yet producing no other result than a conviction of the extreme facility of error, and the remoteness of any probability that Truth can be reached.¹ The only conquest has been *critical*—that is to say, psychological. Vainly do some argue that Philosophy has made no progress hitherto, because its problems are complex, and require more effort than the simpler problems of Science; vainly are we warned not to conclude from the past to the future, averring that no progress will be made because no progress has been made. Perilous as it must ever be to set absolute limits to the future of human capacity, there can be no peril in averring that Metaphysics never will achieve its aims, because those aims lie beyond all scope. The difficulty is impossibility. No progress can be made because no basis of certainty is possible. To aspire to the knowledge of more than phenomena—their resemblances, co-existences, and successions—is to aspire to transcend the inexorable limits of human faculty. To *know* more, we must *be* more.

In the early days of speculation all Philosophy was essentially metaphysical, because Science had not emerged from Common Knowledge to claim theoretical jurisdiction. The particular sciences then cultivated, no less than the higher

¹ Compare Kant in the preface to the 2nd ed. of the *Kritik der reinen Vernunft*: "Der Metaphysik.....ist das Schicksal bisher noch so günstig nicht gewesen, dass sie den sichern Gang einer Wissenschaft einzuschlagen vermocht hätte; ob sie gleich älter ist als alle übrigen.Es ist also kein Zweifel, dass ihr Verfahren bisher ein blosses Herumtappen und, was das Schlimmste ist, unter blossen Begriffen gewesen sei."

generalities on Life, Destiny, and the Universe, were studied on one and the same Method; but in the course of evolution a second Method grew up, at first timidly and unconsciously, gradually enlarging its bounds as it enlarged its powers, and at last separating itself into open antagonism with its parent and rival. The child then destroyed its parent; as the mythic Zeus, calling the Titans to his aid, destroyed Saturn and usurped his throne. The Titans of the new Method were Observation and Experiment.

There are many who deplore the encroachment of Science, fondly imagining that Metaphysical Philosophy would respond better to the higher wants of man. This regret is partly unreasoning sentiment, partly ignorance of the limitations of human faculty. Even among those who admit that Ontology is an impossible attempt, there are many who think it should be preserved in, because of the "lofty views" it is supposed to open to us. This is as if a man desirous of going to America should insist on walking there, because journeys on foot are more poetical than journeys by steam; in vain is he shown the impossibility of crossing the Atlantic on foot; he admits that grovelling fact, but his lofty soul has visions of some mysterious overland route by which he hopes to pass. He dies without reaching America; but to the last gasp he maintains that he has discovered the route on which others may reach it.

Let us hear no more of the lofty views claimed as the exclusive privilege of Metaphysics. Ignorant indeed must be the man who nowadays is unacquainted with the grandeur and sweep of scientific speculation in Astronomy and Geology, or who has never been thrilled by the

revelations of the telescope and microscope. The heights and depths of man's nature, the heights to which he aspires, the depths into which he searches, and the grander generalities on Life, Destiny, and the Universe, find as eminent a place in Science as in Metaphysics. And even were we compelled to acknowledge that lofty views were excluded from Science, the earnest mind would surely barter such loftiness for Truth? Our struggle, our passion, our hope, is for Truth, not for loftiness; for sincerity, not for pretence. If we cannot reach certain heights, let us acknowledge them to be inaccessible, and not deceive ourselves and others by phrases which pretend that these heights are accessible. Bentham warns us against "question-begging epithets"; and one of these is the epithet "lofty," with which Metaphysical Philosophy allures the unwary student. As a specimen of the sentiment so inappropriately dragged in to decide questions not of sentiment but of truth, consider the following passage delivered from the professorial chair to students whose opinions were to be formed:—

"A spirit of most misjudging contempt has for many years become fashionable towards the metaphysical contemplations of the elder sages. Alas! I cannot understand on what principles. Is it, then, a matter to be exulted in, that we have at length discovered that our faculties are only formed for earth and earthly phenomena? Are we to rejoice at our own limitations, and delight that we can be cogently demonstrated to be prisoners of sense and the facts of sense? In those early struggles after a higher and more perfect knowledge, and in the forgetfulness of every inferior science through the very ardour of the pursuit,

there is at least a glorious, an irresistible testimony to the loftier destinies of man; and it might almost be pronounced that in *such* a view, their very errors evidence a truth higher than all our discoveries can disclose! When Lord Bacon, with his clear and powerful reasonings, led our thinkers from these ancient regions of thought (then newly opened to the modern world) to the humbler but more varied and extensive department of inductive inquiry, I represent to myself that angel-guide, all light and grace, who is pictured by our great poet as slowly conducting the first of our race from Paradise, to leave him in a world, vast, indeed, and varied, but where thorns and thistles abounded, and food—often uncertain and often perilous—was to be gained only by the sweat of the brow and in the downcast attitude of servile toil.”¹

It would be an insult to the reader’s understanding to answer the several absurdities and “question-begging” posi-

¹ Archer Butler: *Lectures on the Hist. of Ancient Philosophy*, ii. 109.

tions of this passage, which, however, is typical of much that may be read in many writers. Contempt for the speculations of the elder sages, or indeed of moderns, is a feeling we should be slow to acknowledge, whatever estimate we formed of their truth. If my polemical tone against a Method I believe to be not only hopeless but nowadays pernicious has sometimes seemed to warrant such an accusation, let me, on personal no less than philosophic grounds, rebut it here. The memory of long, laborious study, ever baffled ever renewed, would alone suffice to create sympathy and respect for all earnest seekers; and if this feeling were not present, the Positive Philosophy would suffice, pointing as it does to all the great metaphysicians as necessary precursors, without whose labours Science would never have existed. It is not because the noble pioneers have perished in the trenches that their renown should fade. If we make a bridge of their dead bodies, we should raise a monument to their devotion.

II.—THE OBJECTIVE AND SUBJECTIVE METHODS

§ 12. A SPANISH metaphysician truly says that the question of Method rules, and in one sense comprehends, all philosophical questions, being indeed Philosophy in action.¹ As it is a path on

¹ Nieto Serrano: *Bosquejo de la Ciencia Viviente*, Madrid, 1867. *Parte primera*, p. 31. “La cuestion de método domina y comprende hasta cierto punto todas las cuestiones filosóficas. Efectivamente el método filosófico es la filosofía

which Truth is sought, we must first come to some agreement respecting the object of search.

The question, What is Truth? has been variously answered, but, instead of pausing here to consider the answers, I

misma en accion, la cual aparece ya tal cual es desde los primeros pasos, y no puede desmentirse en lo sucesivo.”

will propose one which is sufficiently catholic to be accepted by all schools.

Truth is the correspondence between the order of ideas and the order of phenomena, so that the one is a reflection of the other—the movement of Thought following the movement of Things.

The correspondence can never be absolute: it must, from the very structure of the mind, be relative; but this relative accuracy suffices when it enables us to foresee with certainty the changes which will arise in the external order under given conditions. If the order in our ideas respecting falling bodies sufficiently corresponds with the order of the phenomena themselves to enable us to express the Law with precision, and foresee its results with certainty, we have in that Law a truth of the only kind attainable by us.

The reader will observe that I have used the phrases "order in ideas" and "movement of thought" instead of adopting the ordinary formula "ideas conformable with objects." If Truth is the conformity of ideas with objects, Truth is a chimera, or Idealism is irresistible. "La notion de *vérité* implique une contradiction," says Delbœuf. "Par définition, une idée n'est vraie qu'à la condition d'être conforme, adéquate à son objet. Mais, par essence, une idée est nécessairement différente d'un objet. Comment donc puis-je parler d'une équation entre l'idée et son objet?"¹ The old sceptical arguments are unanswerable on this ground. We need not, however, rush into Idealism by affirming the identity of ideas and their objects; we need simply give up all pretension to absolute knowledge, and rest contented with rela-

tive knowledge, which permits of our adjusting our actions to the external order. Indeed, the ultimate aim of knowledge is adaptation; and we call it Truth when the adaptation is precise. What bodies are in themselves, what falling is in itself, need not properly concern us; only what are the relations in which bodies and their movements stand to our perceptions. If in attempting to comprehend these relations we succeed in so arranging our ideas that their order corresponds with the order of phenomena (as when we think of falling bodies having a velocity proportional to the time), that arrangement is Truth; but if, instead of the movement of Thought being controlled by the movement of Things, our ideas are arranged in an order which does not correspond with the order of phenomena (as when we think of the velocity being proportional to the space fallen through), that is Error. And this discloses the imperfection of the many definitions of Truth which regard it as "conformity among ideas." The conception of velocity proportional to *space* is a conception which would have nothing against it were it not opposed to the facts. As a pure deduction it is inevitable; a movement of Thought determined by some pre-existing thought necessarily takes that course; but a movement of Thought determined by that of Things, following step by step the succession of phenomena, leads to the conclusion of velocity proportional to the *time*.

§ 13. To attain this correspondence between the internal and external order is the object of Search; and the Methods of Search are two:—

a. The Objective Method which moulds its conceptions on realities by closely following the movements of the objects as they severally present themselves

¹ Delbœuf: *Essai de Logique Scientifique*, p. 35.

to Sense, so that the movements of Thought may synchronise with the movements of Things.

β. The Subjective Method which moulds realities on its conceptions, endeavouring to discern the order of Things, not by step by step adjustments of the order of ideas to it, but by the anticipatory rush of Thought, the direction of which is *determined* by Thoughts and not *controlled* by Objects.

Observation of objects presented to the mind must be succeeded by Conjecture respecting the connecting, but unobserved, links. The successive stages of inquiry are from Observation to Conjecture, and from Conjecture to Verification. The Subjective Method stops at the second stage: its function is Hypothesis. The Objective Method passes on to the third stage: its function is Verification. Thus, while the first characterises our spontaneous tendency, and is seen in full vigour in all the early forms of speculation, the second characterises our reflective tendency, and is the source of positive knowledge. The Objective Method thus absorbs what is excellent in the Subjective Method, as Science takes up into itself whatever Metaphysics can establish, rejecting what is irrelevant and completing what is incomplete. Both physicist and metaphysicist employ Observation and Conjecture; but the physicist, if true to the Objective Method, is careful to verify the accuracy of his observations and conjectures, submitting the order of his ideas to the order of phenomena; whereas the metaphysicist, obeying the subjective impulse, is careless of Verification, and is quite ready to rely on data and conclusions which are absolutely incapable of Verification. The one freely employs Hypothesis under the rigorous condition of

never relying on a conjecture as a fact, never assuming that a harmony in his conceptions must necessarily imply a corresponding arrangement in phenomena; the other employs Hypothesis under the single condition of not thereby introducing a logical discord. In the one case the "anticipatory rush of thought" is controlled by the confrontation of ideas with objects. In the other case the rush of thought is controlled only by the confrontation of ideas with ideas. Briefly, then, it may be said that the Objective Method seeks Truth in the relations of objects; whereas the Subjective Method seeks it in the relations of ideas.

§ 14. Philosophers expound the objective and subjective elements of which Knowledge is composed, as the *material* and *formal* elements. Things furnish the materials. Thought furnishes the forms. Objects stimulate the activity of the Mind; the Laws of mental action determine the result, in the forms of percepts, concepts, and judgments. But philosophers continually overlook the important consideration that the Mind, besides its laws which determine the forms of the material given by objects, has also a movement of its own; and this movement is determined from within, by some pre-existing movement, just as it may be determined from without, by the stimulus of objects. It is this *subjective current* which, disturbing the clear reflection of the objective order, is the main source of error. It determines those concepts and judgments which have no corresponding objects: hallucinations, reveries, dreams, hypotheses, figments. This being so, we cannot accept the notion adopted by Sir W. Hamilton from Twisten, that "the condition of error is not the activity of

intelligence, but its inactivity." On the contrary, we must assign error to the activity of intelligence when it follows its own impulses in lieu of receiving the direction from objects. "What is actually thought," according to Twisten and his follower, "cannot but be correctly thought. Error first commences when thinking is remitted, and can in fact only gain admission in virtue of the truth which it contains;—every error is a perverted truth."¹ This seems to me so glaringly in opposition to all rational interpretation that I must conclude it to mean something very different from what it says. Hamilton's comment only makes the matter worse.

§ 15. That the source of Error is *the subjective current determining the direction of the thoughts*, is easily shown. Error arises in the substitution of Inference for Presentation. No error can possibly arise in Sensation itself, but solely in the movements of thought which are prompted by the sensation. The immense activity of this subjective current, the large interfusion of Inference in the simplest acts of Perception, has long been recognised; and, as I have said elsewhere, what is called a "fact," and held to be indisputable because it is a "fact," is in reality a bundle of inferences, some or all of which may be false, tied together by sensations, which must be true. Take a case so simple as the sight of an apple on the table. All that is here directly certified by consciousness is the sensation of a coloured surface; with this are linked certain ideas of roundness, firmness, sweetness, and fragrance, which were once sensations, and are now recalled by this of colour; and the whole group of actual and inferred sensations

clusters into the fact which is expressed in "there is an apple." Yet any one of these inferences may be erroneous. The coloured object may be the imitation of an apple in wood or stone; the inferences of roundness and solidity would then be correct, those of sweetness and fragrance erroneous; the statement of fact would be false. Or the object seen may be another kind of fruit, resembling an apple, yet in important particulars differing from it. Or the object may not exist, and our perception may be an hallucination. Thus a case seemingly so simple may furnish us with the evidence that Facts express our conception of the order in external things, and not the unadulterated order itself. Should the accuracy of any particular fact happen to be of importance—and in Science all facts are important—we must verify it, before accepting it. How is it verified? *By submitting each of its constituent inferences to the primordial test of Consciousness.* The test with regard to objects within range of sense is obviously the reduction of Inference to Sensation. The test with regard to axioms, or general principles transcending sense, is conformity with the laws of thought; when we have thus verified a fact we have attained the highest degree of certitude.

The mental vision by which in Perception we see the *unapparent* details—*i.e.*, by which sensations formerly co-existing with the one now affecting us are reinstated under the form of ideas, which represent the objects—is a process closely allied to Ratiocination, which also presents an *ideal series* such as, if the objects were before us, would be a series of sensations, or perceptions. A chain of reasoning is a chain of inferences, which are *ideal presentations* of the details now *unapparent to sense*. Could we realise

¹ Hamilton: *Logic*, i. 77.

all the links in this chain, by placing the objects in their actual order as a visible series, the chain of reasoning would be a succession of perceptions, and would cease to be called reasoning. The path of the planets is seen by reason to be an ellipse; it would be perceived as a fact if we were in a proper position, and endowed with the requisite instruments to enable us to follow the planet in its course. Not having this advantage, we infer the unapparent points in its course, from those which are apparent. We see them mentally. In like manner, suppose a human body is discovered under conditions which suggest that it has been burned, but without sufficient indication of the cause—*i.e.*, the facts antecedent to the burning. Some one suggests that these unapparent facts are those of Spontaneous Combustion. Our greater familiarity with the facts of combustion in general, and with the facts of the animal organism, enables us to *see* that this explanation is absurd; we mentally range the supposed objects before us, and see that *such* an order of co-existences and successions is in contradiction to all experience; we cannot see what the actual order was, but see clearly that it was not *that*.

Correct reasoning is the ideal assemblage of objects in their true relations of co-existence and succession. It is seeing with the mind's eye. Bad reasoning results from overlooking either some of the objects, or their relations; some links are dropped, and the gap is filled up from another series. Thus the traveller *sees* a highwayman, where there is truly no more than a sign-post in the twilight; and a philosopher, in the twilight of knowledge, *sees* a pestilence foreshadowed by an eclipse.

These considerations may elucidate

the real meaning to be assigned to Facts, which are sometimes taken to express the order of external things, and sometimes our conception of that order—our *description* of it; just as sound means both the vibrations of the air and our sensation of them. There is a general tendency to use the word Fact for a final truth. "This is a fact, not a theory," means, "This is an indisputable truth, not a disputable *view* of the truth." But if, as we have seen, Facts are inextricably mingled with Inferences, and if both Perception and Reasoning are processes of *mental vision reinstating unapparent details*, and liable to error in the inferences, it is clear that the radical antithesis is not between Fact and Theory, but between *verified and unverified Inferences*.

The antithesis between Fact and Theory is untenable, for the same statement may be either a fact or a theory, without any change in its evidence. It is a fact that the earth is globular. It is a fact that this globe is an oblate spheroid. It is a fact that its orbit is elliptical. No one doubts that these are facts, no one doubts that they are theories. Shall we say that they were theories until they were verified, when they became facts? This will not extricate us; since all facts require verification before they are admitted as truths; up to that point they are not less inferential than theories.

I see an apple now falling, and I see an apple which has fallen. These are two facts which ordinary language will not suffer us to call theories. Now consider two theories which ordinary language suffers us to call facts—namely, that all apples when unsupported will fall, and that the spaces fallen through will be as the squares of the times. These

are two theories of extreme generality, which are far more indisputable than the facts we have contrasted them with. They carry such certainty that no mind having the requisite preparation can for a moment hesitate in assenting to them. They are inferences which are necessities. Whereas the inferences involved in the facts before named may very easily be erroneous. The falling object may not be an apple; the apple found at the foot of the tree may not have fallen, but have been plucked and placed there. Thus doubt is permissible; and if the facts carried any importance we should be bound to verify the accuracy of our inferences. No doubt is permissible in respect to the two theories, because the inferences on which they rest have already been vigorously verified. They carry none of those possibilities of error which we know may be carried by individual experiences; all such possibilities have been eliminated in the establishment of the general truth. Should any individual experience seem in contradiction with a thoroughly verified theory, should a hundred individual experiences contradict it, our confidence would suffer no disturbance; we should at once assign them to the interference of some *condition not included in the formula*. That condition might be wholly undiscoverable, but we should be certain that the laws of nature were invariable; and our experience of disturbing influences is sufficiently extensive to invoke them in every apparent exception to a law. If it happened that two magnets placed side by side impressed on a particle of iron a velocity greater, or less, than the sum of the velocity due to each magnet acting separately, and if this were to occur a thousand times, we should not doubt the truth of the law that the velocity is

proportional to the force, but should attribute this exception to some exceptional condition, such as the influence of one magnet on the other. The reason is simple: the law has been rigorously verified; the absence of any exceptional condition has not been verified, whereas the presence of such a condition is suggested by manifold experiences in analogous cases.

