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IMPLICATION
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IMPLICATION AND LINEAR INFERENCE

BY

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"Knowledge starts neither from sense-data nor from general principles, but from the complex situation in which the human race finds itself at the dawn of self-consciousness."—Professor NORMAN KEMP SMITH, *A Commentary to Kant's Critique of Pure Reason*, p. xxxviii.

PREFACE

My object in the present work is to develop and elucidate the non-syllogistic principle on which my *Logic* was founded. In order to make the central idea clear, I have permitted myself some detailed criticism of other writers, while I have abstained from complicated systematic construction. Still following Mr. Bradley, and influenced further by Mr. Joseph, especially in the distinction between Syllogism and Deduction, I have laid even more stress than before on the principle of coherence, and have insisted on "implication" as a term free from reference to reasoning in its traditional shapes.

I have thus been able, as I hope, to do much more justice to Mr. Bradley's positive account of inference than was done in my former work.

The contrast expressed in the title of the book has forced itself on me continually, not only in the logical studies of which specimens appear in my criticism, but in all common-sense argument and observation, and in actual acquaintance with reasoning as conducted by great writers and capable publicists. It may be illustrated by contrast with such facts as are referred to in the following passage from Professor Sorley's *Moral Values and the Idea of God*:

"Their method [that of the eighteenth-century

rationalists, both Deist and orthodox] if clear was also somewhat narrowly restricted. By 'reason' they meant the passage from proposition to proposition by the ordinary processes of deduction and induction. They brought to light what could and what could not be arrived at in this way; but they sought to apply to the interpretation of the universe as a whole the same kind of intellectual process by which one passes from part to part in the examination of finite things, or from proposition to proposition in a chain of reasoning. They ignored what has been called the synoptic method—the reason as distinguished from the understanding of Plato, Kant, and Hegel. They distrusted the intellectual insight which achieves a view of the whole, even although it is willing to test that view by its adequacy to comprehend the facts."[1]

What is here referred to as the synoptic method, if it were interpreted as including and conditioning those other methods which are contrasted with it, would be the method of implication of which I am to speak. The distinction between reason and understanding should be taken in the same way. There is no argument in which both the aspects so designated are not present. There is a passage in Green's *Prolegomena to Ethics* (Sect. 174) which has always interested me for the same reason. He there speaks of his fundamental philosophical doctrine as something which cannot be proved, in the sense of being deduced from other established or conceded truths, but yet is the only way in which we can put the whole thing together and understand it. Obviously, I take it, supposing the claim to be established, this is the highest degree of proof.

[1] P. 462.

"Implication," as I shall define it, may also help us to understand the conception that "clear and distinct" ideas must be true. I am not competent to criticise the conception as it stands in Descartes' system; but in the form in which it appears in current philosophy it has always seemed to me plainly untenable. Huxley, for instance, has "seen clearly and distinctly, and in a manner which admits of no doubt, that all our knowledge is a knowledge of states of consciousness."[1] It seems plain that an affirmation may be in any ordinary sense clear and distinct before the mind, and yet absolutely false, or, to respect the refinements of theory, almost absolutely false. But if what the doctrine really intends, as, I suppose, in Spinoza's work referred to below, is an affirmation founded on a distinctly apprehended object, the relation of which object to the whole order of experience is also distinctly apprehended, then it seems right to say that what is clearly and distinctly envisaged as inevitable within a certain complex (or *a fortiori* about a simple object if such were possible) must be true, conditionally or absolutely—conditionally if the object is a supposition, merely interpreted by the "surviving reality" (see Chap. VIII.); absolutely if it is itself a factor necessitated by our ordered reality as a whole. These distinctions are embodied in the application of the principle to self-evidence and the *a priori*, especially in the case of Husserl's doctrine, and in the attitude adopted towards judgment and supposition. My argument, particularly in Chaps. VII. and VIII., is, I hope, in harmony with Spinoza's reasoning in the *Tractatus de Intellectus Emendatione*, to the general effect that you cannot but have truth where you have an

[1] *Methods and Results, Essays*, p. 193.

expression of mind without confusion, but that in the details of the sense-world to exclude confusion would demand not abstraction but unlimited individual knowledge. " It is of the nature of a thinking being, *prima facie*, to form true and adequate thoughts" (*op. cit.* Van Vloten, i. p. 25).

I should be more than content if my book should prove of some service in determining the direction in which a *really* non-syllogistic logic is to arise.

I greatly regret the death of Dr. Mercier, for whose courage and ability I had a genuine respect. The present work contains nothing, I think, inconsistent with this feeling.

BERNARD BOSANQUET.

OXSHOTT,
October 1919.

P.S.—At the last moment there comes to me Professor Joachim's Inaugural Lecture, "Immediate Experience and Mediation." Besides much else that is valuable, it contains on pp. 15 and 16 a discussion which supports and explains my criticism of "linear inference." I welcome the coincidence.

CONTENTS

I

THE GENERAL NATURE OF IMPLICATION

In attempting to ascertain the ultimate basis of Inference, it will be well to begin by noting the peculiar nature of the fact which makes knowledge, in principle, irrefragable. This fact may be expressed in different forms; but its underlying character is perhaps best accented by saying that we find it a contradiction in terms to repudiate knowledge as a whole. Denial is a form of knowing, no less than affirmation, and can be applied, as experiment shows directly, only within the whole of knowledge, and not to the whole as such. This is very lucidly stated in a passage of Mr. Russell's writing, to which I shall refer again, and which has something of the effect of an admission from a hostile witness.

"The philosophic scrutiny, therefore, though sceptical in regard to every detail, is not sceptical as regards the whole [of our common knowledge.] That is to say, its criticism of details will only be based upon their relation to other details, not upon some external criterion which can be applied to all the details equally." [1] "Universal scepticism, though logically irrefutable,[2] is practically barren; it can only, therefore, give a certain flavour of hesitancy to our

[1] *Lowell Lectures*, p. 67.

[2] This is what makes me call Mr. Russell a hostile witness. In my view, such scepticism contradicts itself.

beliefs, and cannot be used to substitute other beliefs for them."

"Although data can only be criticised by other data, not by an outside standard"—

This is otherwise expressed, and the inconsistency of a general scepticism is exhibited, in the old observation that it is a plain self-contradiction to say "There is no truth."

And a general doubt will be found open to the same objections as a general denial. It must, that is, and yet cannot, offer itself on the basis of some knowledge of that reality the knowledge of which it declines to accept. A man can, of course, adopt [1] an attitude of general doubt in the sense that he pronounces himself to have found no certainty which satisfies him, and that as a personal resolve he has made up his mind to abandon theoretical enquiry. But he cannot support his position by reasoning without founding it upon some conviction which amounts to an assumption of knowledge as to the kind of thing that can be known.

Now Inference, which is the subject of our enquiry, includes *prima facie* every operation by which knowledge extends itself. When, by reason of one or more things that you know, you believe yourself to have arrived at the knowledge of something further, you claim to have effected an inference. Sometimes there is a difficulty in disentangling the starting-point from the result, as when we say "Two straight lines cannot enclose a space," and a question may be raised whether an inferential transition has actually taken place. But for our present purpose these doubts are unimportant; we only want to trace the nature of Inference in unquestionable examples.

[1] Bradley, *Essays on Truth and Reality*, p. 445.

We seem to have it given, then, as the fundamental feature of certainty in knowledge, that it is impossible to doubt or deny the body of it as a whole. It is agreed in principle that we possess a province of assertion on the whole justified, which we call truth. The difficulty and peculiarity of it is, that when we come within it to any particular statement, doubt is liable to arise as to its justification, whether we suppose this to be intrinsic or to be derivative.

Thus it would seem to be a natural assumption that in establishing the details of our knowledge we transfer the character of certainty which we primarily recognise in the province of truth as a whole, to the several matters which we progressively establish within it. And a general consideration which merely embodies this presumption might be rendered by some such formula as " This or nothing," which, empirically speaking, we do often make use of in representing the grounds of a conviction. The essence of an inference then would be in showing of any suggested assertion that unless we accepted it, our province of truth would as a whole be taken from us. It is through such a conception, with the explanations and modifications which it obviously demands, that I shall attempt to unite under a single point of view some recent contributions to the theory of Inference.

I am hopeful that such a treatment may be of service in many ways. It may confirm what is justly advanced by those who censure the syllogism, and yet mitigate the antagonism which they rightly feel between syllogistic logic and the natural processes of argument, while at the same time pointing out that their own theories frequently do not in principle abandon the ground taken up by the logic which they attack. And it might explain the very real affinity

which exists between the actual mode in which expert writers on general subjects develop their comprehensive arguments, and that "Dialectic" method which a too narrow theory has taught us to regard with superstitious repugnance. Thus in the preliminary explanation we start from the idea of a definite given complex within which, on scrutiny, conclusions emerge whose rejection would shatter the experienced world. Hence two totalities are concerned; the special given complex whose consequences we desire to consider, and the total character of reality, which has to be respected and maintained in specifying those consequences. It is not, of course, that you adjust your given complex—your premises or data—to what you hold to be reality. You cannot at once infer from a premise and readjust it (except by a process which includes and develops it). But though you must base your conclusion precisely on your given complex, whatever it may be, yet you can only draw a conclusion by applying the complex which is your premise to the reality which survives and transcends any modification introduced by the complex. Your given complex is self-contained; your conclusion from it asserts about the world, and is false unless the world confirms its truth. Given a machine that can fly two hundred miles an hour, it can fly from London to Edinburgh in two hours. This depends on the distance between London and Edinburgh, which the given complex does not modify. And however much you take the complex to modify reality, the conclusion must always be an appeal to reality.

Thus it follows from the nature of implication that every inference involves a judgment based on the whole of reality, though referring only to a partial system which need not even be actual. You cannot

draw a conclusion *from* a mere and pure supposition, though you may draw one which explicitly refers to such a supposition and nothing more. Every assertion, when its explicit condition is discounted, asserts absolutely of reality as a whole. This is the claim which truth makes *ab initio*, that you must either affirm this proposition or deny the whole of experience. Apprehend this partial system—so an inference from a supposition says—as continuous with the real universe, and, reality being what it is, so and so must result. Without this reference you do not even know that reality is non-contradictory of itself.[1]

By way of anticipation, and to arouse interest if possible in the idea of a principle pervading the region of contingent inference and insight which is the same as that operative in *a priori* thought or necessary matter, I will add some commonplace examples of everyday reasoning, stated so as to illustrate the analogy I am suggesting. I do not propose to discuss them at the present stage. In every case there is a definite given complex, the individual nature of which, considered together with the system of reality, gives rise to special conclusions.

According to the British Constitution, the king can only act through his ministers; and therefore in and subject to that special complex, "the king can do no wrong."

In the human circulating system the blood is driven through an intricate system of elastic tubes, therefore in that system there must be a powerful force-pump in continuous operation.

In a good electrical installation, a fuse will be blown before any conducting wire can be overheated.

[1] See Chapter VIII. on the hypothetical proposition.

In a country with large foreign trade, if you want to fix prices, you must control imports.

" *Where there is no property*, there is no injustice " (Locke). Here the nature of the system within which the inference is to hold good is perhaps inadequately defined.

In a body like that of any higher animal the separation of the head from the trunk must be fatal to life.

In such a body vitality must one day give way before the forces which obstruct it.[1]

Or the analogy may even be seen in examples where the system of content suggests no necessity in the conclusions—in the connection of fact with fact, say, as cause and effect, but where nevertheless the " circumstantial evidence "—say, the interpretation of a whole complex of facts, as necessitated by the nature of causality—forces an external necessity upon a conjunction of brute circumstances.

On the basis of the given connection of circumstances he was the possible murderer and no one else was.

Considering what is demonstrated and what excluded, i.e. the given system, it follows that the excision of the thyroid gland dulls the intelligence.

Considering testimony causes and results there can be no doubt that Charles I. was beheaded.

This latter set of examples anticipates later discussions. I will now return to the cases of simpler *a priori* apprehension or inference.

Considering then the arithmetical and geometrical examples of apprehended connections within systems, we ought, if our suggestion is warranted, to have before us, in their case, the nerve of inference quite

[1] The presumption which lies beneath and reinforces the affirmation " All men are mortals." I do not say it is absolutely right in theory. Such presumptions may be operative without being right.

naked. What is it? Is our vision of it a mere intuition in the mystic sense; something that defies analysis?

Its necessity is certainly not reducible to subsumption under general formulae which can be arranged as schedules, dictating the arrangement of data and the type of conclusion after syllogistic fashion. Nevertheless, there are some general features which can be noted.

a. In the first place, these complexes, the spatial triangle plus the construction necessary to exhibit this or that among its properties, and the arithmetical system, are typical of the nature of true wholes. I use this cumbrous expression, in preference to saying that they are true wholes, because their character of wholeness is bought at the price of a very extreme simplicity and the omission of nearly all the responsiveness that characterises for example an organic whole. Still, such as they are, they bear the features of genuine wholes, in which no part nor characteristic is indifferent to any other; or perhaps it would be better to speak more moderately, and to say that there is no part nor characteristic which does not affect a number of others quite different from itself. But, owing to the imperfection which in some degree clings to all but the very highest conceivable kinds of system, there are features and modifications of features which are completely indifferent to each other—*e.g.* the magnitude of a triangle and the comparative magnitude of its several angles.

Still, in a very great measure, the connection, as we said, lies naked before us. The three angles of a triangle are together equal to two right angles. If it is equilateral, it is equiangular, and *vice versa*. If a side

is lengthened *ceteris paribus*, the opposite angle is enlarged. So too in the numerical system. Alter the value of any combination, and some correlatives, and ultimately the whole system, must be altered. If 1 is 5, 2 is 10. All is relevant to all. There is something in each which runs through every point in the system, and makes each of them, though apparently unique and peculiar, respond to every other, and vary, though in its own individual manner, yet correspondingly to the variations of other points or traits. Complexes, in so far as they present this character, are true "wholes" or "universals." You can tell from the modification in which one feature of them is given in what modification another feature, though quite dissimilar in character, must be given at the same time. The essence of its nature lies, to repeat it in a sentence, in being a system with different features or properties, such that without being at all similar or repetitions of each other they present variations connected by law, and therefore the variation of one is an index to the variation of others. Such laws are to be seen in simple forms in Euclid's theorems which develop the properties of triangles or in the statements of the multiplication table.

β. In the second place, the connection with one another of such factors or elements within a system—let us call them terms and relations—might in some cases be causal, but obviously it is not so always. It is most adequately expressed by the word implication. Within a given complex, (a system of terms and relations, so far as it possesses the unity of a true universal), the presence or absence of certain terms in certain modifications enables us to be sure that certain other terms in certain determinate forms will be present or absent. Thus, if our suggestion is right, the funda-

mental principle of inference will be implication.[1] This is the general name for the relation which exists between one term or relation within a universal, or connected system of terms and relations, and the others, so far as their respective modifications afford a clue to one another. Its kinds and degrees depend of course upon the nature of the system, and as we saw above, it may be so direct that we are not aware of any operation intervening between starting-point and conclusion, such as we should call an inference. And yet the relation asserted may be far from a tautology. Such is "Two straight lines cannot enclose a space." Plainly, I think, the essential basis of an inference is present here, the nexus between genuine differents; and the absence of an operation, if it is absent, is a mere matter of degree. We must, of course, understand the terms, and I add, we must scrutinise the relation in the light of the system, both immediate and ultimate, within which it is affirmed—here the nature of space or, ultimately, the abstract formal properties of all objects whatever. These requirements together constitute in fact what amounts to a simple and direct inferential operation. Thus, for our purpose, so long

[1] In Dr. Mercier's interesting and acute *New Logic* the author's effort to transcend the syllogistic doctrine, of the narrowness of which he justly complains, is nullified, as it seems to me, by his failure to push home his theory of implication. Implication for him is the relation between two propositions which state the same thing in different words, and are therefore convertible. By this parody of the real nature of a system which is the basis of inference, he condemns himself to restrict implication within the bounds of a purely formal logic, unable to deal with the attainment of truth which transcends the premises. Thus he abandons the world-wide ground of the necessary nexus of truly different propositions within complex systems, and is reduced, like Mill, to substitute for the syllogism, which he justly impeaches, an inferior form of the same subsumptive reasoning under the name of induction.

as there is no tautology, the apparent absence of inference is only apparent. The conditions of which we are speaking, and the insight based upon them, are the same throughout, whether a process can be detected or cannot. But, on the other hand, our description covers the cases in which the detail of the system itself, or of its special bearing on the relations which interest us, has to be elicited by putting data together or by the analysis of a system which is before us as a whole. And these are the typical cases in which we are clearly aware of an operation which we call inference. The implication, that is to say, is in these cases not the first thing we see, but is brought out by some dealing with factors which are *prima facie* not given in complete systematic relations. "A to the right of B, B to the right of C, ∴ A to the right of C." A is not given in immediate systematic relation with C. The very simple system Ç Ḅ Ạ has first to be built up, and then the result, in the implied relation of A to C, to be read off.

γ. All inference, then, is within a connected system, and consists in reading off the implications which this system, construed as one with the whole of knowledge so far as relevant, imposes upon some of its terms. The inference is founded upon our acceptance of the joint system so arising. Its necessity may be expressed, as we saw, in the formula "This or nothing." There is a given complex as starting-point, whether fact or supposition makes no difference. Construed along with the ordered whole of our experience, it affirms a certain result, and this result, its implication, you must admit *as* its implication, so long as you affirm the ordered whole to be real. You cannot escape from the implication as such by pointing out that you do not

affirm as a fact the complex which is your starting-point. On the contrary, you may decide to deny it as a fact just because its implication is inevitable. If the joint system has been rightly read, which we must assume, you could only annul the implication by ceasing to affirm the system of reality within which you are judging it to hold. If you have judged the relation rightly, you would in the end, in attempting to annul your judgment, have to deny the Law of Contradiction. That is to say, an implication rightly judged is guaranteed by the whole system of reality. If you deny it, you leave nothing standing.

"But if the implication seems outrageous you can modify some feature in your general view of reality, and so annul the implication?"

No doubt this is possible. You may have assumed in your general basis, *e.g.*, a false estimate of the earth's diameter, and the implication resulting on that basis may lead you to re-examine this particular point. Only, in that case, *prima facie*, the implication *has* shattered its basis, and so far, between "this" and "nothing" you have chosen "nothing."[1] You have thrown aside the reality on which you founded your conclusion, and you can proceed no further until you have established a new one in its room. And you cannot do this on the ground of your distaste for the implication. For all you can tell, the re-examination may fail to modify your basal reality, and then you will be face to face with the full alternative dictated by our principle. "The implication stands, or your whole reality goes."

[1] The same takes place at an earlier stage in illegitimate supposition. In this case you suppose a state of things which flatly contradicts and destroys the reality in the light of which you would have to judge of it. See my *Logic*, i. 272 ff.

The question of fact, we must observe, "Is the given complex real, *i.e.* is our supposal *true*?" cannot be before us while we are arguing on its implication. If we wish to decide it, it must itself be considered as the implication of some further complex. "Given such and such data, it follows that the British Constitution prevails in this country." The establishment of those data is again an implication of further data, until we reach facts which are guaranteed by our whole experience, *e.g.* the reliability of perception subject to certain tests.

The impossibility of dealing at once with the implication and the fact is the root of what is called the disregard of truth in formal logic. You cannot establish a fact and point out its implication by one and the same process.[1] They are distinct implications having different bases. But if you are arguing from a complex of facts already established, then their implication must also be a fact. The distinct basis, which implies, in its relation to the whole reality, that this particular system is actual, has been already examined and its claim conceded, as *e.g.* in case of the data which implied the existence of Neptune. But implication as such is a relation of content to reality as a whole.

δ. We may observe in this place how the view of inference which we are pursuing removes all temptation to an error which is not extinct though long ago exposed.[2] Reasoning, it has been said, "is a mental vision reinstating unapparent details." Explanation "of a phenomenon by the discovery

[1] Unless it is the indispensable premise of an established conclusion. But that this cannot be shown by syllogism.

[2] Cp. Lewes' *Aristotle*, p. 76, cited in Bradley's *Principles of Logic*, p. 490.

of a cause is simply the completion of its description by the disclosure of some intermediate details which had escaped observation." I only go back upon this idea because the contrast with it throws so strong a light on the conception before us. In those most simple and naked inferential connections with which we have been dealing there is no room for any detection of unapparent detail. We are working with systems of plain and obvious relations and their nexus most unmistakably declares itself to be the mainspring of the inferential operation.

Thus, in all inference the principle is the same. Fresh detail may be of service, if it fills a gap in the systematic connection, as do the additions in a Euclidean construction, or circumstances which supply a missing link in evidence. But the mere aggregation of facts, such as may facilitate imaginative transition between antecedent and consequent, is not essential to inference and may well be a hindrance to the insight which it demands. That is why diagrams are useful in scientific reasoning and why a crowded map may make discernment of strategic relations more difficult than it is on a skeleton plan. Our view of the essence of reasoning makes all this seem natural.

Comparing this preliminary sketch with the character of the simple illustrations employed in it, three points appear which are peculiar, and which I believe must be maintained.

(i.) All implication is in strict logical character, *qua* implication, *a priori*. Actual certainty is a matter of degree, depending on the distinctness of the systematic organisation within the immediate whole on which it reposes, and on the same character of that immediate whole as referred to the ultimate whole. But the nature of implication is one and

one only. It is the connection between terms or sets of terms in virtue of a common nature which binds them into parts within a continuous system such that you can tell from one part of it — or more modestly,[1] that there are parts of it from which you can tell—what the other parts of it, or some of them, are and how they are behaving. Thus, as we saw from our survey of examples, a certain continuity is established between inference in *a priori* matter and inference in contingent matter. Not that the certainty of the former is really impaired, nor that of the latter intensified by this comparison; unless, as may well be the case, the current estimate of it has been affected by logical superstition apart from a careful reference to its actual formulation. Nevertheless a certain vitality is awakened in the doctrine. We see the how and why of the *a priori* character, which lies simply in the absence of complication and confusion. We see the whole province of implications as a graduated scheme, in every part of which the same type of movement is active, subject to easily intelligible distinctions. And we may hope that from the removal of logical superstitions which favoured the special privilege of a formal and isolated self-evidence, dependent in great part on the simplicity or emptiness of the experience concerned, we shall tend to replace in their true rank as regards certainty our valuations of the more concrete appearances of the world. The depth of experience on which some implications are founded, may compensate, by giving their basis a profounder root in the world of reality, for the natural directness which seems to confer pre-eminence on others; and the self-contradiction of affirming that two straight lines can enclose

[1] To meet the case of imperfect systems.

a space will not necessarily seem more flagrant than that of saying, for example, that beauty is an illusion of the human mind. It is clear again, to take a very elementary case, that a judgment of our instructed perception upon a colour harmony is in principle as good an *a priori* judgment as that three angles of a triangle are equal to two right angles, and so with many other valuations. The system of factors is clear and distinct before you, and there is nothing to interfere with the appreciation. If it fails to be unanimous, that merely means that in many persons the perception is inadequately trained. Right appreciation is not every man's affair.

(ii.) It has been said by a recent writer [1] that it is possible for a perfectly clear intuition, which I presume is one with what we mean by an *a priori* truth, to conflict with such another intuition, and in the end to give way before its superior convincingness. It would follow that just as Whewell supposed Dalton's law "the discoverer of which was still living" (J. S. Mill) to have attained the rank of an *a priori* intuition, so too it would be possible for intuitions in the progress of knowledge to lose their self-evidence and their *a priori* character, and with these their claim to truth. Apparent examples of this type are emphasised by those who, like Mill, desire to overthrow altogether the conception of non-empirical truth. But neither the moral which they draw, nor that which might be drawn in favour of denying all *a priori* character to propositions which conflict with others claiming to be of the same type, and have in the end to give way, seem quite to do justice to the facts. Both these conclusions alike would deprive us of all *a priori* truth; the first in

[1] Husserl, *Jahrbuch*, 1913, pp. 36-37.

principle, the second in practice. For the first uses cases of such truth alleged to have proved deceptive, to infer that it has no existence at all. The second, admitting it in principle, throws doubt upon all examples of it which do not maintain their character to the end. And how can we tell, except in certain cases to be mentioned presently, that any particular intuition is such as can never be superseded?

What the facts suggest, in connection with the view here advocated, is rather something of this kind. The *a priori* character of an intuition depends on the distinctness of the whole which is its foundation, together with the depth or comprehensiveness which determines the degree of inherence with which that whole is rooted in reality. It is subordinated by the subordination of that whole to a wider or more truly real one, but is not destroyed. Under its own conditions or reservations it maintains its relative truth, whereas ultimate truth could belong only to intuitions founded upon the ultimate system, such as that of the unreality of the self-contradictory, which is necessary to the recognition of a whole in any sense. Obviously the character of the *a priori* can be brought by modification of content into complexes where it was not before, and can also be withdrawn from others. But no accumulation of external counter-evidence can modify it, unless the content of the complexes on which it rests is itself modified. You cannot get rid of "Two straight lines cannot enclose a space" unless you can alter the conception of the lines or of the spatial world.

For (iii.) even the acceptance of the blankest of brute facts which evidence compels us to believe, depends obviously in one degree, and to some slight

extent at least always in a second also, on implication within a system.

In one degree at least, because — to take Mr. Joseph's example—even if we cannot see how it is implied in the system of the world, or in the psycho-physical system of man, that the excision of the thyroid gland must dull the intelligence,[1] yet it is a truism to say that if we accept the thing as a fact, it is because we see that the evidence is such as to shatter or overthrow our system of knowledge if we did not accept it. We may not see that to deny it contradicts the content of our psycho-physical knowledge; but we see that in face of the system of facts which are brought together it must contradict the logical conditions imposed by the nature of causation as necessary to the systematisation of our experience.