Failing thus to discover any valid antithesis between Fact and Theory, we must look upon the ordinary distinction as simply verbal. Shall we express it by the terms Description and Explanation, implying that a Fact describes the order of phenomena, and a Theory interprets that order? For many purposes this would suffice. Yet on examination we shall find that an Explanation is only a fuller Description: more details are introduced, greater precision is given, the links in the chain which are unapparent to sense are made apparent to reason; but the essential mystery is untouched; successions are enumerated, but causation escapes. Thus in the description of falling bodies, greater fulness and precision of detail are given when the unapparent links are added, and the law of gravitation is introduced as the explanation. In like manner the description of an event, say the destruction of a house by a fire, acquires greater fulness and precision of detail when the apparent details are completed by some eyewitness who saw the fire break out, and explains it by this enumeration of details. In each case the objects are ranged in their order, and are *seen* thus; but in each case many objects are not seen, many intermediate links are overlooked, or are undiscoverable; and the causal nexus is for ever undiscoverable. Thus it is that explanations are descriptions,

and descriptions are explanations, facts are theories, and theories facts. Science is the explanation of nature; the systematic co-ordination of the facts of co-existence and succession.

§ 16. In the preceding paragraphs we have vindicated the necessity of the subjective current, and its dangers. The weakness of the Subjective Method is its impossibility of applying Verification; whereas the security of the Objective Method lies in its vigilant Verification. In both the mind has to supply the *formal* elements; in both it has to link together sensations by inferences, and to classify objects according to inferred relations. But the Objective Method simply co-ordinates the materials furnished by Experience; it introduces no new materials; or if it admits them, it does so provisionally and hypothetically; they are not accepted as real objects until their reality has been otherwise established. Whereas the Subjective Method is perpetually overstepping the limits that divide the material from the formal; its tendency is to confound concepts with percepts, ideas with objects, conjectures with realities. It commits the fault of drawing *material* from the Subject, instead of drawing only *form*. It takes up an inference and treats it as a fact, and thus gives its own fictions the character of reality. Because it cannot apply Verification it assumes that the order of ideas must correspond with the external order if no disorder (contradiction) be displayed. Hence it is that metaphysical conclusions are sometimes so audaciously at variance with what is known of the external order.¹

¹ Hegel, for instance, bases his system on Contradiction. So far from admitting that a thing cannot be the contrary of that which it is, he affirms, as a fundamental principle, that

§ 17. The Objective Method is incapable of reaching any results without the large employment of Inference, the successive steps of discovery being Observation, Hypothesis, and Verification. It is distinguished from the Subjective Method, not by its *aim*, which is in both that of co-ordinating the relations of objects, but by its principle of seeking the relations in the order of the objects themselves, instead of in the order of our ideas: submitting therefore every Inference to the control of Verification, and refusing to accept a conjecture as a fact until it has been tested by confrontation with the external order. The cardinal distinction between Metaphysics and Science lies in Method, not in the nature of their topics; and the proof of this is exemplified in the fact that a theory may be transferred from Metaphysics to Science simply by the addition of a verifiable element; or, conversely, may be transferred from Science to Metaphysics by the withdrawal of this same verifiable element. Thus the law of gravitation is a scientific theory; but if we withdraw from it the verifiable formula "inversely as the square of the distance and directly as the mass," there remains only the occult Attraction—which is metaphysical. On the other hand, if to a metaphysical theory of gravitation, which explains the phenomena by Attraction or an "inherent virtue," we add the verifiable formula of its mode of action, the purely subjective conception passes at once into the objective region, and a scientific theory results.

§ 18. In the course of the history of Philosophy we incessantly witness the

"everything is at once that which it is and the contrary of that which it is."

disastrous effects of transporting the *formal* elements of knowledge into the region of *material* elements—"realising abstractions," as it is called—and deducing conclusions from unverified inferences as if they had been verified. We witness the efforts of philosophers to interpret the external order by the internal order, animating Nature with human tendencies, interpreting *motors* by *motives*. Thus, because we derive our conceptions of Force and Cause from our own efforts and volitions, we interpret the changes seen without us by the changes felt within us. This is the source of the Fetichism of children and savages; of the Polytheism of early nations; and, by a gradual refinement in abstraction, of the Metaphysics and Physics of philosophers. Causes are first personified; next raised into Deities; then, by gradual elimination of the personal qualities, transformed into Entities; and finally resolved into Forces, which are exponents of relations. Thus first disappears the Will, next the independent existence; and what finally remains is an *abstract expression of the observed order*.

§ 19. To make the two Methods more readily appreciable by exhibiting them in operation, I will select an imaginary case and two real cases.

From a country where clocks are unknown, even by tradition, two travellers arrive, and in the kitchen of the cottage where they are first received they observe with astonishment an eight-day clock. The phenomena it presents are so novel that our travellers at once begin attempting an explanation. Now, all explanation consists in bringing the unknown facts under certain general facts already known; only by finding what the unknown is *like*, can it be classed and

known. In the present case the new phenomena resemble certain phenomena observed in animals. Hence the first rough approximation to an explanation is the conjecture that the clock must be alive. Suppose one of the travellers to be uncultivated, and still in the fetichistic stage, he will at once *conclude from his conjecture* that the clock is a fetich, and is inhabited by a good or evil Spirit. Let us, however, suppose him to have emerged from the primitive stage of intellectual development, and to have become a thoughtful metaphysician. His companion we will suppose to have been trained in Science and its methods. Both start from the spontaneous hypothesis that the clock is alive, this being the conjecture which most naturally ranges the new phenomena under known phenomena. Let us now watch their procedure.

A is a subjective philosopher, and, not aware of the absolute necessity of verifying his hypothesis, proceeds to apply it, and to deduce explanations of the clock-phenomena from the known facts of animal life. The ticking resembles the regular sounds of breathing; the beating of the pendulum is like the beating of the heart; the slow movements of the hands are they not movements of feelers in search of food? the striking of the hours are they not cries of pain or expressions of anger? If the hours are struck just as he approaches the clock to examine it, or has laid hold of it, the coincidence easily suggests rage or terror as the cause; and he having once formed that conception, all subsequent experience of the clock striking when he is at a distance from it, or when no one is in the kitchen, will fail to shake it, but will be accommodated to it by other explanations.

By continuing to observe the phenomena his first rough explanation would gradually be modified, and give place to one more consistent with the facts. A variety of ingenious explanations would occur; but they would all be vitiated by the absence of any verification of the data. He observes a certain periodicity in the recurrence of the cries. There is a regularity in the succession of these cries—one being always followed by two, and two by three, and so on up to twelve; after which one recurs and two and three in the old order. To his great delight he at last observes a coincidence between each of these cries and the position of the hands on the dial-plate; the longer hand always pointing to twelve, and the shorter hand to the number corresponding with the cries. Hence he properly infers a causal connection; but *what* that is he can only guess; out of several guesses he selects the most plausible. He propounds his explanation to his friend B with perfect confidence in its truth.

B hereupon impatiently points out the treacherous nature of the procedure A has followed. "My dear fellow, you seem unaware that your starting-point requires strict examination. You assume the vitality of the clock, and, having assumed this, you interpret by it the resemblance of ticking to breathing, and of the sounds to cries of pain and anger. But the clock may be alive, and yet these resemblances may be fallacious; they must be verified before they can be accepted; and if the clock is *not* alive? You muddle yourself with Metaphysics, and amuse yourself with drawing deductions, instead of verifying your data. In classing the new facts under old facts it is necessary that we should assure ourselves that the resemblance we imagine

is a real resemblance, and springs from similar roots. To effect this, rigorous Analysis is indispensable. But on your Subjective Method there is no analysis of objects, only of ideas. Let me describe the course of my own investigations, guided by that Method which Science has taught me to rely on.

"Like you, I conjectured that an animal was before me. What animal? I first perceived that in many respects it was unlike all animals known to me; and, pursuing this track, I found so many points of unlikeness, and these of such significance in animal life, that *another* conjecture emerged, and I asked, Is it an animal at all? Here were two starting-points, both conjectural, both needing verification. I chose to begin upon the second, and for this reason: if the clock were not an animal, the natural inference was that it must be a machine. I was already familiar with many machines, more so than with organisms, and I began trying how far the observed phenomena could be brought under the known facts of mechanism. Now observe the operation of scientific method! You might have joined with me in forming precisely the same conjectures, but you would have started off at a tangent, and would have deduced from mechanical facts just as you deduced from vital facts, without troubling yourself about Verification. Had I not employed that potent instrument Analysis, I should never have discovered the truth about the clock. The complex facts had to be decomposed, and their elements ascertained. As this could not (successfully) be done by analysis of my ideas, I had no alternative but to take the clock to pieces, bit by bit, in the search after the objective condition of each element in this complex whole. I removed the

dial-plate, then the back, finally the whole external case; but still the pendulum swung, still the sounds regularly succeeded. Accidentally arresting the pendulum, I found that all the phenomena disappeared; restoring its swing, I restored the phenomena. After repeating this often enough to eliminate all possibilities of coincidence I came to the conclusion that the clock-phenomena were dependent on the motion of the pendulum. This was one step, and an important one; but it was no explanation. There were two questions still to be answered: What makes the pendulum move in this manner? and how does its motion effect the observed results? Had I been deprived of the means of objective analysis, unable to take the clock to pieces, I should have been reduced to your procedure—ingenious guessing. But Observation having disclosed the ascent of one weight and descent of another, I conjectured that this motion was connected with the striking of the hours: I verified it by pulling the descending weight, and I found that, as I pulled, the hands revolved, and the sounds, previously heard at long intervals, now rapidly succeeded each other. Having laid bare the interior, I could trace the action of each part of the mechanism. I found that each beat of the pendulum detached one tooth of a wheel, and thus liberated the arrested movement of that wheel. I observed that these liberations were pulses coinciding with the tickings, and that the movements of the hands coincided with these movements of the wheel, every sixty revolutions of the wheel coinciding with each stroke of the clock. Having thus *explained* the mechanism, I rejected the idea of the clock being an organism, as a needless

and unacceptable hypothesis. I found that it resembles other mechanisms in all its essential characters, whereas it wants the primary character of an organism, that of drawing its force from Nutrition."

§ 20. Even those who may object that our scientific traveller has too obviously the advantage in this illustration will admit that the two procedures are characteristically opposed. It is in taking an object to pieces by Analysis, either real or ideal, that we learn to estimate its elements and thus to estimate the whole. The Subjective Method deduces the elements from the whole; and it is confirmed in this procedure by the success of Deductive Science. There is, however, a vital distinction between the Deductive Method and the Subjective Method, and it is this: in the former both data and conclusions are verified by confrontation with the external order. If truth is the correspondence between the order of ideas and the order of phenomena, the only right Method must be that which step by step assures the correspondence, demonstrating that the order of our ideas is also that of the phenomena they represent.

§ 21. I have still to exemplify the operation of the rival Methods by two cases that have not the drawback which may attach to imaginary illustration. The first shall be borrowed from Broussais, in his contrast of Brown's system with his own:—

A survey of the phenomena of life led both to the general conception of Excitation as the constant condition of all vital phenomena, and therefore as a compendious expression which resumed the general facts. Up to this point both followed the Objective Method. *From* this point the divergence was great:

“Nous professons d'abord avec Brown, que la vie ne s'entretient que par l'excitation. Mais nous abandonnons aussitôt cet auteur, parce qu'il prend la voie de l'abstraction en dissertant toujours sur *l'excitation considérée en elle-même*; nous aimons mieux *étudier ce phénomène dans les organes* et dans les tissus qui les composent, ou plutôt observer les organes et les tissus excités.”¹

§ 22. Our second illustration shall be taken from the instructive though deplorable hypothesis of Spirit-rapping, which is an indelible disgrace to the education of our age.

A few persons stand round a table, gently resting their hands on it, but careful not to push in any direction. In a little while the table moves, at first slowly, afterwards with growing velocity. The persons are all of the highest respectability, above suspicion of wilful deceit. The phenomenon is so unexpected, so unprecedented, that an explanation is imperiously demanded. In presence of unusual phenomena, men are unable to remain without some explanation which shall render intelligible to them how the unusual event is produced. They are spectators merely; condemned to witness the event, unable to penetrate directly into its causes, unable to get behind the scenes and *see* the strings which move the puppets, they *guess* at what they cannot see. Man is *interpres Naturæ*. Whether he be metaphysician or man of science, his starting-point is the same; and they are in error who say that the metaphysician differs from the man of science in drawing his explanation from the recesses of his own mind in lieu of drawing it from the observation of facts. Both observe facts,

and both draw their interpretations from their own minds. Nay, as we have seen, there is necessarily, even in the most familiar fact, the annexation of mental inference—some formal element added by the mind, suggested by, but not given in, the immediate observation. Facts are the registration of direct observation and direct inference, congeries of particulars partly sensational, partly ideal. The scientific value of facts depends on the validity of the inferences bound up with them; and hence the profound truth of Cullen's paradox, that there are more false facts than false theories current.

The facts comprised in the phenomenon of “Table-turning” are by no means so simple as they have been represented. Let us, however, reserve all criticism, and fix our attention solely on the phenomenon, which, expressed in rigorous terms, amounts to this: the table turns; the cause of its turning is unknown. To explain this, one class of metaphysical minds refers it to the agency of an unseen Spirit. Connecting the spiritual manifestation with others which have been narrated to him, the interpreter finds no difficulty in believing that a Spirit moved the table; for “the movement assuredly issued from no human agency”; the respectable witnesses “declared they did not push.” Unless the table moved itself, therefore, his conclusion must be that it was moved by a Spirit.

Minds of another class give another explanation, one equally metaphysical, although its advocates scornfully reject the spiritual hypothesis. These minds are indisposed to admit the existence of Spirits as agents in natural phenomena; but their interpretation, in spite of its employing the language of Science, is as utterly removed from scientific method as

¹ Broussais: *De l'Irritation*, 2nd ed. 1839, i. 55.

the spiritual interpretation they despise. They attribute the phenomenon to Electricity. Connecting this supposed electrical manifestation with some other facts which seem to warrant the belief of nervous action being identical with electricity, they have no hesitation in affirming that electricity streams from the tips of the fingers. It is even suggested by one gentleman that "the nervous fluid has probably a rotatory action, and a power of throwing off some of its surplus force." How entirely these ideas of nervous fluid, rotatory power, and surplus force are additions drawn from the imagination and not supplied in the objects, I need scarcely pause to point out.

Each of these explanations has been very widely accepted by the general public. The obvious defect in both lies in the utter absence of any objective guarantee. We ought to be satisfied with no explanation which is without its valid guarantee. Before we purchase silver spoons we demand to see the mark of Silversmiths' Hall, to be assured that the spoons are silver, and not plated only. The test of the assayer dispels our misgivings. In like manner, when the motion of a table is explained by spiritual agency, instead of debating whether the spirit "bring airs from heaven or blasts from hell," we let our scepticism fall on the preliminary assumption of the spirit's presence. Prove the presence of the spirit before you ask us to go further. *If present*, the spirit is perhaps capable of producing this motion of the table; we do not know whether it is, for we know nothing about spirits; at any rate, the primary point requiring proof is the presence of the spirit; we cannot permit you to assume such a presence merely to explain such a movement; for if the fact

to be explained is sufficient proof of the explanation, we might with equal justice assume that the movement was caused by an invisible dragon who turned the table by the fanning of his awful wings. If it is permissible to draw material from the Subject, and to make such assumption valid as regards objects, our right to assume the dragon is on a par with our right to assume the spirit.

A similar initial error is observable in the electrical hypothesis. Electricity may be a less intrinsically improbable assumption, but its presence requires proof. After that step had been taken, we should require proof that electricity could comport itself with reference to tables and similar bodies in this particular manner. We have various tests for the presence of electricity; various means of ascertaining how it would act upon a table. But seeing that the gentleman who spoke so confidently of "currents issuing from the tips of the fingers" never once attempted to prove that there *were* currents; and knowing, moreover, that these currents, if present, would *not* make a table turn, all men of true scientific culture dismissed the explanation with contempt.

Such were the metaphysical explanations of the phenomenon. They are vitiated by their Method. Very different was that pursued by men of science. The object sought was the unknown cause of the table's movement. To reach the unknown we must pass by the Objective Method through the avenues of the known; we must not attempt to reach it through the unknown. Is there any known fact with which this movement can be allied? The first and most obvious suggestion was that the table was pushed by the hands which rested on it. There is a

difficulty in the way of this explanation—namely, “that the persons declare solemnly they did *not* push; and, as persons of the highest respectability, we are bound to believe them.” Is this statement of any value? The whole question is involved in it. But the philosophical mind is very little affected by guarantees of respectability in matters implicating sagacity rather than integrity. The Frenchman assured his friend that the earth did turn round the sun, and offered his *parole d'honneur* as a guarantee; but in the delicate and difficult question of science, *paroles d'honneur* have a quite inappreciable weight. We may therefore set aside the respectability of the witnesses, and, with full confidence in their integrity, estimate the real value of their assertion, which amounts to this: they were *not conscious* of pushing. If we come to examine such a case, we find Physiology in possession of abundant examples of muscular action unaccompanied by distinct consciousness, and some of these examples are very similar to those of the unconscious pushing, which may have turned the table; and we are thus satisfied of three important points:—1. Pushing is an adequate cause, and will serve as well as either the supposed spirit or electricity to explain the movement of the table. 2. Pushing *may* take place without any distinct consciousness on the part of those who push. 3. Expectant attention is known to produce such a state of the muscles as would occasion this unconscious pushing.