And in the second degree of which I spoke, I am sure that the proposition of fact includes, as such, a presumption of necessary coherence; and its general nature stands ready, so to speak, to incorporate in its meaning any particular grounds of presumption which its content may be found to offer. The mere requirement of relevance which governs the relation of subject-qualification to content of predicate in ordinary speech proceeds from this implied universality of the proposition and connection. As I pointed out many years ago, we consider ourselves warranted in charging any qualification of the subject with an implication, whether adversative or affirmative, bearing on the content of the predicate. And if such an implication is obviously absent, or is denied when imputed in argument, we resent the omission as a defect or deception in the expression. If we say,

[1] Cp. Joseph, p. 437.

"The birches are lovely in spring," "those scoundrels ought to be hung," "the male Lychnis is tall and lean, and the female shorter and stouter," we are understood to maintain some "point" in the terms attached to the subject in each case; and if we said that we meant nothing in particular about the birches or the scoundrels or the male Lychnis which connected them with their respective predicates otherwise than as mere brute facts conjoined with them, we should be held to have fallen short of the demands of intelligible language. Every proposition claims in form and conception to explain a law, and, as we shall see more fully below, every "association of ideas," however casual and particular, does operate as a general connection of characters, such as must ultimately express itself in a system.[1]

To summarise the suggestions of the present chapter in the simplest form. *All* implication [2] is of the general type of the insight that two straight lines cannot enclose a space. If inferential, in the strict sense of proceeding by an operation, it is of the same type, but brought to bear by an operation which unifies the data, as in the construction which exhibits the angles at the base of an isosceles triangle as equal.

This conception has two factors, and it might be asked which of the two is prior. One of them is the consideration that the whole is all we have, relatively in every case, and absolutely in the universe. In dealing, therefore, with what any whole complex forces upon us, we are confronted with the alternative "This or nothing." The other factor lies in the

[1] Cp. Bradley, *Principles of Logic*, p. 298 ff.

[2] Some reservation must be made on this statement for the case of subsumption.

character of a true whole as a connected system. This is evinced by the coherence which insight reveals, as, for instance, through the correlative modifications which the parts of a true whole exhibit. Our " This or nothing " is not merely a bare alternative proposed to us by destiny. The whole is not merely all we have, but satisfies our intelligence by definite necessities.

This view tends, as I hope, to restore the balance between abstract necessities and concrete valuations, which the common doctrine of *a priorism* has weighted unduly in favour of the former; and to furnish a unitary account of the apprehension of truth, which has been erroneously dissociated as between axiom and simple fact. If we ask whether the compelling feature of implication lies in the alternative " This or nothing," or in the connectedness of genuine wholes, the answer must be that the two are inseparable. It would be the same, except in degree, if there were no connectedness, and if the connectedness were not with all we have. If there were no connectedness there would be no such consideration as, " If I deny this, I must deny that." If the connectedness were not with all we have, we could never reach the final proof, " If I deny this, I must deny everything." And the degrees of stringency in implications of this type are what constitute the differences of *a priori* and empirical reasoning, and a survey of the types of implication is what constitutes the logical method. Subsumption alone stands out as no longer considered in the light of the sole mode of inference, but rather as an inferior and essentially second-hand process. Its place and nature will be discussed below.

We shall see that everything turns on having the true universal nature precisely presented. What

distinguishes the more strictly *a priori* from the empirical basis of implication is that the latter is loaded with irrelevant matter, which in various degree embarrasses our insight into necessary connection, or, in other words, prevents the implications imposed by the empirically given complex from being such as could be sustained on the basis of a more comprehensive whole. But this, it must be remembered, does not make the implications of the narrower complex irrelevant to itself. Thus we are in the habit of thinking that number implies the possibility of enumeration; but it appears that when number is taken in a wider sense the possibility of enumeration ceases to be characteristic of it. But this doctrine, I imagine, makes no difference to the necessity of the truths which are expressed in the multiplication table, so long as we restrict our attention to such numbers as are there concerned.

II

THE LINEAR CONCEPTION OF INFERENCE

THE traditional conception of Inference is widely different from that which I have outlined in the previous chapter. And its vices are far more widespread than most logicians have supposed. They appear not only in the syllogistic doctrine, but also in the theories of its most convinced opponents, as well as in those very modern views which insist on the one hand upon *a priori* principles of inference, and, on the other, upon an Induction through repetition of occurrences in experience. Wherever stress is laid upon argument "downward" or "upward," upon inference from indemonstrable premises, or generalisation from recurrent particulars, we have before us the linear conception of inference with its inherent vices.

By the linear conception of inference I mean that which is drawn from the analogy of the formal syllogism—I say, "from the analogy of it," and not merely "as an embodiment of its principle," because much of what is called Induction proceeds after the same type, and has the same general defects.

In reasoning by the formal syllogism, in the typical case, the essence of Inference is placed in attaching to a subject a predicate or succession of predicates, linked with it by connections through

predicates which are further used as subjects. A highly typical application of it is the Sorites, A is B, B is C, C is D, ∴ A is D. In a syllogism understood after this ideal, the terms, it has been said, far from coalescing, rather tend to bid each other good-bye.[1]

What are employed are a series of statements of conjunctions, which simply serve to attach the terms named in them to the same primary term or subject; or if the chain of reasoning is taken back through a series of narrower subjects, the argument remains of the same character; the conjunction of a predicate with a subject by means of a middle term.

This linear ideal of inference, being thus identified with a series of terms connected by successive statements of conjunction, called a chain of reasoning, is apt to be taken as typical of deduction. But true deduction, which passes, for example, from the law of gravitation to particularisation of the movements of the moon, is obviously a very different thing from a chain of reasoning of the type of the Sorites, which can never particularise its predicate.[2] There is in such deduction a modification of the predicate of the conclusion, which vitiates the argument from a syllogistic point of view.

Moreover, even where there is no such formal defect, it is still a mistake to apply the name of deduction to syllogism. It is not a true syllogism to argue that because A and C are each equal to B ∴ they are equal to one another; nor are any steps of reasoning from conditions to consequents truly syllogistic when the necessity of the major premise is seen in the complex before us at the moment, and

[1] Wallace, *Proleg. to Hegel's Logic*, p. 469.
[2] See Sigwart, *Logic*, Eng. Tr. i. 357.

is not *bona fide* borrowed by assumption or from a previous argument.[1]

From this tradition of the linear chain of reasoning, usually identified with deduction, and very often with empirical induction also, two complementary errors seem to be derived.

One of them is, that the ultimate premises of deduction must be indemonstrable. If deduction is a chain of syllogisms, each resting upon premises previously established, either the series must extend to infinity, or it must somewhere be attached to self-evident principles. Such, it is apt to be supposed, is the principle of the syllogism itself,[2] together with a number of self-evident truths, which furnish various starting-points for Logic and for Science.

The other begins at the other end. It is the same vice in a more modern and fashionable form. You come upon $A_x - B_y$, constantly repeated in experience. Out of it you abstract A – B, and from this you go to any particular case A_1 A_2 A_3 etc.—B_1 B_2 B_3 etc. And here you say that you have first argued "upwards" from the indefinite particulars $A_x - B_y$ to the generality A – B, and can then proceed "downwards" syllogistically, using A – B as major premise. Or you can omit the step A – B and, relying simply on $A_x - B_y$, say that you are proceeding from particulars to particulars, *i.e.* from a general impression, or from some striking conjunction.

Now the first thing to grasp is that the processes of reasoning which appear to be formulated in these two opposite ways really are one and the same, resting on the same principle of a connection of attributes from which you argue by predicating its

[1] Joseph, *Logic*[2], pp. 294, 311, 524.

[2] Russell, *Lowell Lectures*, pp. 37 and 57.

subject of a prior subject, or a further predicate, of its predicate repeated as a subject.

From whence we derive our certainty either of the connection of attributes itself, or of the reasoning which applies it, is a further question, the answer to which divides from one another the two erroneous theories which have been indicated. But the essential point, which separates the principle common to them both from the more comprehensive view of inference which was outlined above, lies in assuming that reasoning can only work by subsumption of new particulars under general connections borrowed from elsewhere. Whether the connection is explicitly stated in a premise introducing a middle term, or whether the reasoning goes, in the familiar phrase, "from particulars to particulars," is irrelevant to this antithesis. The difference is that between going from a presupposed connection to a new case taken to fall under it, and determining a conclusion from a system of relations which in the moment of determination is apprehended as making it inevitable. The former type of inference, whether explicit or implicit, I call linear; the latter in all its forms, which can be shown to include what is often classed as linear, I call systematic.

The second point, then, to grasp is the true place and interpretation of linear inference in the wider scheme I have suggested.

What makes Inference linear is respect for the independence of the terms. On the traditional theory of the Syllogism, and according to any or all of the maxims which have been suggested as its ground, its terms are marks or properties which affect each other, so far as the technical purpose of the reasoning is concerned, only as indications of

each other's presence and absence. If the predicate of the conclusion in Barbara is modified from the predicate of the major premise, because it is affected by the change of subject, the argument is vitiated. The rules forbid you to regard the argument as the construction of a system in which by their combination the terms throw a new light upon one another. You cannot state a proportional argument in a syllogism, if, that is, the rule of proportion, which is predicate of the major, is to be applied in the predicate of the conclusion to the subject of the minor. The alteration of the predicate at once vitiates the form. A ton of coal costs thirty shillings; this is half a ton; therefore this costs fifteen shillings. The argument is formally bad in more ways than one. The law of gravitation involves such and such movements in general; the moon obeys the law of gravitation; therefore the moon shows such and such movements in particular. Again, the argument is formally bad.

You cannot apply or extend a syllogistic argument in this way. Each term must preserve its independent being, as if enclosed in a bracket, and can only react on others by indicating the consequences of its presence or absence in respect of the presence or absence of the others.

Thus, to apply or extend a syllogistic argument, you must find a new term or series of terms which will let itself be added on to the succession which you already possess, either in the form of subjects included in the first given subject, or in predicates including the last given predicate.

This side of the reasoning process depends on the fact that attributes can be conjoined, with a minimum of rational connection, simply by being found to

coexist in the same subject or subjects. And though, even here, undoubtedly a rational connection is presumed to underlie the fact, yet all that is made explicit may be the bare fact itself, that A, which has x, has also y, as in Thackeray's well-known story of the Abbé [1] and the nobleman. In such arguments you get, technically recognised, no bearing of the import of one term upon another at all. They are, so to speak, in capsules, and all you can do with them is to note which lie in the same drawer, and which refuse to do so. You can extend the series *ad infinitum* either way; but you cannot, except by a felicitous choice of a middle term which gives the cause or the reason, deepen or express the rule, which you are taken to possess. And if you do so explain it, you are forbidden to express the result in your conclusion, *e.g.* by explaining what sort or quality of mortality characterises Socrates. It is the extremity of such a doctrine to suppose that the principle of the syllogism is its ultimate premise, and that a train of reasoning derives its force from having at its head an axiom about a class or a rule.

When this extreme irrationality is rejected, and it is observed that the necessity of every syllogism is intrinsic to its form, and not borrowed from a rule under which it is subsumed, the way is paved for reconsidering its whole nature.[2] The argument, "All organisms are mortal, Man is an organism, therefore

[1] I repeat it in case any reader may not have met with it. The Abbé, talking among friends, has just said, "Do you know, ladies, my first penitent was a murderer"; and a nobleman of the neighbourhood, entering the room at the moment, exclaims, "You there, Abbé? Why, ladies, I was the Abbé's first penitent, and I promise you my confession astonished him!"

[2] Joseph, *Logic*[2], p. 311.

he is mortal," has as obvious a necessity as the principle that what satisfies the condition of a rule falls under the rule; and could not be derived from it without using the type of argument which the derivation is meant to justify. The syllogism, in short, contains its own necessity, and when this is seen, we are inclined to ask whether it can be as purely linear as extreme tradition makes it.

And it has become obvious,[1] as indeed Aristotle's account of the first figure implied, that it is not so. The Syllogism at its best is not a mere marshalling of trains of predicates, which remain apart and unmodified. The syllogistic process, properly understood and taken in instances which reveal its full import, is an operation in which the terms come together, modify one another, and construct a systematic whole, within which the conclusion is obvious and explains itself. If you say, "Oxygenated blood is bright; the blood in the arteries is oxygenated blood, therefore the blood in the arteries is bright," you have brought together your terms in the conception of the circulation of the blood, and your conclusion, although it implies a rule, shows also a system in which the terms are factors, their union is rationally explained, and their meaning developed. Such a term as "bright" acquires a new meaning in the construction, and it is a mere matter of convenience whether this demands a modification of expression. If it does not, it is only because general language enables us to understand such a change of meaning without altering the word. But a rule which is aimed, like that of the syllogism, at excluding in principle all modification, would really destroy the vital essence of reasoning.

[1] Bradley's *Logic*, p. 398; author's *Logic*, ii. 202, 206.