Considered, therefore, as a mere hypothesis, this of unconscious pushing is strictly scientific; it may not be true, but it has fulfilled the preliminary conditions. Unlike the two hypotheses it opposes, it assumes nothing previously unknown, or

not easily demonstrable; every position has been or may be verified; whereas the metaphysicians have not verified one of their positions: they have not proved the presence of their agents, nor have they proved that these agents, if present, would act in the required manner. Of spirit we know nothing, consequently can predicate nothing. Of electricity we know something, but what is known is *not* in accordance with the table-turning hypothesis. Of pushing we know that it can and does turn tables. All, then, that is required to convert this latter hypothesis into scientific certainty is to prove the presence of the pushing in this particular case. And it is proved in many ways, positive and negative, as I showed when the phenomenon first became the subject of public investigation. Positive, because if the hands rest on a loose table-cloth, or on substances with perfectly smooth surfaces which will glide easily over the table, the cloth or the substances will move, and not the table. Negative, because if the persons are duly *warned* of their liability to unconscious pushing, and are told to keep vigilant guard over their sensations, they do not move the table, although previously they may have moved it frequently. When we have thus verified the presence of unconscious pushing, all the links in the chain have been verified, and certainty is complete.

§ 23. Reviewing the three explanations which the phenomenon of table-turning called forth, we elicit one characteristic as distinguishing the scientific or Objective Method—namely, the *verification* of each stage in the process, the guaranteeing of each separate point, the cultivated caution of proceeding to the unknown solely through the avenues of the known. The *germinal* difference, then, between

This does not at all disprove the fact that table-turning is due to some minor force, inasmuch as if a cover were put on the table such force would be communicated to the cover & not to the table.
 If this be meant to disprove, it fails; for if a person be warned not to push, this will prevent him concentrating his thought & will make him hardly touch the table in his eagerness not to fail.

the metaphysical and scientific Methods is not that they draw their explanations from a different source, the one employing Reasoning where the other employs Observation, but that the one is content with an explanation which has no further guarantee than is given in the logical explanation of the difficulty; whereas the other imperatively demands that every assumption should be treated as provisional, hypothetical, until it has been confronted with fact, tested by acknowledged tests—in a word, *verified*. The guarantee of the metaphysician is purely logical, subjective: it is the *intellectus sibi permissus*; the guarantee of the other is derived from a correspondence of the internal with the external order. As Bacon says, all merely logical explanations are valueless, the subtlety of nature greatly surpassing that of argument: "Subtilitas naturæ subtilitatem argumentandi multis partibus superat"; and he further says, with his usual felicity, "Sed axiomata à particularibus ritè et ordine abstracta nova particularia rursus facilè indicant et designant." It is these "new particulars" which are reached through those already known, and complete the links of the causal chain.

Open the history of Science at any chapter you will, and its pages will show how all the errors which have gained acceptance gained it because this important principle of verification of particulars was neglected. Incessantly the mind of man leaps forward to "anticipate" Nature, and is satisfied with such anticipations if they have a logical consistence. When Galen and Aristotle thought that the air circulated in the arteries, causing the pulse to beat, and *cooling* the temperature of the blood, they were content with this plausible

anticipation; they did not verify the facts of the air's presence, and its cooling effect; when they said that the "spirituous blood" nourished the delicate organs, such as the lungs, and the "venous blood" nourished the coarser organs, such as the liver; when they said that the "spirit," which was the purer element of the blood, was formed in the left ventricle, and the venous blood in the right ventricle, they contented themselves with unverified assumptions. In like manner, when in our own day physiologists of eminence maintain that in the organism there is a Vital Force which suspends chemical actions, they content themselves with a metaphysical unverified interpretation of phenomena. If they came to rigorous confrontation with fact, they would see that, so far from chemical action being "suspended," it is incessantly at work in the organism; the varieties observable being either due to a difference of conditions (which will produce varieties out of the organism), or to the fact that the action is masked by other actions.

§ 24. If the foregoing discussion has carried with it the reader's assent, he will perceive that the distinguishing characteristic of Science is its Method of graduated Verification, and not, as some think, the employment of Induction in lieu of Deduction. All Science is deductive, and deductive in proportion to its separation from ordinary knowledge and its co-ordination into System. The true antithesis is not between Induction and Deduction, but between verified and unverified cases of Induction and Deduction. The difference between the ancient and modern philosophies lies in the facility with which the one accepted axioms and hypotheses as the basis for its deductions, and the cultivated caution

with which the other insists on verifying its axioms and hypotheses before deducing conclusions from them.¹ We guess as freely as the ancients; but we know that we are guessing; and if we chance to forget it, our rivals quickly remind us that our guess is not evidence. Without guessing, Science would be impossible. We should never discover new islands did we not often venture seawards with intent to sail beyond the sunset. To find new land, we must often quit sight of land. As Dr. Thomson admirably expresses it: "Philosophy proceeds upon a system of credit, and if she never advanced beyond her tangible capital, our wealth would not be so enormous as it is."² While both metaphysician and man of science trade on a system of credit, they do so with profoundly different views of its aid. The metaphysician is a merchant who speculates boldly, but without that convertible capital which can enable him to meet his engagements. He gives bills, yet has no gold, no goods to answer for them; these bills are not representative of wealth which exists in any warehouse. Magnificent as his speculations seem, the first obstinate creditor who insists on payment makes him bankrupt. The man of science is also a venturesome merchant, but one fully alive to the necessity of solid capital which can on emergency be produced to meet his bills; he knows the risks he runs whenever that amount of capital is ex-

ceeded; he knows that bankruptcy awaits him if capital be not forthcoming.

§ 25. Astronomy became a science when men began to seek the unknown through the known, and to interpret celestial phenomena by those laws which were recognised on the surface of the earth. Geology became possible as a science when its principal phenomena were explained by those laws of the action of water, visibly operating in every river, estuary, and bay. Except in the grandeur of its sweep, the mind pursues the same course in the interpretation of geological facts which record the annals of the universe, as in the interpretation of the ordinary incidents of daily life. To read the pages of the great Stone-book, and to perceive from the wet streets that rain has recently fallen, are the same intellectual processes. In the one case the mind traverses immeasurable spaces of time, and infers that the phenomena were produced by causes similar to those which have produced similar phenomena within recent experience; in the other case, the mind similarly infers that the wet streets and swollen gutters have been produced by the same cause we have frequently observed to produce them. Let the inference span with its mighty arch a myriad of years, or span but a few minutes, in each case it rises from the ground of certain familiar indications, and reaches an antecedent known to be capable of producing these indications. Both inferences may be wrong: the wet streets may have been wetted by a water-cart, or by the bursting of a pipe. We cast about for some other indication of rain besides the wetness of the streets and the turbid rush of gutters, which might equally have been produced by the bursting of a water-pipe. If we see

¹ Mr. Bayma, *Molecular Mechanics*, 1866, p. 3, speaks of those "modern thinkers who despise the deductive method as a useless relic of the past." They must be very shallow thinkers who do not see that it is the Subjective, not the Deductive, Method which is the useless relic of the past.

² Thomson: *Outlines of the Laws of Thought*, p. 312.

passers-by carrying wet umbrellas, some still held above the head, our inference is strengthened by this indication that rain, and no other cause, produced the phenomena. In like manner, the geologist casts about for other indications besides those of the subsidence of water, and as they accumulate his conviction strengthens.

§ 26. While this is the course of Science, the course of Metaphysics is very different. Its inferences start from no well-grounded basis; the arches they throw are not from known fact to unknown fact, but from some unknown to some other unknown. Deductions are drawn from the nature of God, the nature of Spirit, the essences of Things, and from what Reason can postulate. Rising from such mists, the arch so brilliant to look upon is after all a rainbow, not a bridge.

To make his method legitimate, the metaphysician must first prove that a co-ordinate correspondence exists between Nature and his Intuitional Reason,¹ so that whatever is true of the one must be true of the other. The geologist, for example, proceeds on the assumption that the action of waters was essentially the same millions of years ago as it is in the present day; so that whatever can be positively proved of it *now* may be confidently asserted of it *then*. He subsequently brings evidence to corroborate

¹ By Intuitional Reason I here wish to express what the Germans call *Vernunft*, which they distinguish from *Verstand*, as Coleridge tried to make Englishmen distinguish between Reason and Understanding. The term Reason is too deeply rooted in our language to be twisted into any new direction; and I hope by the unusual "Intuitional Reason" to keep the reader's attention alive to the fact that by it is designated the process of the mind engaged in transcendental inquiry.

his assumption by showing that the assumption is necessary and competent to explain facts not otherwise to be consistently explained. But does the metaphysician stand in a similar position? Does he show any validity in his preliminary assumption? Does he produce any evidence for the existence of a nexus between his Intuitional Reason and those noumena or essences about which he reasons? Does he show the probability of there being such a correspondence between the two that what is true of the one may be accepted as probable of the other? Nothing of the kind. He assumes that it is so. He assumes, as a preliminary to all Philosophy, that Intuitional Reason is competent to deliver verdicts, even when the evidence is entirely furnished by itself. He assumes that his Intuitions are face to face with Existences, and have consequently immediate knowledge of them. But this immense assumption, this gratuitous begging of the whole question, can only be permitted after a demonstration that the *contrary* assumption must be false. Now, it is certain that we can assume the contrary, and assume it on evidence as cogent as that which furnishes his assumption. I can assume that Intuitions are not face to face with Existences; indeed, this assumption seems to me by far the most probable; and it is surely as valid as the one it opposes? I call upon the metaphysician to prove the validity of his assumption, or the invalidity of mine. I call upon him for some principle of verification. He may tell me (as in past years the Hegelians used to tell me, not without impatience) that "Reason must verify itself"; but unhappily Reason has no such power; for if it had, Philosophy would not be disputing about first principles; and

when it claims the power, who is to answer for its accuracy, *quis custodiet ipsos custodes?* If Ontology is possible, its only basis rests on the *assumed* correspondence of the external and internal orders, a basis shown by Psychology to be excessively treacherous. If all concepts are reducible to percepts, and our widest generalisations are only Representations of what originally was Presentation, Ontology has no standing place. Its data are figments—subjective constructions in which formal elements are transmuted into material elements, relations are transformed into objects, abstractions are personified and endowed with reality.

§ 27. The objects with which Ontology concerns itself do not admit of Presentation (*Anschauung*), consequently its conclusions are incapable of being verified. We can never know whether the assumed correspondence between the order in our thoughts and the order in things is a real correspondence. For example, Cause is a concept constructed out of formal elements—an inference which posits the reality of something over and above the unconditional antecedence and sequence given in Experience. Let us admit the reality; we cannot safely proceed beyond the inference; we cannot justify our transformation of this inference into an object having knowable qualities; we are not entitled to found inferences on this inference. Cause then remains a nebulous thought. If we attempt to define it, our definitions will be arbitrary; if attempt to deduce from it, our deductions will be figments. Herein lies the distinction between Mathematics and Metaphysics: the one can, and the other cannot, be reduced to Presentation; the one has, and the other has not, an objective basis and a constant verification. The material

elements of Mathematics are physical facts gained through Sense; the formal elements are simply serial dispositions of the objects; and thus the widest reaches of mathematical speculation are only the *writing out* of objective knowledge, the development of identical propositions.*

§ 28. Metaphysicians proceed on the assumption that Intuitional Reason, which is independent of Experience, is absolute and final in its guarantee. The validity of its conclusions is self-justified. Hegel boldly says, "Whatever is rational is real, and whatever is real is rational—*das Vernünftige ist wirklich und das Wirkliche vernünftig.*" And writers of less metaphysical rigour frequently avow the axiom, and always imply it. Thus in a remarkable article on Sir W. Hamilton, which appeared in the *Prospective Review*, we read that Philosophy in England has dwindled down to mere Psychology and Logic, whereas its proper business is with the notions of Time, Space, Substance, Soul, God; "to pronounce upon the validity of these notions as revelations of real Existence, and, if they be reliable, use them as a bridge to cross the chasm from relative Thought to absolute Being. Once safe across, and gazing about it in that realm, the mind stands in presence of the objects of Ontology."

"Once safe across"; this is indeed the step which constitutes the whole journey; unhappily we have no means of getting safe across; and in this helplessness we had better hold ourselves aloof

* On the contrast between Mathematics and Metaphysics, see the admirable essay of Kant: *Untersuchungen über die Deutlichkeit der Grundsätze der natürlichen Theologie und der Moral*; and Apelt: *Die Metaphysik*, § 6. Compare Mansel: *Metaphysics*, p. 285. I have argued the point more fully in the chapter on Spinoza, in the *History of Philosophy*, vol. ii., pp. 211-215.

from the attempt. If a man were to discourse with amplitude of detail and eloquence of conviction respecting the inhabitants of Sirius, setting forth in explicit terms what they were like, what embryonic forms they passed through, what had been the course of their social evolution, and what would be its ultimate stage, we should first ask, And pray, Sir, what *evidence* have you for these particulars? what guarantee do you offer for the validity of these conclusions? If he replied that Intuitional Reason assured him these things must be so from the inherent necessities of the case, he having logically evolved these conclusions from the data of Reason, we should suppose him to be either attempting to mystify us, or to be hopelessly insane. Nor would this painful impression be removed by his proceeding to affirm that he never thought of trusting to such fallacious arguments as could be furnished by Observation and Experiment—tests wholly inapplicable to objects so remote from all experience, and accessible only by Reason.

In the present day, speculations on the Metaphysical Method are not, intrinsically, more rational than theories respecting the development of animated beings peopling Sirius; nay, however masked by the ambiguities of language and old familiarities of speculation, the attempt is really less rational, the objects being even less accessible. Psychology has taught us one lesson at least—namely, that we cannot know causes and essences, because Experience is limited to sequences and phenomena. Nothing is gained by despising Experience, and seeking refuge in Intuitional Reason. The senses may be imperfect channels, but at any rate they are in direct communication with their objects, and are

true up to a certain point. The error arising from one sense may be corrected by another; what to the eye appears round, the hand feels to be square. But Intuitional Reason has no such safeguard. It has only itself to correct its own errors. Holding itself aloof from the corroborations of Sense, it is aloof from all possible verification, because it cannot employ the test of confrontation with fact.

This conviction has been growing slowly. It could never have obtained general acceptance until the Metaphysical Method had proved its incapacity by centuries of failure. In the course of the history of philosophy we shall see the question of Certitude continually forced upon philosophers, always producing a crisis in speculation, although always again eluded by the more eager and impatient intellects. Finally, these repeated crises disengage the majority of minds from so hopeless a pursuit, and set them free to follow Science which *has* Certitude.

§ 29. History with overwhelming evidence proves the incompetence of the Subjective Method; Psychology with irresistible force displays the cause. It is a common mistake to suppose that this Method is followed by metaphysicians exclusively; they, indeed, have uniformly employed it, and were forced by the nature of their inquiries to employ it; but savans unhappily have shown a fatal facility in employing it likewise, and have thereby obstructed the advance of knowledge. All we can say is that only on the Objective Method has Science been successful; because only by the verification of conceptions can Truth—which is the correspondence of the internal and external orders—be reached.

With the validity of the Subjective

Method stands or falls the truth of Metaphysics, since that is the Method which alone can be employed in such inquiries. There are three grand divisions of Metaphysics, and these are Psychology, Cosmology, and Theology. It is possible to treat all three on the Objective Method by restricting them to their corresponding phenomena, and waiving all inquiry into essential causes; but this is Science, and for the present we are dealing with Metaphysics; we will therefore follow Wolf, and adopt the scholastic terms, Rational Psychology, Rational Cosmology, and Rational Theology. And as many of my readers will probably be more disposed to accept Mr. Mansel's criticism of these delusive efforts to transcend Experience than a criticism from the positive point of view, I will here borrow his remarks:—

“The aim of Rational Psychology is to frame definitions exhibiting the essential nature of the soul and its properties, as realities conceived by the intellect, underlying and implied by the phenomena presented in consciousness; and to prove by a demonstrative process that the notions thus defined necessarily flow one from another. Psychology is thus raised from a science of observation to one of demonstration [more accurately, from a science of observation to one of inference and deduction from inferences]; and its objects are transformed from phenomena presented in experience to realities contemplated by the intellect. The soul, by virtue of its essential nature as a simple substance, is shown to possess, of necessity, certain attributes as rationally conceived and defined—such as sense, imagination, intelligence, will, spirituality, indestructibility, and so forth; and the same conclusions are even demonstrated of other spiritual natures

which partake of the generic attribute of the soul.” Mr. Mansel hereupon observes: “The weakness of the whole process is that it tacitly postulates as its starting-point a principle which is neither evident in itself, nor such as can be made evident by any process of thought. It assumes, that is to say, a transcendental definition of the real nature of the soul beyond and above the facts and relations which are manifested in consciousness. But how is the truth of such a definition to be guaranteed? Of the soul as a simple substance, apart from its particular modification, consciousness tells us nothing. How, then, is the abstract conception of the nature of the soul to be verified? It cannot be self-evident; for self-evidence is nothing more than the instantaneous assent of consciousness; and the assumption in question cannot be submitted to the judgment of consciousness at all. It cannot be demonstrable; for it could only be demonstrated by the assumption of a higher notion of the same kind, concerning which the same question would then have to be raised. It cannot be generalised from experience; for experience deals with the facts of consciousness only, and tells us not of what *must be*, but only of what *is* or *seems to be*. Unable to verify his fundamental definition by any reference to the reality which it is supposed to represent, the metaphysician is compelled to confine himself to the relations of the language by which it is represented.”¹

Mr. Mansel then examines Rational Cosmology, showing that it can “contain nothing more than an analysis of general notions, and can lead to no conclusions but such as the philosopher has himself virtually assumed in his premises. The

¹ Mansel: *Metaphysics*, p. 293.

abstract notion of the world contains implicitly whatever attributes we choose to assume as its constituents; and the metaphysical or logical analysis of that notion can contain no more."

Still more incisive is his criticism on Rational Theology, which starts from a nominal definition of the Deity. "How do we know," he asks, "that our conception at all corresponds to the nature of the Being whom it professes to represent?"

§ 30. It is the slow rise of the Objective Method and its gradual extension into regions formerly occupied by the Subjective Method which the history of philosophy will have to exhibit; and the

exposition will be twofold, showing the failures of the one Method and the successes of its rival. Thus will be established the conclusion that no problem merits our attention unless its solution is verifiable, and all problems are unverifiable on the Subjective Method.

But on what does Verification rest? Before this can be answered it is requisite to discuss the much-debated question of the origin of knowledge, Have we any higher source than Experience? Is there a fountain of Truth which springs from a source independent of Experience? I shall have to treat this question by and by, but it is needed first to consider the nature of our Test of Truth.

III.—THE TEST OF TRUTH

§ 31. TRUTH being the correspondence between the internal and external order, what is the test of that correspondence? Widely as philosophers differ respecting the origin and scope of knowledge, they are unanimous in affirming that the ultimate test must lie in the verdict of Consciousness, whether the verdicts of Consciousness are, or are not, conformable with Objective Reality. Now, Consciousness is a word of delusive vagueness, and moreover some of its "verdicts" are confessedly false; the question thus arises, Which are certainly true? Metaphysicians implicitly, and sometimes explicitly,¹

assume that all "clear and distinct ideas" are true; an assumption which ill accords with the clearness and distinctness of hallucinations, and many false hypotheses. But those who are unprepared for so facile and delusive an answer as this, and who recognise that Consciousness may on occasions deliver false verdicts, desire to fix some criterion of its infallibility, *when* it is infallible.

A startling result discloses itself: Consciousness is only infallible in verdicts limited to identical propositions, or perhaps the better phrase would be propositions of equivalence—*e.g.*, "A is A," "whatever is is."² Here, and only here, there is no fallibility. No possibility of error weakens an identical proposition.

¹ As the Cartesians. It is thus boldly stated by Tschirnhausen: "verum est quicquid concipi potest; falsum vero quod non concipi potest."—*De Medicinâ Mentis*, 1687, quoted by Ueberweg: *Logik*. This canon receives its full illustration in Hegel.

² χρῆ τὸ λέγειν τε νοεῖν τ' εἶναι ἕμμεναι. Parmenides: *Fragm.* v. 43.

Unhappily, this immunity from error accompanies an infertility of knowledge. It cannot serve as guidance, for it leads nowhither. Its security is imperilled by the first step in advance; for no sooner is one thing affirmed of another than, with this commencement of knowledge, fallibility of judgment commences: what is affirmed may be erroneously affirmed; the door has been opened, and error may creep in stealthily, or stalk in imperiously. Our only resource is vigilance: we challenge every object that presents itself, no matter how insignificant its aspect, and force it to declare its quality. This vigilance is Verification, or the ascertainment that every object *is* what it declares itself to be. The famous *principium identitatis* is not indeed a *guide*, but it is a *test*.¹ Hegel, denying that it is a law of thought (allowing it only as "a law of the abstract understanding"), affirms that "no man thinks or speaks according to this law; to say that a planet is a planet and magnetism is magnetism every one holds to be frivolous."² Perhaps so; and Locke styled such propositions "frivolous";³ nevertheless, the whole stress of Verification consists in reducing propositions to identity or equivalence.

Error arises with Inference, being indeed nothing but the misstatement of the correspondence between what is inferred and what exists. Only two ways of correcting this misstatement are open; and I formerly called them respectively the Real Test and the Ideal Test. The first is a reduction of the inference to a

sensation (§ 15). The second is a reduction of the inference to a necessity of thought. Both are reductions to identical or equivalent propositions, which render their negatives unthinkable. The certainty of feeling *as* feeling cannot be disturbed. It is limpid evidence. If I feel cold, I may indeed err as to the external cause of my feeling, but not as to the feeling itself. The markings of a thermometer may assure me that the temperature of my body during ague-fit is higher than usual; but feeling is its own thermometer, and I am not mistaken in reading its indications when I simply say I *feel* colder, not hotter.

§ 32. This may seem somewhat trite; but if we follow the clue, it will lead us to large issues, one of them being the principle that the infallibility of Consciousness in each instance is the impossibility of a negative being thought. No one denies that an identical proposition is irresistible. Even Hegel, who, among other feats of logical legerdemain, showed that "Every A is at the same time not A," did not deny that A was A, whatever else it might be.

Identical propositions are frivolous when offered as enlargements of knowledge, but not when appealed to as tests of certainty. Condillac, who makes all reasoning consist in a translation of identical propositions, distinguishes between those which are frivolous because their identity is that of terms, and those which are serious because their identity is that of ideas. Thus, to say "six is six" teaches nothing, being only an iteration of the term; but to say "three added to three yield six" enlarges knowledge, by disclosing the same ideas under diversity of terms. "When we judge two men to be of equal size, we see one thing in the two things we compare—that

¹ "Es ist ein Princip des fixirenden Verstandes, nicht der erzeugenden Anschauung; der festen Ruhe, nicht der flüssigen Bewegung." Trendelenburg: *Logische Untersuchungen*, 1862, ii. 155.

² Hegel: *Encyclopädie*, § 115.

³ Comp. Mansel: *Prolegomena Logica*, p. 191.

is to say, one size in two men, and we form an identical proposition."¹ It would be more correct to say that the identity here disclosed is that of *relation*; the ideas of three and three, and of six, and of man and man, are diverse, not identical: the terms "three and three" and "six" denote the same relations, connote different ideas. The relations are equivalent.

Our knowledge begins with the discernment of resemblances and differences: it ends in the establishment of *equations*, which are the resemblances abstracted from the differences, and raised into equivalents. At first sight no one would conclude that $2 + 1$ was the same as $4 - 1$: terms and ideas are obviously different; but that an equality exists we easily disclose: thus $2 + 1 = 3$, and $4 - 1 = 3$, and the identity becomes visible in the final equation, $3 = 3$.² If I say "Man is Man," it is an identical but uninformative proposition, having, however, irresistible certainty, because the negative is unthinkable. If I say "Man is an Animal," it is by an equation with abstraction of differences, which may possibly be erroneous and only acquires irresistible force when an equivalence in the terms Man and Animal is disclosed. That if a force of 7 will produce a velocity of 3, another force of 21 will produce a velocity of 9, is an identical proposition, although the identity has to be disclosed in an equation: we cannot say that the ideas of 7, 21, 3, and 9 are the same; but we say that the relation of 7 to 21 being $\frac{1}{3}$, and the relation of 3 to 9 being also $\frac{1}{3}$, then $3 = 3 = A$ is A. It is in the unfolding of such identities—

the exhibition of uniform relations under different signs—that mathematics, and indeed all science, consists. Mr. Herbert Spencer has shown with masterly clearness how the establishment of relations of Likeness is the process of all reasoning—passing from Likeness to Identity, as it passes from qualitative to quantitative reasoning.³ And the history of Science is the history of this process, tending towards that goal conceived by D'Alembert when he said, "L'univers, pour qui saurait l'embrasser d'un seul point de vue, ne serait, s'il est permis de le dire, qu'un fait unique et une grande vérité." We have already reached the sublime height of regarding all phenomena simply as modifications of each other, capable of being substituted for each other, being, indeed, only different *expressions* of equivalent *relations*, different *signs* of the same *quantities*. This is the grand doctrine of equivalents, which is illustrated in the convertibility of forces. It penetrates beneath the diversities of expression, and searches out the identities of nature.

The establishment of equations through abstraction of differences is the product of all reasoning. When the proposition $A = B$ is first presented, it is by no means an identical one: the obvious diversities in the two terms allow me to infer that the resemblances are by no means so great as to amount to *equivalence*. I can therefore easily think the negative of this proposition. But after repeated demonstration of this equivalence (A being indifferently used for B, and B for A, without variation in the result), the resemblance is seen to be so complete that it amounts to identity, and then the negative is unthinkable. To

¹ Condillac: *Langue des Calculs*, p. 64. Compare also D'Alembert: *Discours Préliminaire*.

² Comp. Delbœuf: *Logique scientifique*, p. 127.

³ Herbert Spencer: *Principles of Psychology*.

establish identity under variety is the office of Investigation; to *exhibit* it is the office of Proof.

§ 33. It will doubtless have occurred to the reader that since Consciousness is the ultimate ground of appeal, and since Consciousness can never transcend its own sphere, we cannot possibly have a test of Objective Truth. In one sense this is correct. We never can know more than states of Consciousness; we cannot know Objects *per se*. But to reach the Truth we have no need for deeper knowledge, since Truth is simply *correspondence* between the internal and external order. That correspondence enables us to adjust our actions to external necessities; and we assure ourselves of its accuracy by the certainty of the adjustment. The touchstone of knowledge is *prevision*. I shall shortly have to consider the nature of the proofs which assure us that the subjective order is similar to the objective order; but for the present it is enough to have shown that the subjective test of a Truth is the unthinkableness of its negative; in other words, the reduction to A is A.

If this disclosure startles and discomposes the reader, the fault will lie with his exaggerated pretensions to infallible knowledge, which may be regarded as one of the disastrous errors of Philosophy. Instead of being contented with that degree of relative certainty which contents Science, and which permits prevision, and the adjustments consequent on prevision, Philosophy has been restless under the suggestion of doubt, and has required that its positions should not only be impregnable, but unassailable. There are many questions beyond the reach of demonstration. The existence of an external world, for instance, cannot be proved, if the highest degree of pro-

bability is rejected as insufficient. This has been declared a scandal to Philosophy; but the scandal lies in the demand for proof—the desire for better bread than can be made of wheat. We should interdict the question from being asked in terms that cannot be answered; it has no claim to be discussed, because the evidence on which it could be decided is not within the compass of human faculty. No astronomer would attend to the sceptic who should maintain that the law of gravitation was only an hypothesis, capable indeed of colligating the facts so that calculations accurately agreed with observation, and prevision was equal to vision, yet nevertheless, *in itself*, the process formulated in the law might be very different. The astronomer would rebuke such purposeless doubt, and would reply that the hypothesis had the highest degree of probability and the highest scientific effectiveness, so long as it was the basis of exact calculation, and received the corroboration of Observation; let a new hypothesis be proposed which exceeds it in reach and in accuracy, and the old one will give way; and not till then. In like manner the hypothesis of an external world carries conviction, and will not be disturbed until proved unsuitable to our needs.

As there is always room for error wherever the proposition is not identical, and as probability of varying degrees is all that can be attained in the majority of our conclusions, it is easy to extend the logical principle which determines infallibility where error is impossible, to the varying degrees of probability where error is possible. That which is the logical justification of A is A—namely, the *impossibility* of thinking its negative—is also the justification of a proposition constructed out of complex

and remote inferences, which have therefore only more or less probability—*i.e.*, a *difficulty* in admitting its negative. For what is the meaning of probability? The harmony of a conclusion with other and better-established conclusions: the likeness in phenomena to other well-known phenomena. When this likeness is ascertained to be complete, when the analogy is proved to be an equivalence, then probability gives place to certainty.

§ 34. A formidable opponent must now be met, and his challenge answered, before we can venture to proceed to the second part of this inquiry. That opponent is Mr. Stuart Mill, who, both in his *Logic* and in his work on *Hamilton*, argues at great length against the unthinkableness of a negative as any test at all. He considers it a lingering remnant of Metaphysics; and in his work on *Comte* expresses his surprise at finding Mr. Herbert Spencer and myself in company on this point with metaphysicians. At which *we* also feel surprised. Mr. Spencer has replied to Mr. Mill in the *Fortnightly Review* (vol. i., pp. 521-550); in the sixth edition of his *Logic*, Mr. Mill has replied to the reply. I shall only touch upon such points as concern my present purpose. Throughout the discussion Mr. Mill seems to be attacking the supposition that inconceivableness implies non-existence—that what is unthinkable cannot exist. But this does not touch us.

“Let the galled jade wince:
Our withers are unwrung.”

If Mr. Spencer's language seems occasionally equivocal, the whole scope and spirit of his speculations sufficiently proclaim his restriction of knowledge to relative knowledge, and consequently of every test as relative. He has thus

forcibly stated his opinion: “Conceding the entire truth of the position that, during any phase of human progress, the ability or inability to form a specific conception wholly depends on the experience men have had; and that, by a widening of their experiences, they may, by-and-by, be enabled to conceive things before inconceivable to them; it may still be argued that, as at any time the best warrant men can have for a belief is the perfect agreement of all pre-existing experience in support of it, it follows that at any time the inconceivableness of its negation is the deepest test any belief admits of. Objective facts are ever impressing themselves upon us; our experience is a register of these objective facts; and the inconceivableness of a thing implies that it is wholly at variance with the register. Even were this all, it is not clear how, if every truth is primarily inductive, any better test of truth could exist. But it must be remembered that while many of these facts impressing themselves upon us are occasional; while others, again, are very general; some are universal, and are unchanging. These universal and unchanging facts are, by the hypothesis, certain to establish beliefs of which the negations are inconceivable; while the others are not certain to do this; and if they do, subsequent fact will reverse their action. Hence if, after an immense accumulation of experiences, there remain beliefs of which the negations are still inconceivable, most, if not all, of them must correspond to universal objective facts.”

On this Mr. Mill remarks: “If our incapacity to conceive the negation of a given supposition is proof of its truth, because proving that our experience has hitherto been uniform in its favour, the real evidence for the supposition is not

the inconceivableness, but the uniformity of experience. Now this, which is the substantial and only proof, is directly accessible. We are not obliged to assume it from an incidental consequence. If all past experience is in favour of a belief, let this be stated and the belief openly rested on that ground; after which the question arises, what that fact may be worth as evidence of its truth?"

§ 35. The first remark needful to be made on this controversy is that, since we all three are thoroughly agreed in maintaining Experience, and Experience only, to be the ground of knowledge, and the Test of Truth to be necessarily an expression of that Experience, there can be little real opposition between us, in spite of some differences in language. Mr. Mill says that the evidence for a proposition is the uniformity of Experience; we say the same, and add that, inasmuch as this uniformity renders the negative unthinkable, it is this unthinkableness of the negative which becomes the Test of Truth. No validity is gained in adducing uniformity of Experience, unless there is a warrant that the experiences which are uniform are themselves beyond question; and this warrant is the unthinkableness of their negation. That some ambiguity will attach itself to the phrase "unthinkable" must be admitted: ambiguities are not to be avoided; and they are even more plentiful if we adopt "uniformity of experience," for that often fails to express the fact. "A is A" does not rest on "uniformity," but on intuition. My belief in my feeling as feeling is as irresistible in one case as after a thousand repetitions. My belief that a body in motion will move for ever, and in a straight line, unless it be influenced by some other body, is a generalisation from Experience, the negative of which

is unthinkable as soon as the proposition is clearly apprehended; but it cannot without ambiguity be called an uniformity of Experience, inasmuch as experiences seem momentarily to contradict it, and this seeming contradiction is only reconciled by an *abstraction of the differences*. Moreover, the test of uniformity can never be irresistible, because a possible diversity is not excluded. The test of identity is irresistible, and excludes all possibility of reversal. A is A for evermore. Not only are there many occasions on which the "unthinkableness of the negative" is a less ambiguous phrase than "uniformity of Experience," but, inasmuch as there are two schools in Philosophy, holding different views respecting the origin of knowledge, one school affirming it to be co-extensive with Experience, the other school affirming it to have an additional source antecedent to and independent of Experience, a Test of Truth ought to find its place in both schools; and this place is found by our Test. So long as discussion is confined to concrete questions, "uniformity of Experience" is as good a test as any; but no sooner does discussion turn upon certain abstract questions—*e.g.*, of Force—than the test of the unthinkable negative resumes its superiority.

Every objection that can be alleged against "unthinkableness" may equally be alleged against "uniformity." That which is unthinkable may turn out to be thinkable, that which has been uniform experience may become diversified. The examples cited of beliefs once universal and now universally rejected are examples of mistaken reliance on uniformity, and of unthinkableness rashly concluded where no equivalence had been established, because the elements were not such as then admitted of an equation.