Thus even the syllogism is really a case of the general character which our theory ascribes to inference. It is true that it possesses a side in which that character is minimised. That is the side which insists on the mere fact that three terms are brought together within the unity of a single subject, or, in the case of one negative premise, at least referred to it. So in the story quoted above,[1] what we have is two events united in a single subject, and all that we do is to recognise that the subject in the two is the same. We do not attempt to elicit further conclusions from the combination of the contents with one another, as we might if the subject were, say, an army, and the two events were two features of its military position. But, of course, there is a reaction between the natures of the terms, though there is no formal means of expressing it. The interest or "point" of the story consists wholly in this reaction—that *such* a person should have united in himself *such* features and revealed them in *such* a way. And so with all syllogisms. All they say is that by certain rules of connection certain terms must come together or be separate. But if the arguments are worth making, of course there is a "point," a something that follows from the construction, which its logical form does not adequately exhibit. For even the linear reasoning is in some sense a construction, from which the conclusion can be read off. Our criticism amounts to saying that it is a construction in which nothing operates beyond the most formal relations of the terms. Something more may be seen in syllogism at its best, when its linear aspect is least and its systematic aspect strongest, when it is least like a case under a borrowed rule and most like an explanation

[1] See p. 26.

of two points by a complex which includes them both.[1]

Now it is a remarkable fact that in all cases, so far as I know, but one or two,[2] the enemies of the syllogism have selected as the true type of progressive knowledge to be set up in its place simply that weaker form of itself which consists in universal connections established by recurrence of conjoined events. Thus while their adverse criticism of the syllogism has been to a great extent justified,[3] yet they have missed a great opportunity. There is a principle of progressive knowledge which explains its relation to experience, and goes far beyond the limits of syllogistic reasoning; but it is not to be discovered so long as we remain within the linear doctrine of inference, and find the antithesis upon which our doctrine turns in the opposition of *a priori* and *a posteriori* or of downward and upward argument. When this fatal position has been adopted, it is impossible to arrive at a tenable doctrine, whether with the older empiricists we resolve the whole of reasoning into an upward (Inductive) followed by a downward (Deductive) movement, or whether, as is more fashionable among recent theorists, we begin at both ends at once, basing syllogistic argument on one self-evident *a priori* principle, and Induction by Simple Enumeration on another. In truth, the older assumption that syllogistic reasoning is one with deductive inference, which is common to Mill and Bain with many believers in the syllogism, contains the germs of the fallacy we are criticising. Syllogism,

[1] See example, p. 27 above.

[2] Mr. Bradley and Mr. Joseph. It is a question how far either of them should be called an enemy of the syllogism.

[3] Not in so far as it alleges a *petitio principii*; when a universal is recognised as opposed to an enumeration this falls to the ground.

as an argument depending on the relation of subject and attribute, does not cover the ground of Deduction and Demonstration; and, strictly speaking, we are not syllogising when we reason from an intrinsic necessity, exhibited, for example, in a spatial or numerical construction. Syllogism and enumerative Induction bear the distinctive character of linear inference. They begin to pass into something different as they develop an aspect of systematic necessity involving transformation of the terms; but when reasoning begins to depend on the intrinsic necessity of a transparent system, to be systematic instead of linear, we are in a wider region, of which syllogism is an outlying province; and no escape from syllogism is open in principle by a passage to enumerative Induction. We have to look away altogether from this region of connections accepted as general rules, whether empirical or *a priori*, and applied by subsumption to more particular cases. We have to enter upon the wider world of implication which our preliminary chapter has outlined.

III

CRITICS OF THE SYLLOGISM REMAIN WITHIN LINEAR INFERENCE

If the discussions of the two previous chapters are sound, any serious amendment of the theory of reasoning has to go much further than the hostile critics of the syllogism appear to have perceived. This may be seen in a moment from the fact that while their criticism often insists on some principle of reasoning which they suppose to differ from that of the syllogism, it has not in the majority of cases travelled outside the linear conception of inference. For, apart from mere modification of syllogistic formulae which in no way widen their principle,[1] the extension of logic proffered as non-syllogistic by the reformers consists in nothing more than a theory of Induction, and that founded upon subsumption or upon relations of similars. Now a theory of Induction might be quite other than this; and in Mill at his best a different line of advance is indicated.[2] But so long as all that is offered is a theory of Induction working by explicit or implicit subsumption of

[1] Such as those of Symbolic Logic.

[2] I think that this is true in some degree of Dr. Mercier's *New Logic*, and still more so of his work on *Causation and Belief*, in so far as Causation is recognised by other evidence than constancy of repetition.

new cases under a principle gathered from previous experience, so long we are within the linear conception, and have passed, at furthest, from an explicit to an implicit syllogism. Especially this is so, if the link between the new and the old cases is stated in terms of resemblance. Any connection of attributes, employed as a premise to determine particular cases, is *prima facie* of a syllogistic nature, though it may itself have been obtained by a better inductive procedure than the observation of resemblances. But if it is laid down, not merely that Induction makes a practice of using a universal connection, but that its universal connection is obtained by noting the similarity of an example before us to a previous example, or to many which are themselves similar to each other, then we are in presence not merely of a syllogistic logic, but of a syllogistic logic founded on a vicious theory of the syllogism, which, so far as applied to Induction, absolutely precludes an advance at any point beyond the method of simple enumeration. Later we shall see in detail how this maxim confines reasoning *ab initio* to a linear method, in the way of ranking example along with example because of an uncriticised resemblance which seems to link the subsequent examples with that which was first observed. In such a method you are tied down to likeness between cases, and at every point you are forbidden to apprehend and analyse the relation between the point of similarity and the case, or between the case and its total conditions.

These preliminary observations may be supported by a very simple fact. With the exceptions indicated above, none of the recent critics give us any help if we ask whether syllogism is really one with deduc-

tion. That deduction and demonstration go from generals to particulars in a "descending" argument, and that syllogism is their instrument, is the traditional assumption. And yet its difficulties stare us in the face. But what we find is that an inherited opposition between Syllogism and Induction has caused them to be regarded as the protagonists in the logical controversy, even when, as with Mill, the solution took the shape of reducing one of them in ultimate principle to the other. So that if Deduction was not Induction, it seemed to follow that it must be Syllogism. Hence no attention was given to the really important facts of deduction and demonstration which prove a wider explanation of reasoning to be necessary, than that of attribute linked to attribute or resemblance to resemblance, whether in the external shape of Syllogism or of Induction.

It is an extraordinary thing to notice the continual repetition in text-books of the double statement that deduction is syllogistic and that deduction leads to particulars. So far as I can see, a true syllogistic process cannot take us to particulars, in the sense in which a genuine deduction or demonstration does so. It can prove a general predicate of a particular subject; but it cannot specify and particularise the general predicate itself in accordance with the special conditions which apply to the particular subject. It follows by syllogism from "The bodies of the solar system are subject to the law of gravitation," and "The moon is a body of the solar system" that "the movements of the moon are in accordance with the law of gravitation"; but I do not see how, by syllogistic procedure, you can fill in the astronomical data affecting the moon in particular, and infer from these data her movements to be true of

her as the exhibition of the law of gravitation in her particular case. You would have, surely, first to assign the data and calculate the movements, and then to invent a major premise saying that from such and such data such and such results could be drawn by calculation. But you could never, by a syllogism, limit the major term " subject to the law of gravitation " to the predicate of a conclusion specifying the movements resulting from gravitation in the case of the moon only. The syllogism would have four terms.

And moreover, no reasoning can be syllogistic in which the operation justifies itself without reliance on a universal connection of attributes such that the conclusion follows from it by mere subsumption; that is, the nerve of the connection being taken upon trust, and not apprehended in the inference. This has often been pointed out in the case of the axiom of things equal to the same thing. Any one who would deny that if $A = B$ and $B = C$, $\therefore A = C$ would just as much deny the axiom in its abstract form. Placed as a major premise, it does no work, and therefore the argument is not a syllogism. So with calculations; for example, with multiplications of large numbers. " The multiplication table up to 12×12 might be said to contain principles, and the multiplication of 266×566 to apply them "; but whatever reason there is to doubt that $60 \times 60 = 3600$, there will be the same reason to doubt whether $6 \times 6 = 36$.[1]

At all events, the assumption that syllogism and deduction are one and the same, together with the assumption that the opposition between syllogism

[1] Joseph, *Logic*[2], p. 549. I have modified the latter half of the sentence to suit my point.

and induction is the principal crux of logic, seem to me to show a strange unconsciousness of the real issue. The true point surely is that whereas the linear type of inference includes both syllogism and induction as a single method, differing only in degrees of explicitness, there is a wholly different way of regarding the basis of reasoning which is suggested by the antithesis, among others, of syllogism and deduction.

The book tradition, which I imagine to be Aristotelian in its origin, regards syllogism and deduction as practically one. And it is worth while to insist upon the insensibility of logical writers to the glaring difficulties of this doctrine.

The recent history of the question shows a curious double reaction. I read it thus. The logical book tradition had narrowed itself into a linear interpretation of the syllogism. In this form it seduced by its simplicity its main antagonists, notably J. S. Mill, so that they, in pushing home their own favourite principle of induction, adopted as its essence a linear type borrowed from that syllogism which they conceived it to supersede. Thus their entire doctrine, aimed at overthrowing the syllogistic book tradition, really remained [1] within a narrow province of their subject into which that tradition had itself inveigled them — the province which I have called that of linear inference.

The foundation of Mill's theory, for example, on the appeal to resemblances between given and recalled particulars of experience, was very suitable to the syllogism in its degraded form as a doctrine of class inclusion. The major premise, as we know, was to be simply a record of the similar experiences

[1] I shall point out below slight reservations on this statement.

which, record or no record, were operative upon the new given particular resembling them. And the result was in Mill's case to establish linear inference as the whole secret of induction and of deduction alike, while the identity of the latter with syllogism was not merely not repudiated, but was held to be triumphantly demonstrated in terms of the very doctrine which established induction as the fundamental principle in both.

In the meantime a remarkable counter-plot was developing. Some interpreters of the book tradition, being through its philosophical aspect in possession of a wider rationale of inference and conception of the universal, took note of the obvious objections to finding a general type of inference in the syllogism. Their insight was stimulated, beyond a doubt, by the vigorous criticism levelled by others at the syllogism so far as it was held to be founded on class relations. And through this insight they began to urge, first, that many types of inference, and especially deduction, could obviously not be identified with syllogism; and secondly, that syllogism itself, when looked at more carefully, revealed a character passing beyond that ascribed to it by the tradition, and therefore was not properly appreciated so far as it was taken to be the deductive aspect of a linear Induction.[1] On the one hand, it was different from deduction; on the other hand, it was not completely linear.

Thus the final dispossession of the syllogism and vital reconstruction of the doctrine of reasoning came from the traditional supporters of the former, while the fallacious re-establishment of it on the throne of

[1] I mean an Induction which argues from case to case on the ground of their similarity or of an identical attribute in them.

inference was due to its old enemies. In saying this, I do not deny that its enemies, to use that word for shortness' sake, co-operated vigorously in destroying the fossilised tradition for which Euler's circles represented the nerve of reasoning.

To illustrate the situation, and not for the sake of controversy, I will indicate my meaning more precisely by one or two examples from either side.

The logical theory of J. S. Mill has been restated and criticised *ad nauseam*; and fortunately it is not necessary for me to retraverse the familiar ground. It is enough to recall what for him was the universal type of the reasoning process; [1] "certain individuals have a given attribute; an individual or individuals resemble the former in certain other attributes; therefore they resemble them also in the given attribute." [2] Inference, that is, always proceeds from known sets of resemblances between cases to a resemblance which in one part of a set is unknown. And this is what I have spoken of as linear inference. With the experimental methods, as I have suggested, there begins a transition towards other types of reasoning.

But we are concerned with a quite simple point, which has passed, I think, nearly unnoticed. It is that syllogism, for Mill, being once reduced to a vehicle of induction, covers completely the whole field of inference beyond the primary induction itself. All inference is induction or the application of induction; and the application of induction is syllogism. Geometrical and arithmetical reasoning, of course, are not excluded. Nothing is more remarkable than

[1] Mill's *Logic*, Bk. II. iii. 6.

[2] Cp. II. iv. 3, "The real premises are the individual observations," etc.

the energy and persistence with which Mill explains and analyses every possible deductive process—from Euclid's theorems[1] to every step of an arithmetical or algebraical calculation[2]—into cases under the maxim *nota notae* which he has adopted as the syllogistic rule. "Deduction as we have seen consists of a series of inferences in this form—*a* is a mark of *b*, *b* of *c*, *c* of *d*, therefore *a* is a mark of *d*, which last may be a truth inaccessible to direct observation."[3]

The identification of the Syllogism with Deduction *prima facie* introduces a cross division to Mill's well-known distinction between the logic of consistency and the logic of truth. The logic of consistency becomes the logic of deduction and demonstration, while the logic of truth becomes the logic of observation or apprehension (in Mill's phrase, of experimental science, *Logic*, II. iv. 5). On the one side he holds that Formal Logic, principally the doctrine of the Syllogism, is nothing more than the logic of consistency; and it is the theory of induction which constitutes the logic of truth. On the other side, the instrument of all deductive and demonstrative science is for him the syllogism; and what belongs

[1] Mill's *Logic*, Bk. II. iv. 4. [2] II. vi. 2.

[3] II. vi. 4; cp. II. iv. 1. The common sorites, given in this quotation, as the general form of Deduction, which we rather expect to go from general to particular, excites surprise at first sight, having all the appearance of a reasoning to more and more general predicates. (Cp. Sigwart's *Logic*, Eng. Tr. i. 357.) "What do we gain by this process of continuous ascent to higher concepts? If our object is to extend our knowledge by means of judgements, we are moving in the wrong direction; our predications become less and less significant, we learn less about our subjects," etc. I take it, judging from Mill's instances, that he thought of the process as departing from *c* is *d*, and finding a narrower middle term to prove the minor premise *a c*. This would be the Goclenian sorites. (Sigwart, ii. 184.) No effective deduction is gained by it.

to Induction pure and simple is confined to sciences which are in a comparatively elementary stage, and to the ascertainment of relatively few general propositions out of which the vast structures of deductive science arise by syllogistic manipulation. The services which consistency is thus represented as rendering to truth are but meagrely acknowledged when the former kind of logic is treated as " a necessary auxiliary " [1] to the latter, by providing for " the correctness of the application to particular cases " of inference drawn from experience in the course of " experimental " investigation.

The fact is, that Mill's preoccupation with the antithesis of Syllogism and Induction has disturbed his whole scheme for the treatment of reasoning. Induction cannot possibly meet the demands of the logic of truth. Syllogism cannot possibly cover the ground of Deduction and Demonstration. They are really the two extremes of *the same* inferential type; that very limited one, which operates through ascending and descending lines of predicates. If, with Mill, we insist on dividing the world of inference between them according to the nearest affinities of its constituents, we find that we have assigned nearly all the province of science to the deductive logic of mere consistency, and that nothing remains for the inductive logic of truth but to subject postulates and perceptions to a kindred organising process, in entire disregard of its claim to proceed by linkage of resemblances. The experimental methods are a confession of this necessity. It is only when we apply the conception of systematic inference that we are able to co-ordinate the types for which the linear conception offered no appropriate places, and we see the logic

[1] Mill's *Logic*, Bk. II. iii. 9.

of system including with modifications both that of consistency and that of truth.

The same fundamental position is retained not only by Mill's immediate followers,[1] but, for example, by Dr. Thomas Case.[2] His view represents, if my outline of the whole development is correct, the book tradition fossilised into a doctrine of class inclusion, and ready, in consequence, to amalgamate with a theory founded upon similarity. For him there are three forms of Inference and no more, Analogy, Induction, Syllogism; and all of these are "applications of the principle of similarity." "Analogical Inference requires that one particular is similar to another, induction that a whole number or class is similar to its particular instances, deduction that each particular is similar to the whole number or class."[3] Thus, *prima facie*, he is altogether within the method of linear inference, and deduction remains purely syllogistic, as an affair of applying predicates true of classes to their members. So with the serial inferences which, insisted on, I think, first in recent times by Mr. Bradley, have figured in all logical treatises since his *Principles of Logic* appeared in 1883. Dr. Case does not shrink from assigning them major premises and calling them syllogistic reasonings. The difficulty here, which he appears to neglect, is not that the major premise is cumbrous, but that it does no work, and the inference is complete without it. It is impossible, as we have seen, to explain deduction and demonstration by help of a major premise. But here again we have, as it seems to me, an entire insensibility on the logician's part (and he is one exceptionally well versed in the book

[1] *E.g.* Fowler and Bain.

[2] *Ency. Brit.* art. "Logic." [3] *Ibid.* xvi. 880.

tradition), to the significance of inferential method outside the procedure by borrowed general connections from instance to instance.[1]

Dr. Schiller's purpose in his work on *Formal Logic* is so alien to my present argument that I may seem to do him an injustice by referring to him in this connection. The fact is, I imagine, that he is so wholly an enemy of form as not much to care whether logic receives or does not receive a reinterpretation with reference to the form which it recognises. But the refusal to use the strongest of all weapons against the traditional linear syllogism is on his part so striking that I feel obliged to notice it.

We may start from his dealing with the spatial and serial forms of non-syllogistic inference.[2] All that interests him about them, I think it is fair to say, is that they are not valid because of their form. He holds, however, that their reasoning may always be reduced to a syllogistic type. So far, I think, as he considers form worth enquiring into at all,[3] he recognises no other than linear inference. "Every argument, whether inductive or deductive, is really analogical.[4] In 'induction' we argue from a number of cases to a 'law' or 'rule.' In 'deduction' we apply a rule or law to a number of cases, or, more precisely, extend the rule's application to fresh cases.

[1] It is notable, however, that he allows us in some cases of induction concerned with objects capable of abstraction and simplification "a power of identification by which we can say that the same thing has two aspects which are inseparable." This power would take us into a new region of inference; *i.e.* "not *a priori*, but in the act of inducing a conclusion." (See *Ency. Brit.* xvi. 880-81.)

[2] *Formal Logic*, p. 214. Perhaps I may here refer to my *Knowledge and Reality*, pp. 316 ff., where I tried to show that argument by subsumption in these cases is always a second-class inference. But I do not now think that I saw their full logical significance.

[3] *E.g. Formal Logic*, p. 247.

[4] *Ibid.* p. 342.

In both, therefore, several 'cases' of a law are involved. But no two cases are ever absolutely 'identical'; they are known to be only 'similar,' and their 'identity' is always constituted by abstracting from their differences, which are judged to be irrelevant. Hence every argument from case to case must rest upon an analogy."

For him, then, I think, as for so many others, inference goes simply up and down. We can see by his treatment of explanation,[1] that the idea of system, which for us gains its value from approximation to the whole, has for him no special bearing on the nature of inference. He is occupied more in refuting the idea of deduction or derivation from a single principle than in analysing the relation of system to reality and experience. Thus, in commenting[2] on the alternative of infinite regress and of intuition as bases of certainty, an alternative which depends entirely on the restriction to linear inference, he sees no third course but to dispense with certainty and to make reasoning tentative. And with this, as a general warning, I have no fault to find. It agrees in principle, though perhaps not in the degree of its application, with the thesis I am maintaining. But as a mere general warning it seems to me out of place when the question is one of relative inferential values as between different ways of looking at our experience.

Much of Dr. Schiller's language is calculated to raise a doubt whether he admits in principle that there can be justified inference at all. To say that it is tentative, difficult and hazardous is to say in principle nothing at all. The question is whether under the most favourable conditions you can know

[1] *Formal Logic*, p. 342. [2] P. 247.

one thing by knowing another. We all quite understand that you may be wrong; unhappily, experience leaves no doubt of that. But is there any nature in things in virtue of which it is ever possible to be right, otherwise than by a mere chance coincidence? Can an element of experience imply something beyond itself? If it can, Dr. Schiller's arguments about the paradox of the syllogism[1] fall to the ground. If it cannot, inference is not merely hazardous; it is, as inference, impossible; and what Dr. Schiller is talking about is not really inference but guesswork, and the only way of judging its value is to wait and see how it turns out.

But if there is something on which inference can be founded, it seems necessary to consider fully what that something is. There is no ground for enquiring only into a restricted type of it, say, into laws and cases, and neglecting system and structure. The emphasis on relevance as the true desideratum in Induction[2] shows indeed, as Mill also showed at this point, a tendency to escape from the limits of case-to-case similarity. Relevance implies, surely, the formulation of a whole of conditions, within which you can see the more or less intimate connection of the elements. It is an introduction to the logic of system. Intuition, I should add, used of insight within such constructions, is not liable to the criticisms which are fatal to it in its current application. Dr. Schiller's account of mathematical certainty shows an appreciation of this point, although he does not make it clear whether he conceives the method of mathematics to be syllogistic, and from some of his utterances I should imagine that he does.[3]

In short, the same thing is true here which we

[1] *Formal Logic*, p. 208. [2] P. 269. [3] Pp. 214, 249.

have seen to be true of Mill. The critic stands in principle on the same ground with what he is criticising. His view is confined to ascending and descending lines of inference; and in his polemic against what he considers the mistakes of abstract form, he does not think it worth while to advert to the question what there is in the experienced world which makes inference possible at all, and whether that character has hitherto been adequately portrayed.

And the same peculiarity reaches a climax in Dr. Mercier's brilliant treatise.[1] If a complete survey of this work came within my plan, I should have much to say of the acuteness which it displays in raising logical difficulties, and the vigour with which the author's own conceptions are pressed home. But for my immediate purpose in the present work, all his vigour and acuteness serve principally to throw into relief the fundamental point which I am endeavouring to make clear, and which his very courage and energy have only emphasised.

Dr. Mercier's acuteness, exercised upon the work of his predecessors in similar views, has saved him from some obvious pitfalls. But, in avoiding these, he has recognised facts which plainly reveal the bankruptcy of their common theory.

In his doctrine we still have the Logic of Consistency, that is, of Syllogism or Deduction, called Inference *par excellence*, and that of Truth, or Induction, or Empirical or Material Reasoning, as protagonists in the logical drama. But, though he verbally identifies Syllogism with Deduction, he is aware, apparently, of the fatal result, for his views, of treating mathematical reasoning as syllogistic, and so

[1] *New Logic.*

insists that this kind of reasoning is not deductive—he means merely, I think, not syllogistic. And if this is his meaning, I take it he is perfectly right. We noted Mill's paradox on this head, and Dr. Case's concession. So with the test cases of the serial type, $A>B$, $B>C$, $\therefore A>C$. He will not, with Dr. Case or Dr. Schiller, force these under major premises; and here again I take it he is perfectly right. Whether "substitution" is a satisfactory method of inference is a further question. I should say that he admits it to be a mere result of deductive insight; not, you can infer where you can substitute, but, you can substitute where you can infer. But the net result is this. We have on our hands Induction and Deduction (Syllogism) sharply opposed as before; but a great part of our knowledge falls under a third category, or more than one; and of this or these categories, and their moral for logical theory as a whole, we hear much less than we could wish. They suggest some form of inference genuinely outside syllogistic and linear limits, some non-syllogistic deduction and induction.

For Dr. Mercier, however, as for Mill, the protagonists, as we said, are Induction and Syllogism. Induction is the appeal to experience, and may be immediate by direct observation or experiment, but as a rule, is mediate. "Inference" may also be immediate or mediate, but mediate Inference (= Deduction or Syllogism) is the principal form of "Inference" discussed. The radical difference between "Inference" and Induction is that Inference starts from postulates only, and takes no account of truth or of experience, while Induction rests on experience alone.[1]

[1] *New Logic*, p. 204.

Inference consists in the explication of implications. It is therefore purely verbal. "The one statement is implied in the other; and the meanings cannot therefore be diverse. But the two propositions look at the same fact from different points of view. The attention is directed to different aspects of the same fact" [1] (cp. on Dr. Case's "identification" above). Implication, then, is confined to a verbal procedure, and can never hold from one meaning to another that is *bona fide* different. "In my view Deductive Logic is purely formal, on this ground, and in this sense, that it consists solely in casting the matter of the Postulate into different forms. The Postulate gives us the matter in one form, and the task, the sole task, of Deduction, is to convert the Postulate, or part of it, into another form and to ensure that the two forms are consistent with one another." [2] It is plain that such an account of deduction could not stand for a moment if mathematics were taken to be deductive. But Dr. Mercier, aware of this consequence, and admitting it, denies, as we saw, not only that mathematics are syllogistic, but that they are deductive.[3] I have said, that if by the latter term he only means the former, he seems to me to be right. But the fact of deduction in a non-syllogistic sense would remain for him to deal with as a form of the problem which I suggest that the enemies of the syllogism neglect throughout. There would seem to be, then, a nexus of inference which is neither syllogism nor induction, but might conceivably throw a light on both.[4]

But in any case, the careful reader of the above sentences will note, I think, that the attitude to

[1] *New Logic*, p. 246; cp. p. 302.
[2] *Ibid.* p. 261. [3] P. 328. [4] Pp. 209, 348.

implication is impossible, as the obvious slurring of the facts betrays. What is for me the root of all knowledge and reasoning is described in so many words as the same fact seen in different aspects—what I should call identity in difference—only to have its real import denied. Given certain premises you can go by deduction in Dr. Mercier's sense from one aspect of a fact to another,[1] *e.g.* from the aspect of Lord X, in which he was the priest's first penitent, to that other aspect in which he was a murderer. Only you must remember to say that the meaning is unchanged and the transition is purely verbal.[2]

Mediate Induction, "Empirical Reasoning," or "Material Reasoning" is the full opposite of mediate "Inference." It always appeals to experience in the form of a previous instance to which that before us is similar,[3] and has four terms to the three of the syllogism. "The reasoning may be represented thus; the mark ‖ being the sign of assimilation:

$$\begin{array}{ccccc} \underbrace{\text{Jenny Brown's illness}} & & \underbrace{\text{was caused by}} & & \underbrace{\text{foul drains}} \\ \| & & \| & & \| \\ \overbrace{\text{Johnny Jones's illness}} & & \overbrace{\text{was caused by}} & & \overbrace{(x)\ \text{foul drains.}''} \end{array}$$

This is the first and simple statement. The going round explicitly through a similar case, actually experienced, and compared with the case to be determined, is fundamental in the sharp contrast with "Inference." And we have seen that this, the distinction between cases and a rule, is the only possible distinction when you argue from similarity. You must go to previous cases, and the only possible

[1] Cp. Dr. Case's "identification," by which he explains mathematical reasoning.