It is urged that men once believed the sun to move round the earth, and that, when they did so, "the contrary was inconceivable"; yet we now know that "inconceivable" to be true. I answer: When men affirmed that they saw the sun moving from east to west, and revolving round the earth, they affirmed a truth, a subjective, relative truth, indeed, but one which, being translateable into an identical proposition, was placed beyond the assaults of scepticism, and must survive all the changes of Science. What was that truth? It was that they saw the sun moving—*i.e.*, they had certain impressions from certain definite appearances, which followed in a definite order. The fact of their having these impressions was indisputable. How far the actual order corresponded with these impressions, how far their inferences were right or wrong, it was for Science to determine. It did so by proving that these inferences wanted the character of equivalence on which certainty reposes, and by showing that other inferences gave a more consistent explanation. The belief in the *appearance* of the sun's motion continues, and will for ever continue, for it is a truth the negation of which is unthinkable; but the belief in the *cause* of that appearance (which is only an inference) will vary as explanations vary: at each stage the only absolute ground of certainty is the reduction of every inference to sensation or to a necessity of thought; and where this ground cannot be reached, our only ground is *probability*, or such harmony of our explanation with established truths as compels conviction, and thus, for the time, renders the negative, if not unthinkable, yet so difficult of acceptance as to be almost equivalent to it. When asked why a man believes that two multiplied by three

gives six as the product, the answer is, Because he must: an alternative is impossible, the negative is unthinkable; he has discovered the equivalence of the relations. If asked why he believes that chemical combinations are uniformly dependent on vibratory calorific actions, the answer likewise will be, Because he must: the negative is unthinkable now that the equivalence of the relations has been exhibited to him. *Before* that exhibition he would have had no more difficulty in thinking the negative than he would have had in thinking the product of two multiplied by three was five before he had ascertained that the relations of multiplied numbers were not the relations of added numbers. The numerical identity is seen to be absolute, whereas the identity of heat and affinity may, in the present state of science, be considered as hypothetical. Nevertheless, in each case the Test applies.

There are, notoriously, cases of inseparable association determined by the structure of our minds, such as no enlargement of experience could loosen, no subtler analysis dissolve, unless the structure of the mind itself were altered. There are also cases of association which are loosened by the recognition of a mistake in the supposition of identity. We supposed that the thunder was identical with the explosion of wrath, and we associated with it the idea of an angry deity, until the recognised identity of thunder and electricity severed the association. Finally, it is notorious that our experience, even when uniform, is narrow; so that, when a man affirms anything on the guarantee of its negative being unthinkable, we can disturb his confidence by showing that the negative *is* thinkable, and conformable with a wider experience.

§ 36. Mr. Mill has noticed several of the inevitable ambiguities of language; yet he has not always succeeded in disentangling himself from them; as, for example, in his objection to Mr. Spencer's assertion that when he feels cold he cannot conceive himself not feeling cold. Mr. Mill replies by saying that he *can* conceive himself not feeling cold; and that he can imagine himself looking into darkness at the very moment that he is actually looking at the sun. The ambiguity of language here permits him to say this, although all that it lawfully expresses is that, while he looks at the sun, he can imagine himself (under *other* conditions) to be looking into darkness; just as it is possible for his thoughts to wander to Nova Zembla while he is sauntering down Regent Street. What Mr. Spencer meant to say was that, during the state of consciousness produced by his looking at the sun, it is impossible for the opposite state of consciousness to emerge; and this Mr. Mill has not answered, nor would he attempt to answer it.

§ 37. This digression ended, we may proceed to the second and more important part of the inquiry: the correspondence of the subjective and objective, as disclosed by our Test.

"Truth relatively to man cannot be defined as consisting in the conformity of knowledge with its object; for to man the object itself exists only as it is known by one faculty or another."¹ This is the old sceptical position, that the agreement can only be agreement of ideas. Kant adopts it by affirming that an universal *material* criterion is impossible, because the conception implies a contradiction;

but a *formal* criterion is possible, that being simply the agreement of ideas.¹

These and other perplexing suggestions are set aside by our regarding Truth as the correspondence between the order of ideas and the order of things; whether ideas and things are or are not alike, it is enough if their *order* is alike. Here an equation can be established, and certainty found. Whether planets are moved by inhabiting spirits, or are whirled in a sling by some distant spirit, whether they are ellipsoid solids or unextended centres of force, whether they are in any respect like or unlike our conception of them, is of little consequence to us, so long as we have ascertained the *order* of the phenomena, the law of their motions. So absolute is this abstraction of differences, that we may admit the real law to be different from the law we conceive, provided only that there is equivalence—*i.e.*, that they numerically correspond, so as to admit of calculations which agree with observation. Hence all that Science needs is correct formulas of the *order* of phenomena: these are truths. How these formulas are reached we have not to consider here; when reached, they are placed by the Test beyond the conflict with doubt.

§ 38. It thus appears that the question which has been debated since the beginning of Philosophy may now receive a decisive answer. This was impossible hitherto, because of the terms in which the question was put. We must no longer seek Truth in the conformity of ideas with objects (which is impossible), nor in the agreement of ideas with ideas (which is a purely subjective condition, carrying no objective validity); we must seek it in the equation of the internal

¹ Mansel: *Prolegomena Logica*, p. 241.

¹ Kant: *Logik*. Einleitung, vii.

and external orders, abstracting all differences. And the proof of this equation is the corroboration of calculation. When we can employ a formula with absolute precision, using it as if it were identical with the order of things, and applying it to events which are to come, we are certain that this formula expresses equivalence and is a truth.

Subjective agreement is as perfect in hallucination as in perception, which M. Taine happily calls "une hallucination vraie."¹ How, then, are we ever to be certain that our formulas are true—that the order of our ideas is in correspondence with the order of things? What is the bridge over the gulf between the subject and object? Let us pause awhile to consider.

I am seated in my study, and, on raising my head from a book, see a man slowly pass out of the room, cross the lawn, and seat himself on the garden wall. This has been the order of my sensations. Considered subjectively, the truth is indisputable. It is an identical proposition to say that I saw what I saw, felt what I felt. But can I with equal certainty say that what I saw had a corresponding reality, that the objective order was the same as the subjective? Not so. As yet no proof exists. I may have had an hallucination. To prove that my subjective state had its correspondent objective, some corroboration is needed. My wife enters the room, and she also sees the man on the garden wall. This proves that I have not had an hallucination of vision; but it does not prove the reality of my inference. Her testimony is not final, because she may misinterpret the appearances, as I mis-

interpret them. A dog comes in, and, seeing the figure on the wall, begins barking furiously. This shows that, although wife and dog may misinterpret the appearances, there is *some* external object. If I could touch it, the corroboration of one sense by another would be valuable; I can, at any rate, speak to it. I do so; and, asking the man what he does there, he replies by some insulting jest. My conviction becomes deepened with each corroborating fact; and when, finally, I order my servant to fetch a policeman, and the policeman comes, and carries off the struggling intruder, the impossibility of my thinking that the vision had not an objective reality is absolute. When all the senses converge, when all the evidences corroborate, we are forced to believe in the objective reality, unless we declare all existence to be a dream.

§ 39. Inasmuch as all knowledge is the expression of Experience, the truth of any proposition respecting things can only be tested by some term of Experience. The elements of Inference must be severally reduced to Feeling, or must be established by Reason. If I cannot reduce an Inference to Feeling, I can approach it through the Feeling of others; and their corroboration is the stronger in proportion as it concerns the objective nature of the thing inferred. I want no evidence of the fact that sugar is sweet to me; but if everyone everywhere declares sugar to be sweet, Reason tells me there must be some objective something corresponding with this sensation; and when I find that this something, which exists in various fruits and various substances, has in all these the same atomic elements, I have got hold of an equation between the internal and external orders.

§ 40. Mr. Mill insists that a necessity

¹ Taine: *Les Philosophes Français du XIXième siècle*. 1857.

of Thought cannot be accepted as a necessity of Things. Perhaps not; perhaps it can. We are incompetent to decide. To decide it would be to have absolute knowledge. Let me ask, why should not a necessity of Thought be sometimes the expression of an equivalent necessity of Things, since it is the product of Experience, which is determined by objective conditions? And even if we grant that a subjective necessity can never carry with it an objective necessity, we must still say, This is what we are compelled to think, and this for us is Truth. Not that I "erect the incurable limitation of the human conceptive faculty into laws of the outward universe." Far from it. I simply erect them into "laws of the conceptions we form of the universe"; and wherever we find these conceptions so far corresponding with external laws that they enable us to foresee results, and modify phenomena with certainty, we may declare the equivalence of the law and the conception. In such a case the necessity of Thought is the expression of a necessity of Things. The laws of Number, Form, and Motion are necessities of things no less than of Thought, not perhaps existing objectively in the same forms as they exist subjectively, but having an equivalent order; and the proof is that we *discover* them in Things, we do not put them there.

§ 41. And this leads me to remark on Mr. Mill's criticism that I "set up acquired necessities of thought in the minds of one or two generations as evidence of real necessities in the universe." Undoubtedly, the laws of Number, Form, and Motion are *discoveries*, and whether these were early or late in being made nowise affects their truth. Because men, until within the last twenty

years, failed to see the equivalence of Heat and Motion, are we to conclude that this equivalence is not a necessity of things? Did not the order in Things proceed on this law (or on a corresponding law) during all the centuries in which men's conceptions of the order were very different? And now that men's conceptions have been readjusted, and they have detected the identity of Heat and Motion, has not the law become a necessity of Thought no less than of Things?

§ 42. What Mr. Mill justly condemns is the tendency to accept necessities of Thought as necessities of Things, *before they have been proved to be identical*. Against this tendency to assume that the order of ideas corresponds with the order in phenomena, and that what is logically valid will always be objectively valid, I have repeatedly protested in the course of my History; for, indeed, the whole body of Metaphysics is a result of that vicious tendency. Nevertheless, believing that Truth is possible—according to the definition I have given of it—and that a correspondence between the internal and external orders, though difficult of attainment, has a decisive Test, I have shown that a proposition is *absolutely true* only when its terms are equivalent, and that as this rests on the impossibility of our thinking a negative of the proposition, the varying degrees of *probability* will depend on the possibility of admitting a negative. This latter condition varies, of course, with the enlargements of knowledge; that negative which was easily thinkable at one epoch becoming unthinkable at another, and that which was unthinkable in the infancy of Science becoming not only thinkable, but irresistible in its maturity. That men should be able to stand at the antipodes was formerly quite unthinkable; they

were conceived under conditions which would necessitate their falling away into space. Science has not disproved *this* necessity, but has displaced the erroneous conception of the facts on which the proposition rested, and replaced it by another proposition. (Compare § 67.) If we now conclude that men will stand as well on the earth at the antipodes as they stand beside us, it is because we believe the conditions to be equivalent in both places, and with equivalent conditions necessarily arise identical results.

§ 43. No one supposes that it will guarantee a truth to say simply that we are compelled to believe it, without exhibiting our grounds of belief.¹ We must show the evidence to be irresistible, displaying our belief as a necessary conclusion, not a mere prejudice or tradition. In adducing our evidence, we have to establish a series of identical propositions; and it is precisely because

we cannot do this in complex questions that demonstration halts.

§ 44. We shall have to resume the subject of necessity in a future section, when discussing Necessary Truths in relation to the origin of Knowledge; for the present, therefore, the argument may close. What the preceding paragraphs have attempted to establish is the possibility of Truth and its Test. This Test is absolute and relative: absolute, when the negative of a proposition is unthinkable because the proposition itself is an identical one; relative, when the negative, though not positively unthinkable, is nevertheless so opposed to existing knowledge as to be inadmissible, in which case the Test only reveals a high degree of probability. But in no case is the Test a means of enlarging knowledge; it only determines the degree of certainty. How knowledge is enlarged we have already seen in the exposition of Method.

IV.—SOME INFIRMITIES OF THOUGHT

§ 45. IF History is Philosophy teaching by example, the examples of infirmity disclosed in the various systems which have gained acceptance should be care-

fully analysed. I do not propose to enumerate them here, nor to write a treatise on Error, but a few instructive examples may be specified.

And first of that tendency, already noticed, § 16, to commute the formal into material elements, to raise Relations out of their proper category, and transport them into the category of Things. This is the parent of Metaphysics. It is often called the tendency to "realise abstractions." Having combined certain elements of particular experiences into a single conception, we treat the concept

¹ Kant properly objects, that the proposition "what we cannot but think as true must be true" is no ground of proof, but only a confession of inability. "Nun giebt es freilich wohl viele unerweisliche Erkenntnisse, allein das Gefühl der Ueberzeugung in Ansehung derselben ist ein Geständniss, aber nicht ein Beweisgrund davon, dass sie wahr sind." *Unters. über die Deutlichkeit der Grundsätze*. Werke, i. 89, ed. Hartenstein, 1838. (This is the edition I usually refer to.)

as if it were an individual object.¹ The belief in Universals, which was accepted for centuries, is a well-known example. Professor Bain has truly remarked that "the more we analyse or decompose concrete objects into the abstract qualities that make them up, the more difficult it is to remount to the concrete. Hence the most arduous attempt of all is to make actual nature rise up out of scientific or technical language—to conceive minerals from a book of mineralogy, and the parts of the human body from anatomical description."² Why this difficulty? Because we have to undo what has been laboriously done—to immerse the abstractions in the concretes from which they were abstracted. And yet "this process of resolving natural aggregates into their ultimate abstractions" is the great instrument of Philosophy. These abstracts represent the *constants*; whereas the concretes are the *variables*; and these variables, by their multiplicity and change, confuse the eye and distract the attention. But if, as our infirmity tends, we give objective independence to these abstracts, we distort the order of Things; in other words, we follow the movements of Thought, instead of following the movements of Things.

Now, in Science, when pursued on the Objective Method, we are constantly

¹ "Toutes les fois que certains éléments d'une représentation sont distingués par une analyse, ou groupés systématiquement dans une synthèse, un tout se forme et se pose; rien de mieux; mais on ne s'arrête pas là; on entend que les relations, sous condition desquelles cette opération s'est faite, disparaissent comme l'échafaudage inutile d'une édifice achevée, et que le tout qu'on a constitué demeure à part, debout, comme de lui-même, en lui-même."—Renouvier: *Essais de Critique Générale*, 1854, i. 9.

² Bain: *The Senses and the Intellect*, 2nd ed., 1864, p. 603.

made aware of this tendency, and are forced to correct it by our failures in reconciling calculation with observation; but in Ontology such correction is impossible; accordingly, it is in Metaphysics that we see the most frequent exhibitions of the infirmity.

§ 46. A good example of the tendency is the once popular but now gradually expiring doctrine of a Vital Principle.

Life is the connexus of the organic activities: a complex whole of various particular facts, abstracted from those particulars, and raised into objective reality. Each organ is composed of constituent tissues; each tissue has its constituent elements; each element, each tissue, has its specific properties; the activity of each organ is the sum of these properties; the organism is the connexus of the whole. Life is thus a concept formed out of particulars. And because the functional relation of each organ to the whole, as of each tissue to each organ, is necessarily dependent on the established connexus, both terms of the relation (parts and whole) being inseparable, some physiologists have argued that the connexus is prior to the organs, the whole *generating* the parts, instead of being a *generalisation* from the parts.

Thus, forgetting the simple teachings of experience that Life is the connexus of various phenomena—an abstract from the phenomena—men have realised the abstraction, declared the *resultant* to be a necessary *antecedent*, and have constructed an Entity out of a Relation. They speak of a Vital Principle anterior to, and independent of, all the organic activities—a Plastic Force, which mysteriously shapes the elements into tissues, the tissues into organs, the organs into an organism, and which, while thus

building up the parts, endows them with its own special property—vitality. “In the absence of this Principle,” they argue, “all the activities which could be manifested within a tissue, or an organ, would be chemical and physical, not vital. The presence, therefore, of the Principle is presupposed in every atom of the vital organism; and this presence is not a resultant, but a cause.”

§ 47. Erroneous as this hypothesis seems to most biologists at the present day, it has been strenuously supported, and even still finds eminent supporters. The main source of its persistence lies in the infirmity we are now considering. Because vital phenomena are only observed under a *special* conjunction of conditions, in which the forces (that are elsewhere observed acting in different directions) are seen to have a specific direction impressed on them, we form an abstract of this special conjunction, and then easily fall into the error of realising our abstraction, giving it objective independence. But let us remount to the source of our abstraction. Let us immerse the abstract once more in the concretes from which it was drawn. Let us follow the movements of phenomena, and the illusion will vanish.

A strip of muscle detached from the organism will manifest all its vital properties, so long as its specific constitution as muscle remains, so long as it resists disintegration; it will absorb oxygen, exhale carbonic acid, and contract under appropriate stimulus. A gland removed from the body continues to be a small laboratory of chemical change, secreting as it secreted in the organism. A nerve removed from the body continues to manifest its specific property of Neurility, and will cause a muscle to contract if stimulated; nay, a nerve-centre removed

from its connection with the rest of the body will continue to manifest its specific Sensibility; a decapitated bee will sting with its headless body, or bite with its bodiless head.

These phenomena prove that what each part does in the organism, each part does out of the organism. In other words, the Life of the animal is the sum of the particular vital activities;¹ not a power anterior to, and independent of, these activities. What is Life, if it is not the sum of vital phenomena? And if it is the sum, it cannot be independent of the integers of which it is the sum. The abstract is of course different from any one of its concretes. The organism as a whole—a combination of activities—presents phenomena which cannot be presented by the parts separately. The animal which has its muscles, glands, nerves, and nerve-centres, all harmoniously working together in one body, in one connexus, is capable of manifesting complex phenomena which could not be manifested by any of its separated organs; and the only question that remains is, whether there may not be a Vital Principle which unites these parts into one harmonious whole? Let the question be distinctly stated: Do we mean by Life the *source* of all vital phenomena, or is it simply a personified expression of the phenomena? If the former, then

¹ “La force vitale peut être conçue comme une formule laconique destinée à exprimer en un seul mot les caractères propres à la matière organisée.”—Béclard: *Physiologie*, p. 13. “La vida de la materia es una *funcion*: depende de sus elementos y cada uno de sus elementos depende de los demás y del todo que constituyen.El organismo entero es una *funcion* de funciones orgánicas, un conjunto que depende de sus partes, no pudiendo perder las todas, sin desaparecer como tal conjunto.”—Nieto Serrano: *Bosquejo de la Ciencia Viviente*, p. 337.

we mean that anterior to all vital phenomena there is a Principle, or Entity, which is in no wise dependent on these phenomena; and on this Principle all phenomena depend, as effects depend, upon their causes.