[2] The example is mine.

[3] *New Logic*, p. 202.

question is whether you cite them, or go by the general impression they leave on your mind (a general rule). Dr. Mercier leaves no doubt on this head.[1]

Now my point here is twofold. First, to proceed upon likeness ties you down *ab initio* to linear inference, and secondly, taken as within linear inference, Induction and Syllogism, so far from being opposed, are the same process. The peculiarities which are alleged as distinguishing them are bound to vanish in proportion as the connection assumes a shape which can be operative. I will say a word on these two points.

(i.) Dr. Mercier puts the fundamental issue quite plainly.[2] "The formation of relations of likeness and unlikeness is at the base of all reasoning. In Induction the first step, upon which the whole depends, is the discovery of a datum, that is to say, the discernment of likeness between an element in the Problem [the case some point in which is to be determined [3]] and an homologous element in some proposition derived from previous experience. The next step is the establishment of identity, that is, of complete likeness, between the second element of the Problem and its homologous element in the Premise. The third step is the assimilation of the third element in the Premise to the Quaesitum. In Inference, if one proposition or ratio [4] or term is equivalent to or included or implied in another, the equivalence or inclusion or implication rests upon likeness, etc."

[1] See *loc. cit.* just below and cp. *New Logic*, p. 348.

[2] *Op. cit.* p. 348.

[3] See statement of terms and "ratio" (*e.g.* causation) set out on previous page.

[4] Dr. Mercier's name for what has been called the relating relation between the two terms of a proposition, as "was caused by" in the formula on previous page.

It is plain at once that this kind of inference is what has been described as linear. What you look for from the beginning is a similarity to a case before you, in an element of a connection which for some unknown reason was accepted in a former case in experience. Out of an element (term or " ratio ") in that previous connection you fill in an element in the connection, of which the starting-point is now presented to you. *Ex hypothesi* you do not examine the direct arguments and presumptions arising from the whole complex of conditions in the case to be determined. The appeal to similarity with a previous instance prohibits that course *ab initio*. But what is stranger, you do not examine them in the previous case either. Not a word is said of criticising or testing the " ratio " between the two different terms in that previous case, *e.g.* the illness and its cause. That is taken for granted, and you argue purely from the likeness between Jenny's illness and Johnny's illness to a cause of Johnny's illness resembling the cause of Jenny's. Is not the type of argument unmistakable ? You are applying to a new case a connection which you are under the impression that you have derived from past experience, and which as applied to a new case does the work of a general rule. Of course this is linear inference. There is no idea of testing the connection in either case ; no word of criticising it in its relations to the surrounding world of knowledge or of experience. And if, retaining the same method, you claim for the observed relation *constancy in experience*, you are merely referring to the same likeness as linking the first previous case with indefinite other previous cases as uncriticised as itself, in short, to induction by simple enumeration. There cannot be a shadow of doubt that this

reasoning works by applying an uncriticised general connection, on the ground of a resemblance of characters, to a new particular case. And that is linear inference; and so long as an argument is founded on likeness you cannot escape from it, if you adduce a million previous cases. You are forbidden in any one of them to test the alleged connection by a precise analysis of the case and its whole conditions, so as to ascertain the true constant relation.

(ii.) And my second point is, that this is essentially syllogistic argument, or what Dr. Mercier calls deductive.[1] Not that this account is strictly true of Syllogism or of any reasoning, because sameness and not similarity is their real principle. But as Dr. Mercier has told us, he offers it as representing the common basis of all reasoning; and we say that on this assumption *his* Induction is one with Syllogism.

To test this matter let us follow the fortunes of Jenny's and Johnny's respective illnesses from p. 201 to p. 209.[2] Is it not plain that by 209 the assimilation of Jenny's illness to Johnny's has become the subsumption of the latter under a universal relation of characteristics, causal, and constant in experience? But then, with the appearance of these characteristics, the relation is no longer derivable from Jenny's illness as given in experience. Constancy in experience certainly cannot be revealed by a single instance; nor can causation be so revealed so long as the connection of the terms is not specially investigated; and this falls beyond an induction based on likeness.

[1] Cp. the criticism referred to, *New Logic*, pp. 239 ff. Dr. Mercier's reply does not, I think, touch the point, which is, whether the universal is borrowed *aliunde*, or apprehended as intrinsic to the argument. His "constancy in experience," moreover, dissolves under criticism.

[2] And cp. p. 404.

What we have now arrived at is thus expressed by the author:[1] "In formal propositions we may state the argument thus:

"Since men have constantly in experience been found mortal,

and since Socrates resembles in respects material to the argument men who have died,

∴ Socrates will die.

In this argument will be found certain characters that are common to all mediate Induction, and that form the conditions of validity of all such Induction."

He has followed the same necessity which Mill followed in formulating his universal type of reasoning. I repeat Mill's formula for comparison.[2] "Certain individuals have a given attribute; an individual or individuals resemble the other in certain other attributes; therefore they resemble them also in the given attribute." Of course the phrase "other attributes" in the second clause implies a first set of attributes possessed by the "certain individuals" but not mentioned in the first clause.

It is worth noting that the qualifications "constantly in experience" and "material to the argument" betray a mind divided between two divergent considerations of which one must strictly be surplusage. What you want to know is whether the connection can be relied on to hold good. If you say "it is constant in experience" you tie yourself down, as we remarked above, to simple enumeration, and, of course, assert something that no case and no number of cases can, strictly speaking, tell you. If you say "resemblance in material respects" (and this or its equivalent is a very frequent expression of the author) you mean one of two things, which I

[1] *New Logic*, p. 209. [2] See p. 37 above.

do not think that the author habitually distinguishes. One is "in respects which are generally a reliable index of the remaining properties of the things in which they occur." Then you are appealing to the doctrine of essence or importance, and the allegation that, say, large numbers of men have died retains *some* bearing on the conclusion; because such index "respects" do not show directly that the possessors of these properties are likely to die, but only that what one such creature does, another is likely to do.[1]

This already goes beyond similarity in the direction of examination of the connection, but leaves *some* value to numbers.

The other is that you have direct reason to think that the "material respects" are indications of the predicate of the conclusion, here "liability to die," and not merely of a tendency to fare as other similar creatures fare. Then the mention of men who have died does not operate in the argument *at all*, and the reasoning ought to run; x (organisms ?) are sure to die, Socrates is x ∴ Socrates is sure to die. Obviously constancy in experience is of no use except as furnishing a presumption that the respects are material and the connection therefore reliable. But there can be little doubt that the respects being held material often operate as an unacknowledged presumption in favour of constancy in experience. *E.g.* it cannot possibly be said that no one has ever believed in a man's exemption from death; and I take it that the belief in a past absolute constancy of mortality itself rests to a great extent on a presumption that

[1] Dr. Mercier repudiates the idea of essence, but in trying to explain what he means is driven at last to the hardly less obscure term "nature" (*New Logic*, p. 217). He is there interpreting the "material respects" appealed to in the argument about Socrates cited above.

creatures like us must be perishable. In all these enumerative arguments the conclusion is very apt to get into the premise. In any case, we have it admitted that you argue in Induction (Dr. Mercier's Induction), not from a particular case previously experienced, the thesis from which he started, but from a universal connection, universal either by repetition or by some special necessity; the former of which transcends any single case, and the latter of which, if asserted on the basis of Induction through similarity, cannot be investigated.

The reasoning is plainly syllogistic; an application of a rule to a case.[1]

But here we are met by the author's reiterated complaint, "The Universal of Induction, as a relation found in experience to be constant, has never been clearly or consistently distinguished from the Universal of Deduction, which is a general rule postulated for the purpose of the argument."

Except for a single point, we have already seen enough to destroy this distinction; remembering that Deduction means for the author, not non-syllogistic synthesis or analysis, but syllogistic reasoning from a universal major premise. We have observed that the inductive connection, in proportion as it comes to be recognised and employed as a premise in its own right, becomes also determinate as between certain qualities (that is "universal") and sloughs off the peculiarities of particular cases. It becomes, in fact, a general law, and is used precisely as a major premise is used in syllogism.

And this is so in the psychology of inductive argument, as we might have said at once and cut the knot. The account of the use of instances from

[1] *New Logic*, p. 404.

experience on pp. 202-3 [1] recalls to us something that may sometimes happen, but it gives neither the true connection nor the normal fact. It is possible, if a detailed memory is awakened, to attach an argument about a case before us to a particular case in past experience, but as a rule it does not happen, and there is no reason for it. The connection is general from the first, even in the particular case, if there is one, which is recalled to memory. The connection between determinate qualities is inevitably general. And as to the fact, with all respect for Dr. Mercier's special knowledge, I cannot believe that a doctor who has treated perhaps a thousand cases of a certain ailment goes back to a particular past case in order to diagnose it in me.[2] The connection of definite qualities has established itself in his mind, and defined itself by a continual process of adjustment and correction, and he goes at once from certain determinate appearances to the cause or nature or treatment which they "indicate." Daily experience leaves no doubt on this head. In judging of the weather, or of the action of a familiar poison, or of the strains which different materials will bear, or of the temper of a public meeting, what expert ever refers back to a particular previous occasion? He possesses the connection gathered by selection and adjustment from a long and wide experience, and also from books, the sifted and generalised experience of others, and goes straight from the appearance to his conclusion.

[1] *Op. cit.*

[2] Not long since, a friend, who is a G.P. in a working-class district, permitted me to see certain generalisations which he had formulated after attending five thousand confinements. Am I to suppose he had in mind all the particular cases that had gone to form his conclusions?

So long as reasoning is linear, that is, relies on a determinate connection applied by subsumption as a premise, you cannot possibly distinguish the principles of induction and of syllogism.

But in deduction or syllogism, we are told, the universal is a mere postulate for the purpose of the argument.[1] "'The earth is larger than the sun' is a proposition having a definite meaning, and capable of entering into a logical argument, but it does not, to me at least, imply a belief in the statement made, nor do I in making it claim the assent of the hearer." "The[2] task of Inference is the extraction of the implications of propositions, etc."

The author has here made use of a special case to support an incorrect general inference, just as he did in attaching the reference to a previous particular instance to the application of an inductive universal. Judging in make-believe, or subject to reservations of many kinds, as in artistic fiction, or again in mathematics, is a well-known practice, the theory of which has been carefully studied. But to say that every general judgment, the moment you argue from it as from a premise, acquires so total a reservation that it ceases altogether to be an assertion, is surely the very madness of method. Indeed, the whole conception of ideas entertained and not affirmed I believe to be untenable.[3]

It is true that if Dr. Mercier told me that the earth is larger than the sun I should probably assume him to be speaking with some hidden purpose; but it is not certain that every one would make for every one the same allowance. The theory and usage are

[1] *New Logic*, pp. 26, 239, 404. [2] *Ibid.* pp. 194-5.

[3] See Bradley, *Essays on Truth and Reality*, p. 29; cp. my *Knowledge and Reality*, p. 146.

surely quite simple. A complete enunciative sentence is an assertion and the speaker is committed to it. Any reservation is indicated by some one of numerous conventions, of which inverted commas are the simplest, and the mere extravagance of the statement is one of the hardest to interpret. You can take any content of judgment as an assumption; as something prefaced by a "that" and as not asserted; but so taken it cannot strictly be expressed by a complete enunciative sentence, nor form a true unit of thought. Even the most extravagant proposition or one made under the completest reservation, expresses some amount of truth about things. Otherwise it could not be argued from. For the conclusion of an argument always follows not from the "postulate" alone, but from the relation of the postulate to fact. Otherwise there would be no conclusion, but the whole sequence of affirmations, conclusion and all, would be pure fancy. From "the earth is larger than the sun," as from any other proposition, nothing follows except by its relation to facts and to the system of the world in general. You may, if you specially desire to, *suppose* the premises, but if you mean to make any pretence of arguing, you must *draw* the conclusion. That is, you must find out what the premises demand, when combined within the system of such a world as ours.

It is, then, possible to use a proposition as a postulate from which to reason; but even so something more than the postulate, viz. the world of fact, has to be accepted before reasoning can take place. And in normal usage the universal connections applied to cases, which guide our thought and action every day and all day long, may indeed be truly said to be *taken for granted* as drawn from previous

experience,[1] but are certainly not *postulated* merely with a view to argument. The link between syllogism and induction by subsumption or similarity is the use, in both, of these relations which have been gathered from experience and possess no intrinsic necessity—no implication, visible at the moment of consideration, from any systematic complex.

And it is plain that the alleged distinctions between the two are untenable.[2] They obviously form a single class in contrast to non-syllogistic reasoning in which there is true deduction and demonstration; in which, that is, intrinsic necessity is operative.

And in any case, admitting postulation to be possible, it is a mere misconception by which Dr. Mercier labours to fix it on the premises of syllogism as opposed to the premises of induction. This feature really belongs, as it seems to me, no more to the one of them than to the other, and depends, so far as it exists at all, on the mere fact that they can both be used as examples in logical text-books.[3] This is one of the simple conventions which govern our interpretation of propositions. It is true that we do not demand truth to fact from an example in a Latin grammar or in a logical text-book. And we can see this character at once in Dr. Mercier's own instances of induction. Who supposes that the cases of Johnny Jones and Jenny Brown [4] are cases drawn as they stand from actual experience, and what possible difference can it make to the reader's understanding of the description whether they are so or not ? In a working induction, no doubt, we expect veracity from the exponent, though

[1] To which, as we have seen, they are seldom explicitly referred.
[2] Cp. *New Logic*. Answer to a critic, pp. 239-41.
[3] Cp. Joseph, *Logic*[2], pp. 254-5.
[4] *New Logic*, p. 202.

it must be remembered that his veracity or *bona fides* does not in the least guarantee that his examples are truly founded on experience, but merely, if assumed, save us some trouble in investigation by excluding one cause of error. All possible absurdities are founded on experience, if you believe their advocates, who may be perfectly honest. To determine the relation of an alleged fact to experience is a matter not of assurance but of methodical analysis, which is outside the process of subsumptive induction which Dr. Mercier is describing, and, as we have seen, is excluded by it. In analysing thought you must begin somewhere, and you cannot begin before your beginning. You might indicate an appeal to a different method as preceding, but Dr. Mercier's language, as we see, excludes such an appeal. With the syllogistic premise it is just the same; no more so, and no less. In a text-book example of a logical process we are illustrating forward, so to speak; we are taking up the description of an argument at a certain point for didactic purposes. We cannot begin before our beginning, and include in our analysis of the argument forward the proofs which lie behind the initial step. Dr. Mercier has taken the inductive premise as if outside the logical text-book, and the syllogistic premise as if within it. But if we come upon a syllogism in a serious economic or critical treatise, we do not suppose the premises to lose their quality of categorical affirmatives or negatives just because they are argued from. I think that there is a tendency to forget that the business of logic is not to *be* science or reasoning, but to understand and analyse them. In doing this, it necessarily breaks them up into specimens, which, as specimens must, differ in certain features from the complete construction which is being analysed. But

it is the latter, the actual argument as found in knowledge, and not the former, whose character has to be established by logic. And this character certainly cannot involve the denial of affirmative quality to propositions in so far as they are employed as premises in the actual body of knowledge.

It must be remembered that the suggested distinction is not one that could be produced by mere *bona fides* or detected by simple inspection. There is no point at which facts can be infallibly perceived as rooted in experience. When called upon to justify an affirmation you can only appeal to systems upon systems of propositions, describing the conditions which you hold to make the proposition reliable, and behind these the propositions which corroborate these first conditions. Dr. Mercier speaks as if to establish that a statement is founded on experience were as simple a matter as to believe in a witness's veracity. But veracity is no guarantee of competence, and can itself only be established on the whole by reasoning from our systematic knowledge to the substance of what is alleged.

It appears then to me to be plain that in principle subsumptive induction—induction from similarity of repeated cases or by simple enumeration—is of the same class as syllogism, and that both are in contrast with true deduction or demonstration which come under the category of systematic reasoning. The doctrine of implication has to be freed from the limitations which have been imposed upon it, and has to be recognised as applicable to the whole of systematic reasoning, and beyond that, to all argument in which any presumption of necessity or causation is traceable. All this is suggested by Dr. Mercier's exposition, and is rendered inevitable, I think, by the

failure of the attempt to hold apart the provinces of syllogism and induction, and to restrict implication to meaningless formality, combined with the just recognition of non-syllogistic inference in certain serial arguments and in mathematics. The principle of mathematical reasoning for him is quantitative analogy. I do not suppose that this would cover the ground of the facts of non-syllogistic deduction.

If the story of induction by enumeration had ended here, I do not know that it would have been worth the telling.[1] But it is a remarkable fact that among very distinguished philosophers whose modes of thought differ profoundly from each other and from those above mentioned, the same conception has reappeared, inset in quite other philosophies than that of its origin. I have in mind M. Bergson, Mr. Russell, and Dr. M'Taggart.[2]

I have discussed M. Bergson's doctrine in another work,[3] and need here only point out that it is a view expressly hostile to intelligence. Intelligence, for him, deals naturally and solely with repetitions. Its function is to bind the same to the same. The probability of a connection affirmed on inductive grounds is according to such a view proportional to the number of cases in which the alleged connection is precisely repeated. As repetition is never precise, and as the doctrine attaches no importance to the extension of a principle by adaptation over a widening area of

[1] I do not mean to be discourteous to Dr. Schiller and Dr. Mercier, but the former, I am sure, is not specially interested in the question, and the value of the latter's brilliant book is due to his beginning to diverge from the doctrine.

[2] Dr. M'Taggart's attitude appears in separating the *a priori* sharply from the empirical implication, and making the latter dependent on repetition. *Mind*, No. 95, p. 330.

[3] *Logic*[2], ii. 174.

experience, and over an expanding field of differing constituents, it naturally throws a disparaging light upon the intellect as in the main an observer of tautologies. I should imagine that the conception has in this case arisen independently of the English inductive school, and rests on a deep foundation of imperfect logic derived from the "imitation" theorists of the school of M. Tarde.[1]

Mr. Russell's doctrine again, and of course that of Dr. M'Taggart, differ fundamentally from that of Mill in not suggesting that the inductive principle can be proved by simple enumeration. They are agreed that if the conclusions of induction are to be valid, it must rest on an *a priori* principle. Linear inference still in them has its independent basis apart from any other, but is founded, not on a continuation *ad infinitum* of itself, but on an *a priori* principle specially appropriated and framed for it.

But what survives in this doctrine, and, as it seems to me, in a form that suggests inheritance from Mill,[2] is the peculiar nature of the experience to which it takes the degree of inductive probability to be proportional, with the result, I think, of a needless specialty and isolation in the *a priori* principle to be assumed, and of a serious failure to unify the doctrine of inference.

Mr. Russell's statement [3] of the problem of induction begins with the opposition of past and future. "If we are asked why the sun will rise to-morrow, we shall naturally answer, 'Because it always has risen every day.' We have a firm belief that it will rise in the future because it has risen in the past."

[1] See my *Logic*[2], ii. p. 240.

[2] Russell, *The Problem of Philosophy*, p. 94, "a sign of . . ." recalling the phrase *nota notae*.

[3] *Op. cit.* pp. 95 ff.

We may refer our belief further to the laws of motion, "but the interesting doubt is whether the laws of motion will remain in operation until to-morrow." "The *only*[1] reason for believing that the laws of motion will remain in operation is that they have operated hitherto, so far as our knowledge of the past enables us to judge." "The real question is, do *any*[1] number of cases of a law being fulfilled in the past afford evidence that it will be fulfilled in the future?"

He distinguishes the cause of expectations from the reasonable ground for them. "The[2] mere fact that something has happened a certain number of times causes animals and men to expect that it may happen again." Then we come to the recognition that the reference to the future is not essential. "The question[3] we really have to ask is, 'When two things have been found to be often associated, and no instance is known of the one occurring without the other, does the occurrence of one of the two, in a fresh instance, give any good ground for expecting the other?'" The reign of law[4] cannot be used to prove the certainty of induction, for it is itself only probable, and our belief in it rests on the very principle we are examining.

This is the principle of induction, and is stated in two forms, as regards a single fresh case, and as regards a general law. I quote the latter.

"(*a*)[5] The greater the number of cases in which a thing of the sort A has been found associated with a thing of the sort B, the more probable is it (if no cases of failure of association are known) that A is always associated with B.

"(*b*) Under the same circumstances, a sufficient

[1] Mr. Russell's italics. [2] *Op. cit.* p. 98.
[3] P. 101. [4] P. 102. [5] P. 104.

number of cases of the association of A with B will make it nearly certain that A is always associated with B, and will make this general law approach certainty without limit." I will add an observation from the chapter on *a priori* knowledge. "Thus[1] our knowledge of the general propositions of mathematics (and the same applies to logic) must be accounted for otherwise than our (merely probable) knowledge of empirical generalisations such as 'all men are mortal.' The problem arises through the fact that such knowledge is general, whereas all experience is particular." The principle of induction is, as I understand, an *a priori* principle.

The points which concern my argument in the doctrine thus exhibited are reducible to two—

(i.) The relation between number of cases and inductive probability, and

(ii.) The consequent specialisation of the form given to the *a priori* principle of induction.

It is my object to show that (i.) inductive probability depends rather on the unification of a region of experience than on the number of cases in which similar conjunctions are repeated, and that (ii.) the principle of induction is not a separate and special *a priori* principle, but the fundamental assumption that the universe is a connected whole; and that therefore, though it may be called *a priori*, it is not *a priori* in the sense in which supposed separate axioms, considered to be severally self-evident, are *a priori*.

(i.) The assumption is *ab initio* that experience is of particulars only. This governs both α the type assigned to inductive belief and β the character assigned to the instances on which it is held to depend.

α. It is assumed that if we are asked why we believe

[1] P. 131.

that the sun will rise to-morrow, we shall naturally answer, "Because it has risen every day." It is pretty much a chance what an unreflective person would answer, but I should say that a better answer, and one equally likely, would be, "Why not?" That is to say, if the world in general is going on, why, apart from any special menace, pick out the sun [1] as likely to stop? Our beliefs through natural induction do not depend, I think, on conjunctions separated from the context of our one world, each series within itself, like successive couples of chain-shot, having no internal structure, and interwoven with no general scene and background. No experience, I should affirm, is particular, but every one is general; and a more careful observation of natural inductive beliefs reveals this feature within them in a degree which has logical importance. From the first, the beliefs we form do not embody tautologous repetitions, but ideas or practical readinesses extending through considerable variations of context, and including systematic modifications.[2] And besides being systematic within, they are interwoven in a system without. They are established on the presupposed basis of the whole normal world,[3] from which it is not logically nor factually correct to dissociate them. The argument is in effect: "If all this goes on, why not that which seems to be inseparable from it, unless you can show a special exception against it?" If you suggest that perhaps nothing is to go on, that surely requires very special explanation and motivation. It might be

[1] Or the earth's rotation.

[2] Bradley, *Principles of Logic*, p. 302. I think this feature of association—that it is a general connection—is logically important, and that natural induction is treated far too much on the lines of particularised memory; see above on Mercier's view, p. 54.

[3] See Bradley, *Appearance*, p. 602.

questioned whether it has any meaning.[1] The more the systematic connection includes, the more force this contention acquires, as *e.g.* if we refer the sun's rising to the laws of motion. The sceptic may be asked, Do you admit that anything goes on, and, if so, why select, whatever you do select, as in danger of stopping ? [2]

β. We notice that the instances, on the repetition of which inductive probability is held to depend, are described as connections of " things " or " sorts of things " (this recognises the non-particular nature of experience ; *every* experienced connection is between sorts of things) and have effectiveness through their numbers. It is striking that the introduction to the argument should state it as a question of past resembling future, a phraseology soon abandoned.

This makes a considerable difference in estimating the logic actually used in the argument. " Will the future resemble the past ? " assumes that the past is solidly given ; while we know that as a rule it is not, and the constancy of the past experience is itself constructed by the same means as the resemblance hoped for from the future. We are not in possession of detailed experience that all men have died. We assume it on the ground of very various experiences and very complicated presumptions. It has not been an absolutely unopposed conviction. Thus even in the most commonplace causation of beliefs, numbers

[1] As Bergson has in fact questioned, *L'Évolution créatrice*, p. 318.

[2] It is important, I think, *not* to put the improbability of an apparent change or lapse in the world system supernaturally high. To do so weakens our argument, by introducing an element of the miraculous. Our expectation of *de facto* constancy is relative to the exhaustion of possibilities by our positive knowledge, and that, I presume, is very trifling. Still change, like persistence, can only be rationally suggested by positive knowledge.

play a smaller part than we are apt to suppose. The alleged numbers of instances belong to the conclusion nearly as much to the premises.[1]

And if we examine the question rationally the point is still clearer. What can a tautologous repetition possibly teach us? If we note a repetition under changed conditions, then of course it is a help to abstracting the true form of the repeated connection from the complex of circumstances. But apart from this it is surely plain that mere repetition does not and cannot advance our conviction. By the hypothesis we have had AB before, *the* very conjunction which we are to learn to believe in as a connection. Where this is assumed, there can no longer be a question of elimination of error. It is, then, *ab initio* what we are looking for, and what can be the use of giving it us again? What happens in fact is that we assume a real connection of qualities everywhere; and that which seems constant through varying conditions, or adapted in application to them, appears most likely to approximate to the real one.

(ii.) The principle of induction, in the form cited above,[2] embodies in itself the appeal to number of repetitions.

It therefore appears to me to deviate from the true ground of inference in two respects, by claiming for itself *a priori* truth or self-evidence within its four corners, and by offering support to an inductive belief which rests on an accumulation of particular experienced conjunctions. If the character of experienced conjunctions were carefully scrutinised and the ultimate ground of knowledge considered in its full import, I believe that this recurrence to a linear scheme of

[1] See Joseph, *Logic*[2], p. 422.