§ 48. Before considering this aspect of the old doctrine, there is one objection which must be anticipated. Seeing each part of the organism capable of manifesting vitality, the vitalists may claim that fact as peremptory evidence of the truth of their doctrine. "The parts are alive," they argue; "but how alive? They have been *endowed* with vitality by the Principle which forms the organism; not holding it from any virtue in themselves, but receiving it from the source of all organic activity. Indeed, the conclusive proof of the existence of a Vital Principle is the fact that every atom of the organism is interfused with life."

I will meet this argument by the simple question: Is the Vital Principle identical with, and co-extensive with, the Life manifested by the whole organism, or is it simply the Life manifested by each part? When we speak of a Vital Principle, do we mean the Life of the animal, and is that the same thing as the Life of an isolated muscle, gland, or nerve? Obviously not. In the one we group together various phenomena of sensibility, contractility, nutrition, reproduction, development, and decay. In the other we group together only certain special phenomena. The muscle will contract, will absorb oxygen and exhale carbonic acid; but it will not nourish itself, it will not grow, it will not reproduce other muscles, it will not feel, nor think. If we admit that there is a certain community in all parts of the organism, a community which expresses a fundamental identity, the parts being differen-

tiated from one common mass, we must nevertheless admit the great diversity in the various parts. The organism is the synthesis of these parts, and Life is the synthesis of their properties.

To make this position clearer, let us analyse our knowledge of a locomotive. We find that the fire will heat water out of the machine as in it; the water, when raised to a temperature of 212° F., will pass off into steam; the expansion of this steam will force a piston; the crank will turn a wheel; the wheel will roll a carriage. The skilful adjustment of these various parts results in a whole which we name a locomotive. But no one supposes that the phenomena presented by the locomotive could be presented by any one of its parts. Still less does any one suppose that the phenomena are due to a Locomotive Principle, independent of the parts, which created and adjusted the parts. The engine-maker who adjusted the parts did not give them their properties; he found them, and used them.

Now, the only point in which this parallelism is incomplete is in the community which runs through all the parts of the organism, and is not found in all parts of the machine. As I said before, this arises from the organism being constituted by differentiations of a substance originally homogeneous; whereas the machine is constructed of materials originally heterogeneous. The one was evolved; the other made. If, therefore, the Vital Principle be that which is common to all parts, we shall have to simplify our conception of Life, and reduce it to the properties of a blastema. Eliminating many of the great phenomena of organic activity, we are left with a structureless substance having the properties of Assimilation and Disintegration, from which Development, Reproduction,

and Death result. Nor will even this simplification much assist the doctrine of a Vital Principle. Life is only known in dependence on substance; its activity is accelerated or retarded according to the conditions in which the chemical changes of the substance are facilitated or impeded, and it vanishes with the disintegration of the substance. What, therefore, remains but to conclude that Vitality is the abstract designation of certain *special* properties manifested by matter under certain *special* conditions? Thus conceived, the ascending complexity of vital phenomena with an ascending complexity of organic structure, in harmony with certain special conditions, becomes intelligible, and Vitality distinguishes the simplest living monad no less than the most complex animal organism. Community is thus reconciled with diversity.

§ 49. Metaphysical ghosts cannot be killed, because they cannot be touched; but they may be dispelled by dispelling the twilight in which shadows and solidities are easily confounded. The Vital Principle is an entity of this ghostly kind; and although the daylight has dissipated it, and positive Biology is no longer vexed with its visitations, it nevertheless re-appears in another shape in the shadowy region of mystery which surrounds biological and all other questions. I indicated this region of mystery when I said that the organism differed from all other mechanisms in being evolved from a homogeneous substance, and not made out of heterogeneous substances. How comes this possibility of evolution? Whence the adjustment of part to part and function to function? If the machine requires a mechanist to dispose and adjust the parts, does not the organism require its mechanist or Plastic Principle?

In presence of this question the metaphysiologist, although he may have given up his belief in an Entity, a Life independent of living substances, has ready recourse to another form of the same belief, and substitutes for the Vital Principle the conception of a Plan or *Scheme*, according to which the physical forces are coerced into an organic unity. The same conception has been applied to the Cosmos. It may be here considered solely in reference to the organism, though students will have no difficulty in extending the argument.

§ 50. At the outset note a false analogy, arising from a misconception of Evolution. We see an architect arranging a plan for a house, and a builder arranging the materials in accordance with this plan. Finding in an organism a certain adjustment of parts, which may be reduced to a plan, we are easily led to conceive that this plan was made before the parts, and that the adjustment was determined by the plan. This is what logicians call *ὑστερον πρότερον*, and ordinary men "putting the cart before the horse"; the resultant is transformed into the cause.

We not only see that the architect's plan determined the arrangement of materials in the house, but we see why it must have done so, because the materials have no spontaneous tendency to group themselves into houses; that not being a recognised property of bricks, mortar, wood, and glass. But what we know of organic materials is that they *have* this spontaneous tendency to arrange themselves in definite forms; precisely as we see chemical substances arranging themselves in definite forms, without the intervention of any extra-chemical agency.

Observe: either the Plan is independent

of the materials, in which case it is an extra-biological agency; or it is the generalised concept of the indwelling tendencies of matter, when under definite conditions. In the one case the analogy of the architectural Plan is correct; but this destroys the idea of *evolution*, and substitutes that of *construction*. In the other case the analogy is seen to be founded on a misconception of organic facts; the parts with their adjustments *evolve a plan*, and are not *constructed after a plan*. From an observed *nexus* men rashly infer a *nisus*, from an actual conjunction a previous intention. If this conception of a Plan be admitted in Biology, it must equally be admitted in Chemistry, Physics, and Astronomy. Matter and Force not being mysterious enough, we must add a new mystery of architectural Plan, shaping Matter and directing Force. There is, however, this dilemma: Is the Plan in itself a shaping Power? It is then only another name for the Universal Cause. Is it without specific power? It is then an impotent overseer.

§ 51. According to the first answer, the Plan is identified with God. But this introduction of God, besides its pantheistic issues, is an evasion of the real question. We did not ask whether God fashions all things, organisms as well as worlds; but whether each organism and each chemical species has over and above its constituent elements and properties a shaping Idea, an independent Plan, which gives specific direction to the constituent elements and properties? This is the question. There are two answers: 1st, *the teleological*. There must be such a Plan, because our examination of an organism discloses its resemblance to mechanisms which we know to have been constructed on a Plan, and we con-

clude that each adjustment was intended to effect its purpose. 2nd, *the psychological*. The conception of a Plan, when it does not arise from a false analogy (§ 50), is a generalised expression of the observed facts of organic independence: the facts of a nexus. Science finding it indispensable to co-ordinate all the facts in a general concept, such as a Plan, men are led by an infirmity of thought to realise the concept; and having first used it only as a convenient expression, they grow into a belief of this nexus being *also* a *nisus*.

§ 52. This argument will perhaps be met by the distinction of Potential and Actual, which has played so prominent a part in Metaphysics, and which is itself one of the products of the infirmity now under examination. It will be said "the Plan pre-exists, not as an actual objective fact, but as a Possibility, a Potentiality."

Let us first see what experience tells us of the development of an organism. The ovum and the seed are starting-points from which an animal and a plant may, *under requisite conditions*, be developed. This is the expression of our experience. But now observe the jugglery of thought! One of the elements of the whole result, absolutely necessary to the result (indicated by italics in our statement), is quietly eliminated, and never afterwards restored. By a regressive movement of Thought we carry the developed organism back again to its starting-point (*minus* the conditions of development, therefore), and form a concept of the ovum and seed as *potentially* containing the animal and the plant.

At first this is mental shorthand, useful as an artifice. Unhappily it soon loses its position as an artifice, and passes into

a fallacy. The elements which have been omitted are never restored (compare § 54). If we restore them, if we write out the full meaning of our shorthand notes, what do we read? Assuredly not that the lineaments of the animal are actually present in the ovum. In the ovum they do not exist. When you say that they exist *potentially*, what is the translation of your phrase? It is, that under a given history—under a successive series of particular conditions, a special result will ensue. If we know the conditions and their succession, we may foretell the result. The law of causation determines it. Any variation in any one of the conditions will be followed by a corresponding variation in the result. All this history of development is omitted in the shorthand of Thought. The result is foreseen, because, the conditions being taken for granted, their action is anticipated.

But nature must not be thus distorted and compressed. If our feeble faculties make artifices necessary, we must not forget that they are artifices; we must restore, in a final elaboration, what, in a preliminary elaboration, we rejected. The facts of Nature remain whether we reject them or accept them. Potential existence is ideal, not real. If you adjust your rifle accurately, the animal aimed at may be *potentially* dead, but *is* alive; and the merest trifle, the swerving of your hand, or the dampness of your powder, puts an end to the potential existence. A fact is not a fact until it is accomplished. Nothing exists before it exists. This truism is disregarded by those who talk of potential existence. The conception of a plan preceding the execution of a work does not prove that the plan pre-exists *in re*. The realised plan does not begin to exist, out of

Thought, until the work is begun, and is completed with the completion of the work.

§ 52. Potential existence is subjective only. My forecasts of the results of a history may be true or false. I foresee the result by grouping together the facts which *will be* with the facts which *are*, and I make one concept of them. In doing so I annihilate history. I transcend the conditions of Time and the necessities of Causality, and conceive as simultaneously completed that which in Nature must be successive and graduated. So far well. But if I desire to ascertain the actual facts, I must follow the course of Nature, and restore that history which has been left out of sight. Following the development of the ovum, historically, I observe that not only are certain conditions indispensable, but that every variation in the requisite conditions produces a variation in the result—modifies the structure of the animal, arrests or accelerates its development. If I varnish the shell of an egg, I prevent the embryo from developing into a bird. If I varnish one part of the shell, I so alter the requisite conditions that the result is a bird incapable of living, or curiously malformed. In altering the history I have changed the historical result. What, then, has the Plan effected? The Plan has not come into existence. If the conjunction has thus altered with the altered conditions, how can it be the fulfilment of a Plan irrespective of conditions? and a Plan which is strictly dependent on conditions is not a *nisus*, but a *nexus*. The inevitable conclusion is that Plan neither shapes the Organism nor determines the conditions through which the development takes place. In mathematical phrase, the Plan is the *function* of Development and Developing

Conditions, and is variable with every variation of either.¹

The fallacy that a concept has independent existence prior to the particulars out of which it is formed, or that a Plan exists as a potential before it exists as an actual, will frequently be met with in the History of Philosophy. Indeed, Aristotle's distinction of *δυνάμις* and *ἐνεργεία* was for centuries regarded as a luminous guide.

§ 53. An infirmity closely connected with the foregoing is forgetfulness of the necessity we are under of dislocating the order of Nature, by Analysis and Abstraction; which artifice, since it leads to discovery, may be copiously used on condition of our remembering that it is an artifice, and that the order we have dislocated must be finally restored, if the order in Thought is to correspond with the order in Things.

Science is distinguished from Common Knowledge by its wider reach and more systematic structure, and also by its conscious employment of artifices which our infirmity renders indispensable, and which the unscientific mind employs unconsciously. Abstraction is one of the necessary artifices of research; and the man of science is conscious of what he

is doing when he abstracts certain phenomena from the mass presented to him, and proceeds to deal with those abstractions as if they were the whole reality. Ordinary men do the same, but are unconscious of doing it.

Why must we make this preliminary abstraction—why deviate thus from the actual facts, in order to understand the facts we falsify? The answer is simple. Unless some such simplification be made, all search will be hopelessly baffled by the complexity of phenomena. The parrots of Bacon chatter about Observation; but Observation of cases, however patient and prolonged, will never suffice to disclose the Laws which are enveloped in the cases, and which form the real aim of Science. And what are Laws? They are the *constants* in phenomena, and can only be separated from the *perturbations*, due to other Laws, by a process of abstraction which sets aside all the variable accidents and individual peculiarities accompanying and determining each special case. Let us have Observation, by all means; but of what? Of ore and dross together? or of ore and dross separated? The constants found in every case must be separated from the variables found in varying cases. The mineralogist separates the ore from the dross; and the philosopher separates the constants from the variables. Even the Laws of Motion and Gravitation, universal as they are, could never have been discovered by observation of cases of motion and gravity; a preliminary abstraction eliminated all consideration of the variable resistances. The Laws of chemical affinity could never have been disclosed to Observation, except by a preliminary Analysis, which tore one element away from another, and studied each separately.

¹ Nieto Serrano is worth citing on this question of potentiality: "Es, pues, la fuerza potencial una fuerza que no es tal fuerza, pero que puede serlo; es la posibilidad sobrepuesta por la inteligencia á todo orden determinado. Mas la posibilidad no es absoluta, no es una indiferencia completa respecto del porvenir: esta indiferencia se halla limitada por los hechos, por las fuerzas actuales, por las que aparecen en la totalidad presente, como presentes ó como pasadas, y semejante limitacion constituye una probabilidad, que determina de algun modo la potencia." *Bos uejo de la Ciencia Viviente*, p. 269.

Every one knows that unless Kepler and Newton had boldly disregarded all consideration of planetary perturbations which were nevertheless essential facts in planetary movements, they would have been unable to detect the planetary Laws. But this preliminary falsification was rectified by their successors, who deduced the perturbations from secondary gravitations. It is this twofold process which I propose to erect into a logical canon applicable in all inductive inquiry,¹ the Canon of Restitution:—

§ 54 Every investigation requires for its completion that Analysis be succeeded by Synthesis—*i.e.*, the preliminary abstractions be succeeded by a restoration of the rejected elements, so that the synthesis be made to correspond with reality.

In establishing the Laws of Mechanics philosophers falsify the facts to the extent of assuming that the lines of direction are undisturbed, and that the materials

¹ Compare Auguste Comte: *Synthèse Subjective*, p. 604. Some time after this Canon with its illustrations had appeared in the *Fortnightly Review*, I found this passage in Comte's *Politique Positive*, vol. i., p. 426: "Les événements ne pouvant s'étudier que dans des êtres, il faut écarter les circonstances propres à chaque cas pour y saisir la loi commune. C'est ainsi, par exemple, que nous ignorerions encore les lois dynamiques de la pesanteur si nous n'avions pas fait d'abord abstraction de la résistance et de l'agitation des milieux. Même, envers les moindres phénomènes nous sommes donc obligés de décomposer pour abstraire avant de pouvoir obtenir cette réduction de la variété à la constance que poursuivent toujours nos saines méditations. Or ces simplifications préalables sans lesquelles la vraie science n'existerait jamais exigent partout des restitutions correspondantes quand il s'agit de prévisions réelles." Although I had not marked the passage previously, nor realised its full significance, it is highly probable that I was unconsciously guided by it in the construction of the canon.

are perfect. In reality, this is never so; and the practical mechanic has to rectify the rational Law by the restitution of the discarded elements. His action is synthetic, and his calculations must be so likewise. At peril of ignoble failure, he has to ascertain what are the actual lines of direction, as determined by the rational Law *and* the perturbing resistances; he has also to ascertain to what extent the materials are uniform.

§ 55 Two illustrations will suffice to exhibit the neglect of this canon. The undulatory theory, of light and heat, is justly regarded among the triumphs of modern science. It starts from oscillating atoms having no dimensions—mere mathematical points. This is a bold disregard of concrete observation; points without form or size are abstractions so entirely removed from reality as to be unimaginable. Nevertheless, Analysis occupied solely with oscillations, and discarding the oscillating atoms, as if they were not elements of the synthesis, has furnished Laws of vibration that explain many of the most remarkable phenomena of light and heat—*e.g.*, polarisation, refraction, interference. This success justifies the falsification. But inasmuch as the theory fails to account for other important phenomena, the Canon of Restitution suggests that the failure may lie in this falsification, and that the outlying elements may furnish a solution of the unexplained difficulties. If the atoms exist at all, it is unthinkable that they should not have certain geometric properties, and these geometric properties entail dynamic properties. If they have Form, they must have a corresponding Movement. As it is impossible to conceive them unextended, as they must have size and form, they must have the motions deducible therefrom.

But these facts have hitherto been disregarded. Let them be restored, and let mathematical analysis be directed to the problem under this new aspect. The movement of the wave—*i.e.*, the movement of translation—has been sufficiently analysed; now let the movement of the atom—*i.e.*, the movement of rotation, according to Poinso't's immortal principles—be investigated. In the mechanics of translation the form of a body is indifferent, but in the mechanics of rotation the form is everything. If the investigation in this direction failed to clear up the present difficulties, it would at least have this result, that it would prove the rotation of the atoms to be legitimately disregarded in the theory of Light and Heat, because not sensible factors in the result.

§ 56. The second illustration of our Canon shall be the question of the Origin of Species.

Are Species variable or invariable? This question resembles that of planetary perturbation. The abstract Law of Reproduction—that Like produces Like—is unassailable as a Rational Law; and it points to the fixity of Species as a fundamental truth. But the Law is Rational, not Natural. It abstracts the Organism from the Medium—one factor from its coefficient—and thus violates the synthesis of Nature, which never yet presented an Organism independent of the Medium in which it lived. And there is matter for meditation in the fact that only in modern Biology has the necessary reaction of the Medium been steadily conceived as one of the necessary elements of every biological problem; formerly the Organism was always conceived as if it were no less independent really than it was ideally.

The restitution of the discarded

elements—namely, the reaction of the Medium and the Struggle for Existence, which act as perturbations of the biological Law—brings forward this problem: What is the sweep of the perturbations? Can these perturbations be assigned to some secondary biological Law (the reaction of the Medium), and can they, by accumulation, determine a change in the primary Law?

At present we have two groups of thinkers, each relying on a group of indisputable facts: one proves the constancy of forms, and another proves the variability of forms. The complete theory must include and reconcile both groups. For this it is necessary that a rational Biology should elaborate a theory of the Organism, and a theory of the Medium; then the Law of Reproduction being completed by the restitution of the Perturbations, also reduced to Law, we shall have a possible synthesis explaining all the cases.

§ 57. The Canon just exhibited is needful as a corrector of our natural infirmity, which first makes the separation necessary, and then forgets that the restitution is no less so. The anthropomorphic infirmity, which suffuses Objects with our Feelings, making Cause inseparably associated with Effort, and Attraction with Desire, is too well known to need more than a passing mention here. It is a fertile source of metaphysical speculation.

Another is the strange assumption, that because knowledge is the bringing of the Unknown under the categories of the Known (for only thus can the Unknown be thinkable at all), therefore we can discover the further relations of this Unknown. For instance, Kant, in the preface to the second edition of the *Kritik*, says that Will, the phenomenon,

is not free, because it is subject to the laws of phenomena; but Will, the thing in itself, may be thought as free, because no longer subject to the laws of phenomena. Now, he admits that things in themselves are beyond knowledge. If we cannot know the *Ding an sich*, how can we predicate anything of them? In his *Prolegomena* he has this illustration of analogy: "I can never do anything to another without thereby giving him the right to do the same under similar conditions; just as no body can act on another without thereby causing an equal reaction on itself. Here Right and Force are two entirely different things, but there is a complete resemblance in their relations. By means of such analysis I can consequently attain conceptions of the relations of things, which things are absolutely unknown to me."¹ If the things were absolutely unknown, how could the relations, upon which the analogy is founded, be known?

The fact is, men are constantly affirming certain existences to be Unknown and Unknowable, yet in the same breath affirming relations of them which presuppose knowledge. They will admit that Matter, as *Ding an sich*, is absolutely and necessarily extruded from the sphere of possible knowledge; yet they will proceed to argue that it must, or must not, be constituted of discrete atoms—that these atoms are, or are not, in contact. They will admit that it is impossible for us to know God otherwise than through Revelation. Yet they have not the slightest misgiving in affirming many things of God's nature, interpreting his intentions, without any warrant in Revelation. Thus implying that they know what they have declared unknowable.

This list of infirmities might be extended, but it may close here. Others will meet us in the *History of Philosophy*.

V.—NECESSARY TRUTHS

§ 58. THE great question which has been debated in the schools respecting the Origin and Limits of Knowledge has of late years resolved itself very much into a debate respecting the nature of Necessary Truths. The philosophers who hold that, over and above the results of Experience, in its widest acceptation, we have truths of a higher authority and a larger reach, springing from a nobler source, invoke, as decisive evidence of

their opinion, the existence of Necessary Truths, which cannot (they affirm) be the results of Experience.

This position rests upon a radical misconception of Experience, and a psychological misconception of the nature of Necessary Truths; both of these mistakes it will be important to clear away. We may admit, at the outset, that the mind is in possession of many ideas which could never have been directly given in Experience, if Experience be restricted to Sense. The restriction, however, is unwarranted. Ratiocination is as much

¹ Kant: *Prolegomena zu jeder künftigen Metaphysik*, § 58. Werke, iii. 285.

an organic function as Sensation. Just as the base line gives the indirect, yet certain, measure of the inaccessible line of the triangle, so from the data of Experience may we measure consequences which are not directly accessible. But the analogy must not be perverted: the base line only gives us the directly inaccessible line, it does not give other lines; the data of Experience only give the directly inaccessible consequences of the data, not the consequences of *other* data; and it is owing to an imperfect appreciation of such limits in the deduction of the unknown from the known that the doctrine of Necessary Truths, independent of Experience, has attained currency.

§ 59. What is Experience? It is the sum of the actions of Objects on Consciousness; or—to word it differently—the sum of the modifications which arise from the relations of the Sensitive Organism and its environment. In this sum are included:—1st. The direct affections of Consciousness in its relations to the outer world; 2nd. The results of those affections through the action of Consciousness in combining, classifying, and transforming the materials furnished by Sense. Thus Experience, in its widest acceptation, is the product of two factors: Sensation and Laws of Consciousness.

So far all thinkers are agreed. The point of separation is this: Are the Laws of Consciousness evolved out of the relations of the Sensitive Organism and its environment; or are they pre-existent, and independent of any such relations? When the empirical school declares its acceptance of the former alternative, it seems to proclaim an absurdity—Experience, being a product of Sensations and Laws, is said to produce the Laws of

which it is the product. But this verbal contradiction is got rid of when we distinguish Experience from Experiences. Every particular modification of Consciousness is a particular experience. Each modification prepares the way for successors, and influences them. The Laws are evolved through these successive modifications, and Experience is the general term expressing the sum of these modifications.

But are the Laws evolved? The Sensational School has greatly obscured this question by the unscientific conception of the mind as a *tabula rasa* upon which Things inscribe their characters—a mirror passively reflecting the images of objects. This presupposes that Consciousness is absolved from the universal law of action and reaction, presupposes that the Organism has no movements of its own; and thus Psychology is separated from its only true biological ground. The *à priori* School commits the opposite mistake of conceiving Consciousness as a pure spontaneity, undetermined by the conditions of the Organism and its environment; a spontaneity which brings Laws, not evolved from relations, and organised as results, but derived from a supra-mundane, supra-vital source.

§ 60. We cannot take a step unless we admit that Consciousness is an active reagent, even in its first stage of evolution. Sensibility is not passive, cannot be conceived otherwise than as an excitation. Nor is this all. Biology teaches that the Sensitive Organism inherits certain aptitudes, as it inherits the structure, of its progenitors; so that the individual may be said to resume the Experience of the race. Faculties grow up in the development of the race. Forms of Thought, which are essential parts of the mechanism of Experience, are evolved,

just like the Forms of other vital processes. In fact, as Function is only the Form of activity of an Organ, it is obvious that, if the Organ is evolved, the Function is evolved, and with it the Laws of its action.

The *à priori* School denies this, not indeed explicitly, but with energetic implication. It does not boldly affirm that Function can exist without an organ; but it denies that Consciousness is a Function. Hence it has no difficulty in maintaining that the Mind of an infant is full-formed at birth, equipped with all its faculties, though without those materials of Thought which will afterwards be furnished in Experience. How can this be? The Aristotelian refuge of *potential existence* (§ 52) is ready for the escape of the metaphysician pursued by Fact. To us, who decline that refuge, the assertion that the Mind is full-formed at birth is as rational as the assertion that the infant is born a full-formed man, equipped with all his faculties of locomotion, speech, reproduction, etc. The infant may *become* a man, but *is* an infant, and his mind is undeveloped; if the spiritual experiences of the infant were suddenly arrested, does any one suppose that we should find in them those Fundamental Truths and Forms of Thought which Psychologists declare to be the native dowry of the mind? I do not know that any one frankly affirms this; but I know that the *à priori* School implies it, in maintaining that we have within us a source of knowledge which is not evolved in Experience.

§ 61. Kant is the most potent philosopher of this school, and, although in my criticism of the *Kritik* I have had to

consider his position, I cannot pass it by here without challenge; referring the reader therefore to what is said (vol. ii., p. 460 and pp. 475 sq., *History of Philosophy*, 3rd edition), I will here notice only such points as the argument needs.

Kant says: "There are two branches of knowledge: Sensibility and Understanding—which possibly spring from a common but unknown root. Through the one objects are *given*, through the other they are *thought*."¹ Except for the reservation in the word "possibly," this is unimpeachable; but the reservation was dictated by his exaggerated view of the part played by the Subject in the construction of knowledge. He made an entity out of a relation. He thought the subjective element could be separated from the objective; and, thus separated, it would reveal itself as independent of and antecedent to Experience, constituting indeed the very conditions of Experience. I have shown this to be a fallacy. "The understanding," he says, "does not draw its laws (*à priori*) from Nature, but prescribes them to Nature—*schreibt sie dieser vor*."²

§ 62. The error arises from a false point of view, which mistakes Anatomy for Morphology and Logic for Psychology. Accepting the human understanding in its developed forms, he presents us with these *constituent forms* as if they were *initial conditions*; the results which are developed through successive experiences are presented as the primary conditions of Experience: the generalisations are made antecedent to the particulars from which they are drawn. We are told that these Forms are implied in the particular

¹ *Kritik*. Einleitung: sub finem.

² *Prolegomena zu jeder künftigen Metaphysik*, ii. § 36. Compare also his *Anthropologie*, i. § 9.

¹ Compare the striking passage in Mansel's *Metaphysics*, p. 45.

experiences. Granted: if they were not implied, they could not have been elicited. Logic is justified in disregarding the process of evolution, content with the result; for Logic has to exhibit the Forms of Thought, not their origin. In like manner, Anatomy has to do with the organs of the body, not with their genesis, which belongs to another branch of the science, Morphology. Now, the question of Experience is a question of origin; and Psychology reveals that Experience is the self-woven garment of Thought in which every thread is an experience. To assert that *à priori* principles or Forms of Thought render Experience possible is to assert either that these Forms exist before Thought itself exists, or else it is to confound the general with the particulars. Let us see this in an analogy.

§ 63. The vertebrate type is by some *à priori* thinkers held to be the necessary Form which renders the vertebrate animal possible. Anatomically, this is acceptable. But what says Morphology? Does it disclose the existence of a Type anterior to the existence of the animal? or does it not disclose the emergence of the typical Form in the successive phases of the animal's development? Obviously, the idea of pre-existences is a figment, a mere ὕστερον πρότερον (§ 50).

Again: a frog breathes by means of lungs. The lungs, once developed and brought into action, become a necessary condition of possible breathing. Ever afterwards the frog's existence is determined by this condition. But if we take the frog in its early stages, we find it breathing by means of gills, the lungs not having yet come into play. At this period it is not a lung-breathing animal; the necessary condition is somewhat different. In the course of development the forelegs begin to press upon the

arteries which supply the gills, and the consequence of this pressure is the gradual disappearance of the gills. Meanwhile the lungs pass from their rudimentary inactive state into an active state, and the disappearing gills are replaced by the emerging lungs. It is thus also with the development of Mind: the necessary conditions which render experiences possible in the early stages are not the same in the later stages. Mind is a successive evolution from experiences, and its laws are the action of results. The Forms of Thought are developed just as the Forms of an Organism are developed. The infant Newton is no more the author of the *Principia* than the egg is the game-cock.

Indeed, this notion of *à priori* Forms, connate if not innate, is a violation of the ground-principle of Biology, and consequently, as all but metaphysicians must admit, of Psychology. If there is one lesson taught us everywhere in Biology, it is that nothing which is definitive is primitive—no form characteristic of the developed state is to be found in the germinal state. Therefore, unless we maintain that Mind is, *ab initio*, adult, as to its powers if not as to its Knowledge—that it does not develop, but only appears—we must admit that with Mind, as with Body, there is not preformation or pre-existence, but evolution and epigenesis.

§ 64. What is it prevents some men from accepting this alternative? It is that they discover in the adult mind principles which cannot, they affirm, be evolved from Experience. Necessity and universality point to an *à priori* source. Necessity is not given in any particular experience. Universality is not given in any number of experiences. Hence (here lies the fallacy!) they are not empirical.

We affirm that they belong to Experience, are products of Experience, and of Experience only; they are the results of that movement of Thought which passes from particulars to generals. I shall presently show that they are necessities of Thought under the limitations of Experience. Of course, it is requisite to avoid the common confusions on this subject, and not restrict Experience to Sense, as many unwarrantably restrict it. Thus Dr. Thomas Brown repeats the false statement commonly accepted as an axiom, that "Experience teaches us the past only, not the future." Is this so? Is it not the fact that, although experiences are only past modifications of Consciousness, they have a forward projection, and hence Experience teaches—whether correctly or falsely—the future irresistibly? Expectation is surely a product of experiences. Association is experience. When a dog, having once experienced the pain produced by a stick falling swiftly on his ribs, again sees me about to strike him, is there anything over and above his modified consciousness (Experience) which causes him to foresee pain to himself in that preliminary? The metaphysician wants an occult something to give this simple case the requisite obscurity. "It is not to experience alone," he says, "that we must have recourse for the origin of our belief that the future will resemble the past, but to some other principle which converts the simple facts of experience into a general expectation or confidence."¹ This is easily said, but Brown is forced to add: "This principle, since it cannot be derived from Experience itself, which relates only to the past, must be.....an

original principle of our nature." A very typical example of metaphysical logic! If the "original principle" mean something born with us, ready to receive our experiences as in a mould, I affirm this to be the *ὑστερον πρότερον* fallacy. If it mean no more than that our psychical nature is such as to group together phenomena experienced together, so that when once the stick has been coupled with pain the two ideas are associated, then indeed there is no objection to the phrase, except its mysteriousness.¹

§ 65. Having thus defined and explained what is the sense in which Experience is legitimately held, we may address ourselves to the question of Necessary Truths, and see whether they point to a source of knowledge which is superior to, or at least independent of, Experience.

It may be convenient to use the term empirical, as opposed to *à priori*, to designate what is contingent, as opposed to what is necessary. But Kant himself saw that the distinction is only verbal, and in the opening section of the *Kritik* says: "We are wont to call many conclusions, which have their source in experience, *à priori*, simply because they are not drawn immediately from experience, but from a general rule, which was, nevertheless, drawn from experience. Thus we say of a man who undermined his house: He might have known *à priori* that the house would fall in—*i.e.*, he need not have waited for the experience of its actual fall. Yet purely *à*

¹ "If we think in relations, and if relations have certain universal forms, it is manifest that such universal forms of relations will become universal forms of our consciousness. And if these further universal forms are thus explicable, it is superfluous, and therefore unphilosophical, to assign them an independent origin."—Spencer: *First Principles*, p. 229.

¹ Brown: *Lectures on the Philosophy of the Mind*, vi.

priori, this could not have been known, for he must have learnt through experience that bodies are heavy, and fall when their supports are removed." Nevertheless, although Kant saw this, he still believed in the existence of *à priori* principles, which are demonstrably not less empirical. What misled him was, I think, the confusion between contingent Knowledge and contingent Truth. He declared Experience to be empirical and contingent, because our experiences could never be necessary and universal; whereas universal and necessary Truths were *à priori*, because they could not be given in particulars, and hence were *anterior* to all Experience. That they might be *posterior* to (*i.e.*, evolved from) Experience was an alternative he omitted to consider.

With these preliminary explanations, let us now examine how far the Necessary Truths are, or are not, capable of reduction to Experience.

§ 66. It appears to me that all writers on this subject have failed to see a distinction which is so obvious when pointed out that the neglect of it seems inexplicable: the distinction is between the (objective) fact and our (subjective) knowledge of the fact. We speak of sound, sometimes meaning the undulation of the air without us, and sometimes meaning the sensation excited within us by that undulation pulsating on our tympanum. By a similar laxity, we speak of a Truth sometimes as the relations of an external fact, and sometimes as the conception we have formed of the fact. Now, in the Truths classified as Contingent, the contingency is never applicable to the relations themselves, but solely to our conceptions of them. That 72 and 140 added together will make 212 is a truth which, objectively, has no contin-

gency whatever; but there is a subjective contingency in this as in all other unverified propositions: namely, the contingency of our miscalculating—misconceiving the objective relations. That "a body moving under certain conditions *as if* attracted by a force varying inversely as the square of the distance will describe an ellipse having the centre of attraction in one of the foci" is a proposition which, *once demonstrated*, has no contingency, although we may easily misconceive the relations it expresses; and that "the earth is a body acted on by such a force under such conditions" is likewise a proposition which is contingent until verified, and is necessary when verified. Assuming that there is an external world, its order must be necessary—*i.e.*, the relations must be what they are; the contingency can only lie in the correctness or incorrectness of our appreciation of those relations. Hence, instead of confusedly speaking of Necessary and Contingent Truths, it will be less ambiguous to speak of Verified and Unverified Propositions. All truths are true, but all propositions do not correctly express the external relations, and the question arises, which propositions are to be accepted as correctly expressing the relations? Obviously those only which have been verified by the equivalence of the internal and the external order, or the reduction to $A=A$.

Several persons seated at a table are startled by shrill sounds, which they one and all infer to be the shrieks of a child in pain or terror. The fact that they hear the sounds is indisputable, and the expression of this fact is a truth as "necessary" as that "two parallel lines cannot enclose space." Nor is there any contingency in the fact that these sounds are produced by pulsations of the air on their tympanum. Why is there none?

Simply because experience has found that the sensation of Sound *is* produced in this way—the objective relations have been verified. There is, however, some contingency in the proposition, “These sounds are caused by a child in terror or in pain”; not that there is the slightest contingency in the fact itself. On proceeding to the spot, the child is found to be struggling with an animal, and shrieking as it struggles. The truth of the proposition is now verified, and, unless scepticism be extended so far as to doubt whether all the phenomena are not the pageantry of a dream, we may affirm that the proposition is a necessary truth.

It may surprise the reader to see an example of this kind cited as a necessary truth, but I have selected it for the very purpose of my argument, which is to prove that the question of contingency lies solely within the region of all unverified propositions. All verified propositions are necessary truths; all unverified propositions are contingent. This is a complete reversal of the position maintained by metaphysicians, for they affirm that necessary truths are precisely those propositions which cannot be verified (*i.e.*, exhibited in Experience), and that all propositions dependent on the verification of Experience are contingent.

§ 67. Let us now take another step. The advocates of Necessity, as an indication of a source of knowledge superior to Experience, are guilty of a confusion so misleading that I am surprised at neither friend nor foe having pointed it out. It is nothing less than *changing one of the terms of the proposition*, and then concluding as if the terms had remained unaltered. Thus the one argument incessantly brought forward is that some Truths are such as are seen to be not only true, but *necessarily* true; whereas,

there are other truths which, however true to-day, are contingent, because changes may occur to-morrow which will reverse them. It is further added that no amount of experience, no number of examples, can establish necessity, but only the fact of generality, and a life-long experience of uniformity cannot exclude the possibility of a sudden reversal. All that Experience can show is that a certain order has been uniformly observed; it cannot show that what has always been must always be.* Philosophers have accepted this reasoning as if it were irresistible; every one uses it without suspicion; but no sooner do we examine it closely than we find it rests on the unconscious substitution of one premiss for another. To say that “what has occurred will occur again, will occur always,” is to say that “under precisely similar conditions precisely similar results will issue.” A is A; and A is A for evermore. But to say that “what has occurred may probably not occur again, will not occur always,” is to say that “under *dissimilar* conditions the results will not be similar.” This proposition is as absolutely true as the former; but who does not see that it is a different proposition? When we declare that the laws of Nature are not necessary truths, but only contingent truths, because the mind readily conceives the possibility of their reversal, readily imagines such a change in the external conditions as would arrest the earth’s motion, and with it all the manifold phenomena now resulting from that motion, what is it that we have declared? It is that, the relations

* “Tous les exemples qui confirment une vérité générale, de quelque nombre qu’ils soient, ne suffisent pas pour établir la nécessité universelle de cette même vérité: car il ne suit pas que ce qui est arrivé arrivera toujours de même.”
—Leibnitz: *Nouveaux Essais*, preface.

of phenomena being altered, our conceptions, to be true, must alter with them. It is that, instead of the proposition, "Such *is* the order of Nature, and such it *will be so long as it is unaltered*," we have silently substituted this proposition: "Such is *now* the order of Nature, but *if at any time it should be altered*, it will be different." The only necessity is that a thing is what it is; the only contingency is that we may be mistaken as to *what* it is. The law of gravitation, or the elliptical orbits of the planets, may, or may not, be truths; but if they *are* truths, they are necessary truths. To say that they are "observed facts, nothing more," is all that is required by Necessity; and when we add that there is no proof of the continuance of the observed order, we either deny that "A is A," or we silently change the proposition, and say "if A becomes B, it will no longer be A"; for, if the conditions continue unchanged, the order must necessarily continue unchanged; if the conditions alter, the order necessarily alters with them.

§ 68. The answer to this will probably be, That certain truths have such a character as to render their negation inconceivable, *no* alteration being conceivable in relations so absolute: and it is these truths that involve Necessity and *a priori* inspiration. This leads me to the only distinction between the truths of the two orders—namely, that in those classified as Necessary the relations are abstracted from all conditions, and considered simply in themselves; whereas in those classified as Contingent the relations are mixed with variable conditions; and it is in this variability that the contingency lies. When we say " $2 \times 2 = 4$," or "the internal angles of a triangle are equal to two right angles," we abstract the relations of Number and

Form from all other conditions whatever, and our propositions are true, whether the objects counted and measured be hot or cold, large or small, heavy or light, red or blue. Inasmuch as the truths express the abstract relations only, no change in the other conditions can affect these relations; and truths must always remain undisturbed *until* a change take place in their terms. Alter the number 2, or the figure triangle, by an infinitesimal degree, and the truth is thereby altered. When we say that bodies expand by heat, the proposition is a concrete one, including the variable conditions; but, although these variable conditions prevent our saying that "all bodies will, under all conditions, be always and for evermore expanded by heat," the case is not really distinguished from the former one, since both the Contingent and the Necessary Truth can only be altered by an alteration in the terms. If a body which does not expand by heat (there are such) be brought forward as impugning the truth of our proposition, we at once recognise that this body is under different conditions from those which our proposition included. This is the introduction of a new truth, not a falsification of the old. Our error, if we erred, was in too hastily assuming that all bodies were under the same conditions.

Hence the correct definition of a Contingent Truth is "one which *generalises the conditions*"; while that of a Necessary Truth is "one which is an *unconditional generalisation*." The first affirms that whatever is seen to be true, under present conditions, will be true so long as these conditions remain unaltered. The second affirms that whatever is true now, being a truth irrespective of conditions, cannot suffer any change from interfering conditions, and must therefore be universally true.

"The belief in the uniformity of nature is not a necessary truth, however constantly guaranteed by our actual experience. We are not compelled to believe that because A is ascertained to be the cause of B at a particular time, whatever may be meant by that relation, A must therefore inevitably be the cause of B on all future occasions."¹ This will command the assent of every one who fails to perceive the silent change in the terms of the proposition. Instead of saying "on all *like* occasions," which would give necessity to the proposition, Mr. Mansel renders it contingent by saying, "on all future occasions," and the contingency lies in this, that some of the future occasions may be *unlike*, in which cases a new proposition replaces the old. "That fire will ignite paper on all occasions when the two may be brought together" is what no one but a child or a savage with limited experience would assert; but that fire will always ignite paper on all future occasions which present conditions precisely similar to those that have once caused the ignition, is a truth having the character of necessity and universality which belongs to all identical propositions, and to those only.

§ 69. It will now be an easier task to criticise the arguments which profess to show that necessity and universality are irresistible marks of an origin superior to Experience. If what has already been said has found acceptance with the reader, he will recognise that every proposition being necessarily true, if it is true at all, the only question that can arise is, *Is the proposition true?* The only answer that can decide this is one which reduces it to an identical proposition; and as this reduction is the process

of Verification, and all Verification is through Experience, the conclusion inevitably reached is one directly counter to the *à priori* hypothesis.

Two positions require to be established. First, that we gain our conceptions of Mathematical, no less than Physical, relations through Experience. Secondly, that in those conceptions so gained are involved their characters of universality and necessity.

§ 70. The argument could not indeed be conducted if we allowed Experience to be restricted to Sensation only, as the metaphysicians unwarrantably restrict it. Dr. Whewell finds no difficulty in showing that propositions "obtained by mere observation of actual facts" cannot be necessarily true; for *no* proposition whatever can be thus obtained. His definition of Experience is, "the impressions of sense and our consciousness of our thoughts."¹ A far more accurate and philosophical thinker has defined its wider sense to be "co-extensive with the whole of consciousness, including all of which the mind is conscious as agent or patient, all that it does from within, as well as all that it suffers from without"; and he truly adds, "in this sense the laws of thought, as well as the phenomena of matter—in fact, all knowledge whatever, may be said to be derived from experience."² The reader, not familiar with Kant's or Mr. Mansel's speculations, may, perhaps, marvel that, after so comprehensive and just a definition of Experience, Mr. Mansel escapes the conclusion he has himself pointed out as irresistible, and falls back into the *à priori* argument, restricting Experience to "its narrower and more common meaning, as limited

¹ Mansell: *Metaphysics*, 267.

¹ Whewell: *Hist. of Scientific Ideas*, 1858, i. 131.

² Mansell: *Prolegomena Logica*, 93.

to the results of sensation and perception only." The explanation is that Mr. Mansel adopts the Kantian conception of Forms of Thought, as conditions of Experience, a conception I have attempted to refute. (Vol. ii., pp. 475 sq.) One passage is all that need be given:—

"That experience," says Mr. Mansel, "is the chronological antecedent of all our knowledge, even of the most necessary truths, is now generally admitted. But a distinction is frequently drawn between truths or notions of which experience is the *source* and those of which it is only the *occasion*.....Every general concept is in one sense empirical; for every concept must be formed from an intuition, and every intuition is experienced. But there are some intuitions which, from our constitution and position in the world, we cannot help experiencing, and there are others which, according to circumstances, we may experience or not. The former will give rise to concepts which, without any great impropriety of language, may be called *native* or *à priori*; being such as *though not coeval with the mind itself* [an important admission] will certainly be formed in every man as he grows up, and such as it was pre-ordained that every man should have. The latter will give rise to concepts which, for a like reason, may be called *adventitious* or *à posteriori*; being such as may or may not be formed according to the special experience of this or that individual."¹

Inasmuch as I throughout interpret Experience according to the wider definition given by Mr. Mansel, and only differ from him in regarding the Forms of Thought as evolved through Experience, both in the race and the indivi-

dual, whereas he (confounding, I think, Anatomy with Morphology) regards the Forms as conditions of experience, it will be needless to criticise his defence of Necessary Truths, having an *à priori* source, because the arguments I have urged against Kant are the arguments I should urge against Mr. Mansel.

§ 71. We may thus securely lay down the proposition that whatever can be learned must be learned by and through Experience; and we have then to examine whether we learn Necessary Truths, or bring them with us into the world as the heritage of a higher life.

That two parallel lines can never meet is a Necessary Truth. That is to say, it necessarily follows from the definition of a straight line. To call it, however, an *à priori* truth, a truth independent of Experience, is a very imperfect analysis of the mind's operations. An attempt is made to prove that the idea could never have been gained through Experience, because it commands universal assent, and because Experience itself could never give it necessity. Dr. Whewell's argument is that, let us follow two parallel lines out as far as we can, we are still unable to follow them to infinity; and, for all our experience can tell us to the contrary, these lines may possibly begin to approach immediately beyond the farthest point to which we have followed them, and so finally meet. Now, what ground have we for believing that this possibility is not the fact? In other words, how do we know the axiom to be absolutely true? Clearly *not* from Experience, says Dr. Whewell, following Kant.

We answer, Yes; clearly *from* Experience. For our experience of two parallel lines is precisely this: they do not enclose space. Dr. Whewell says that, for all our experience can tell us to

¹ *Op. cit.*, p. 170.

the contrary, the lines may possibly begin to approach each other at some distant point; and he would correct this imperfect experience by *à priori* truth. The case is precisely the reverse. The tendency of the mind unquestionably is to fancy that the two lines *will* meet at some point; it is enlarged experience which corrects this tendency. There are many analogies in nature to suggest the meeting of the two lines. It is only our reflective experience which can furnish us with the proof which Dr. Whewell refers to ideas independent of all Experience. What proof have we that two parallel lines cannot enclose space? Why this: as soon as they *assume the property of enclosing space, they lose the property of parallelism*: they are no longer *straight* lines, but *bent* lines. In carrying out imaginatively the two parallel lines into infinity, we have a tendency to make them approach; we can only correct this by a recurrence to our experience of parallel lines; we must call up a distinct image of a parallel, and then we see that two such lines cannot enclose space.

The whole difficulty lies in the clearness or obscurity with which the mind makes present to itself past experience. "Refrain from rendering your terms into ideas," says Herbert Spencer, "and you may reach any conclusion whatever. 'The whole is equal to its part' is a proposition that may be quite comfortably entertained so long as neither wholes nor parts are imagined."¹ But no sooner do we make present to our minds the meaning of parallel lines than in that very act we make present the impossibility of their meeting, and only as the idea of these lines becomes wavering does the idea of

their meeting become possible. A is no longer A, but B.

"Necessary truths," says Dr. Whewell, "are those in which we not only learn that the proposition *is* true, but see that it *must* be true; in which the negation is not only false, but impossible; in which we cannot, even by an effort of the imagination, or in a supposition, conceive the reverse of that which is asserted. That there are such truths cannot be doubted. We may take, for example, all relations of Number. Three and two make five. We cannot conceive it otherwise. We cannot, by any freak of thought, imagine three and two to make seven."

That Dr. Whewell cannot, by any freak of thought, *now* imagine three and two to make seven is very likely; but that he could *never* imagine this is untrue. If he had been asked the question before he had learned to reckon, he would have imagined seven quite as easily as five: that is to say, he would *not* have known the relation of three and two. Children have no intuitions of numbers: they learn them as they learn other things. "The apples and the marbles," says Herschel, "are put in requisition, and through the multitude of gingerbread-nuts their ideas acquire clearness, precision, and generality." But though, from its simplicity, the calculation of three added to two is with a grown man an instantaneous act, yet if you ask him suddenly how many are twice 365, he cannot answer till he has reckoned. He might certainly, by a very easy "freak of thought" (*i.e.*, by an erroneous calculation), imagine the sum-total to be 720; and although, when he repeats his calculation, he may discover the error, and declare 730 to be the sum-total, and say, "It is a Necessary Truth that 365 added to 365 make 730," we

¹ *Principles of Psychology*, p. 49.

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should not in the least dispute the necessity of the truth, but presume that he had arrived at it through experience—namely, through his knowledge of the relations of numbers, a knowledge which he remembers to have laboriously acquired when a boy at school.

Dr. Whewell maintains that whereas Contingent Truths are seen to be true only by observation, and could not beforehand have been detected, Necessary Truths are “seen to be true by a pure act of thought.” But he overlooks the fact that even the simple truths of Number are not seen to be true *before* these relations have been exhibited; and if they are afterwards seen to be true by a pure act of thought, not less so are physical truths, once demonstrated, seen by a pure act of thought: neither can be seen beforehand. He declares that we cannot distinctly, although we may indistinctly, conceive the contrary of a Necessary Truth. Here again the oversight is the same. We cannot conceive the contrary of a truth *after* its necessity has been demonstrated, but we can distinctly conceive that $17 + 9 = 25$ *before* verification. So little does he apprehend the real case that, referring to the mistakes of children and savages, he winds up with the serene remark, “But I suppose no persons would, on such grounds, hold that these arithmetical truths are truths known only by experience.”

§ 72. Let us now turn to another argument. Kant says: “Experience, no doubt, teaches us that this or that object is constituted in such and such a manner, but not that it could not possibly exist otherwise.” “Empirical universality is only an arbitrary extension of the validity from that which may be predicated of a proposition valid in most cases

to that which is asserted of a proposition which holds good in all. When, on the contrary, strict universality characterises a judgment, it necessarily indicates another peculiar source of knowledge—namely, a faculty of cognition *à priori*. Necessity and strict universality, therefore, are infallible tests for distinguishing pure from empirical knowledge, and are inseparably connected with each other.”¹ And elsewhere: “If we thought to free ourselves from the labour of these investigations by saying, ‘Experience is constantly offering us examples of the relation of cause and effect in phenomena, and presents us with abundant opportunity of abstracting the conception of cause, and so at the same time of corroborating the objective validity of this conception’—we should in this case be overlooking the fact that the conception of cause cannot arise in this way at all; that, on the contrary, it must either have a basis in the Understanding or be rejected as a mere chimera. For this conception demands that something (A) should be of such a nature that something else (B) should follow from it necessarily, and according to an absolutely universal law. We may certainly collect from phenomena a law, according to which this or that *usually* happens; but the element of necessity is not to be found in it. Hence it is evident that to the synthesis of cause and effect belongs a dignity which is utterly wanting in any empirical synthesis.”²

§ 73. I answer that the very fact of our being compelled to judge of the unknown by the known—of our irresistibly anticipating the future to resemble the past—

¹ Kant: *Kritik: Einleitung*, § ii. (Micklejohn’s translation, p. 3).

² *Op. cit. Transcendental Logik*, § 9 (Transl., p. 76).

of our incapacity to believe that similar effects will not always follow similar causes—this fact is a proof that we have *no* ideas except such as are acquired through Experience, and that uniformity in Experience irresistibly determines our conceptions of the future. For if we had *à priori* ideas, these ideas, being superior to Experience, would not always inevitably conform to it; they would bring *another* standard by which to judge—a standard which was not that of the already known. Have we such a standard?

§ 74. The school of *à priori* philosophers maintain that we have, and that the standard is the Necessity and Universality which certain truths involve, and which cannot be given in Experience. But we have had abundant evidence that every truth is necessarily true, and the fallacy is, that of first using a proposition in one sense, and then concluding from it in a different sense. It is not Truth which is contingent, but conditions which are variable, and every truth becomes invariable so long as the conditions do not vary. The same argument proves universality. If a truth simply express an unconditional generalisation—if it express an abstract relation, of course it is true for ever without possibility of change. In both cases we say A is A, and will be A for ever. When Kant says Experience cannot be universal, but only general, and cannot therefore bestow universality, because it cannot itself be universal, he forgets that Experience itself is no more general than it is universal—it is particular, and *repeated*. Now, just as a finite line may be produced to infinity although the mind is finite, just as zero may be added to zero, and space to space, without end, by the

simple process of repetition, so may a truth, "A is A," though particular in itself, be transformed into an universal.

I close here the discussion of one of the most important topics in the whole range of Metaphysics, and with it these Prolegomena.

When we enter on the scene of History, we see men nobly striving to grapple with the Unknowable. The shadow of the unknown world everywhere mingles with the light of day. It is the dark background on which Phenomena are visible. It is always present, and always limiting—as shadows limit—the objects of our thought. Beyond the Known stretches the vague Mystery, into which our eyes peer vainly, yet persistently. The border-land is ill-defined, and it is so because the sphere of the Known is always becoming larger and larger. We always hope that the Unknown is not also the Unknowable.

Hence Speculation is tempted to enter the realm of shadows, and will not admit the obvious fact that, on quitting *terra firma*, it abuts on vacancy, and peoples an airy void with airy nothings. Psychology has to check this groping amid shadows, by showing that the coast-line of the Knowable is sharply defined from the ocean of the Unknowable by the necessary limitation of human faculties. Between us and that ocean there stretches a vast and fertile region, where golden harvests have already been reaped, and where still richer harvests await the sickle—truths already gathered for the regulation of our Life, and wider truths which will hereafter be gathered for its renovation.

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