[2] P. 62. Cp. *Problems of Philosophy*, p. 167.

inference would appear unnatural and contrary to logical unity.

Mr. Russell refuses, as we saw, to rest inductive probability on the reign of law, because in his view the reign of law itself is only probable and rests on the ground of inductive probability, which for him is an *a priori* law. But all that is needed for the basis of inductive inference is surely taken for granted when we assume in any form that the whole of experience furnishes a criterion, which we cannot doubt, for all its details.[1] This is a position which we know cannot be denied without self-contradiction. If so, we have only to say, what follows from the above, and what Mr. Russell has implied elsewhere,[2] that about everything there is a true proposition, whether we know it or not; and to add to this that an expansion towards totality is a guarantee of relative approximation to the truth; and we have all that is required for genuine induction. We thus get rid of the disorderly crowd of *a priori* principles, and we understand that the degrees of self-evidence, which Mr. Russell most suggestively mentions,[3] are simply degrees of implication in the whole system which is the ultimate criterion.

Induction then ceases to be, in accordance with the linear scheme of reasoning, a weakened syllogism proceeding on a connection drawn through similarity from previous cases, and returns to its natural place as the procedure by which—a universal connection being in every case assumed[4]—any suggested connection is tested and modified according to the support or modification which the whole system of experience offers to it. Any special inductive principle, drawn

[1] *Lowell Lectures*, p. 67.
[2] *Problems*, p. 89.
[3] *Ibid.* p. 183.
[4] Joseph, *Logic*[2], pp. 406 ff.

so as to justify an enumerative procedure, falls to the ground with the enumerative procedure itself.

The general character of the criterion is traceable from the first in the natural expansion of experienced connections towards systematic completeness, just as even with animals, even in what would be set down as the mere causation of associations, they are much less particular and much more capable of including adapted variations than is commonly observed.[1]

And the sharp distinction between the empirical and the *a priori* universal [2] is also untenable, as indeed the admission that self-evidence has degrees very strongly suggests. It is not necessary to show that any of the simpler *a priori* principles are practically doubtful. It is enough to point out that all of them owe their self-evidence to their extreme simplicity and distinctness, and that it is altogether illogical to assume their truth apart from existence—the existence, for example, of the universe. It is enough to rely on the insight that nothing is really certain except the whole, for it is impossible to say that apart from the conditions which the whole furnishes, anything would be what it is.

On the other hand, in order to maintain the unity of the method of knowledge, it is not necessary to claim for empirical universals any degree of intrinsic certainty which is usually denied them. It is enough to say that all of them represent a presumption forced upon us by the order of our experience, that we have in them the best approximation which our present resources afford to the intrinsic connection which we divine and which our entire experience is an attempt to approach. None of these are given as a linkage of separate solids. All of them are selections out

[1] Above, p. 64.

[2] *Problems*, p. 167.

of the mass of a vital and indivisible whole, which persists throughout and underneath the connections which we trace in it. And it may be said that in a sense the concrete experiences which carry the higher values are more certain than the simpler and more abstract relations which we are apt to call self-evident, because they carry with them more of the whole.[1]

The linear scheme of inference naturally leads to a disruption of the theory of reasoning, and with that to an isolation of *a priori* principles from each other, and of the whole *a priori* world from the whole of that which is called empirical—of certainty from value. And this I believe to be a profound philosophical error.

[1] Cp. *Principle of Individuality and Value*, p. 51.

IV

IMPLICATION, PRESUMPTION, AND *A PRIORI*

We have noted the broad distinction between a theory of inference based on implication, and theories which, however critical of the syllogism, in truth confine themselves within its characteristic principle of subsumption under a borrowed premise.

We are now free to develop the idea of implication as it operates, under the various circumstances which experience offers to us, at all points between the extreme poles of the regions which have formerly been known as those of necessary and contingent matter. Our guiding notion is perfectly simple. It is to trace the fundamental character of inference throughout our efforts to establish truth, on the hypothesis that it is essentially the same with the principle in virtue of which we affirm unhesitatingly that if a triangle is equilateral it is equiangular and *vice versa*, that $2 + 2 = 4$, or that the same thing cannot possess differing qualities except in distinct relations.

In the present chapter I shall attempt to make quite plain what I have in mind by help of a graduated set of examples, briefly commented on in passing; and then, as I hope, further elucidated by a short

discussion of a divergent opinion offered by a first-rate logician.

I will begin in the middle, so as to hit, I if can, the meeting point of extremes. Thus I hope to start with cases which are both important, as representing practically all the inferences we use from day to day, and illuminating, as exhibiting the common nature which links *a priori* necessity at the one extreme to the faintest presumption of rationality at the other.

1. I offer three examples from this middle region. The principle to be illustrated, it will be remembered, is that within any complex of terms and relations, which is distinctly before our apprehension, connections can be seen as between antecedents and consequents which are necessary and relatively *a priori* so long as that complex is assumed.[1]

I have previously suggested [2] that legal or political systems form an excellent hunting ground for examples of inferential necessity outside mathematics and formal logic. Such a case we may observe in the British Constitution when analysed as a complex governed by the fact and principle of the rule of law.[3]

The logical point is, that in order to apprehend the relative necessity of a number of connections between antecedent and consequent which arise within such a complex, it must be envisaged as an organised whole, in sufficient detail to render the reciprocal operation of its parts or factors intelligible.[4]

Thus in this example you have presented a com-

[1] On the distinction between such connections and the bare facts of the complex, see below, pp. 73 ff.

[2] *Logic*, ii. p. 18.

[3] See A. V. Dicey's *Lectures Introductory to the Study of the Law of the Constitution*, 1886. I am taking the system as Prof. Dicey presents it, and am not writing as a politician or social reformer.

[4] Cp. p. 8 *supra*.

munity of persons with a machinery for self-expression through a legislature, by which self-expression called the law, and by it alone, authority to control the actions of individuals is conferred. For every act of authority some one, *e.g.* in the case of the Crown a Secretary of State, is responsible, and no agent of authority can be protected, say, by superior orders, from liability to answer before an ordinary law court for action which may violate that communal self-expression. Thus no individual can be interfered with, to use the most general expression, except in the name of the law; and if he suspects that the agent of authority has overstepped the law, he has his remedy by stated processes, open alike to every one.

From such a complex we can read off as a necessary connection that if administrative authority becomes oppressive it can appeal for support to no separate and peculiar law of its own, such as in some countries protects official conduct. Its agents are liable to actions before a judge and jury, by the same law and procedure as every man. Or more generally, if the actions and demands of the administration conflict with a judge's construction of the law, the ordinary law, it is the latter that prevails and takes effect. This consecution can be exhibited in many problems; for example, in issues affecting personal freedom, or the right to freedom of discussion, or the right of public meeting or other analogous rights.[1] It is not the case that they are recognised in a constitution of this type by particular legal provisions, and they are better secured by not being so. They are not special concessions conquered one by one from an autocratic power. They follow from the rule, and the restric-

[1] Cp. *Lect.* VI.

tions on them are the exceptions, enacted in special relations in order to avoid in each case (I am not speaking in legal phrase) some particular nuisance to the public. The rule, or general nature of the complex, is as we have said that no one can interfere with others except in virtue of a law.

It is interesting to observe how the spirit of this complex carries with it such a proposition as that if the " conventions of the Constitution " are violated (for example, the obligation on ministers to summon Parliament at least once a year, itself not a law, that is, not a rule which the Courts will enforce) a violation of the law of the land must quickly follow.[1] The communal self-expression, one might say, is a life, and needs periodic renewal. In the absence of such renewal, the most dutiful of public servants will be found to be acting illegally in the discharge of their everyday functions, as for instance in drawing money from the Treasury to expend on public service.

I note that our principle of implication might be caricatured by the observation, " Why of course—if the complex is so, all its details are so as long as it is so; that is a tautology." But our principle is not this; it is that if the complex is so, then as long as it is so certain universal connections within it must be so, not because they are given so, but because, in the conditions which are given, and reality in general being what it is, they imply each other. We can see what details are mere fact compared with these connections, as we can see that the size of a triangle does not affect its properties *qua* triangle. Such connections of reason and consequent are not necessary to our eyes in the fullest sense which can be given to *a priori* necessity, that is, as incapable of

[1] *Ibid. Lect.* VIII.

being conceived otherwise even if we have regard only to the general characteristics of any possible universe. But for all that, if we duly apprehend the complex we are considering in its spirit and the relations of its constituent terms, assuming our general knowledge of civilised human nature, we shall have insight that they are not mere fact, but within their sub-system of the world are necessities and relations *a priori*.

Here is an instance which I take from Professor Dicey's work,[1] which shows the nature of the complex maintaining itself where a layman would scarcely expect it. A Board of Trade inspector, in what he holds to be the discharge of his duty, detains a ship from going to sea. If the ship-owner thinks the inspector has gone beyond the law or acted in any way informally, he may bring an action against him, and if a jury, probably sympathetic to ship-owners, holds that the law does not bear out what has been done, the action will succeed. Of course such a feature of our system is not necessary with geometrical necessity, but it rests on an implication seen to be inherent by those who understand the complex, and could only be defeated by a special provision of the general law, which could only be made, *ex hypothesi*, in the public interest.

Thus it is not a matter of principle whether the facts in the complex are all of them guaranteed externally as data, or are in some cases arrived at primarily as conclusions of inferences from the system. Only, as data, vouched for, that is to say, simply by evidence, they can possess neither full meaning nor full certainty. For, for all the evidence can tell us, they may be so to-day, and not so to-morrow. But

[1] *Op. cit.* p. 203.

when apprehended in their systematic connection they are seen to be objects of a very strong presumption consisting in the perception that they cannot change, or cannot change in their central features, unless the complex also is to lose its distinctive character. Within the system every element, however capable of being given as a datum, is also clothed with an inferential character, and whether it is first apprehended on the strength of an inference or on the strength of factual evidence is historical accident. The following example will place this characteristic in a strong light.

A description,[1] which seems to me exceedingly clear, of Harvey's great discovery, sets down eight points especially as " proved " by him in his treatise on the Circulation of the Blood. I do not know, except in a single case, which of these points he established by direct observation, and which by inference. All of them severally, as it appears to me, might have been established in either way, though of course not all at once could be established by inference. But it happens that one of them, though subsequently corroborated by observation, was reached by Harvey, we are expressly told, through inference alone.

This point was the fundamental one—by itself almost a theory of the circulation—that the blood in the arteries and the veins is the same blood; that is to say, that it, or most of it, runs through from the arteries into the veins, instead of belonging, as had previously been supposed, to separate systems by which different kinds of blood were circulated through the veins and arteries from the right and left ventricles respectively. Harvey, we are told, himself

[1] *Ency. Brit.* art. " Harvey," by Dr. Pye-Smith.

never saw the " capillary channels " by which the blood actually passes from the arteries to the veins. They were first observed by Malpighi in 1661 through the newly invented compound microscope.

Other essential points, in correction of previous opinion, were that the heart by its muscular contraction was the motor power of the circulation; that there was no passage for blood through the division between the chambers of the heart, so that the whole of the blood passes from the right to the left ventricle through the lungs and not through the interior of the heart; and, by combining this point with that above mentioned as in the first instance inferred, that the whole of the blood in the left ventricle is driven by it through the arteries of the body into the veins, by which it returns to the heart.

It is the logical interest of this investigation, as I see it, that it looks, *prima facie*, as if the investigator had really nothing to do but to observe and set down each of the eight points (which nevertheless the account I am quoting rightly says he " proves ") in order to demonstrate the whole character of the complex, that is to discern the " circulation of the blood." Yet the logical position of the one essential point which we know that he was unable to observe, is enough to compel us to discriminate the logical position of all the other points as members of the complex from their logical position as facts of observation or experiment. *If* there is to be a lesser and greater circulation (pulmonary and systematic) there must be in the system a double force-pump such as the two ventricles of the heart. *If* the blood is to be oxidised by passing through the lungs, it must not make its passage through an opening inside the heart. *If* the veins are return pipes to the heart, it

is natural that they should have valves such as to check an outflow. *If* it is the heart beat that drives the blood, it is natural that there should be a pulse keeping time with it. These and such as these are the systematic relations of the terms within the complex, and it is plain from the instance of the passage between arteries and veins that the explanation of the relations would have sufficed to prove the existence of particular unobserved terms with a certainty which would grow in proportion to the total establishment of the data by observation or experiment.

On the other hand, the observation of all the terms one by one would not in formal necessity have carried the explanation with it, although in this felicitous instance it seems to us after the fact that the nature of the whole explanation was exhibited to direct insight within the operation of every member of the system. And yet such direct observation as had been made in the previous history of science had failed to establish anything approaching to the system in its true character.

Thus we may say that implication within such a complex not merely establishes connections of the terms having a relative necessity, but along with that both confirms their existence and establishes the true character in which they exist. Observation establishes their bare existence as a something or other, but apart from insight into the complex gives us no security that we are apprehending the constituent members as they really are. Our common convictions about objects or occurrences which possess any degree of organisation or any correlation of factors, in short, about all matters about which we usually think it worth while to think or reason, are inferences from implications within systems somewhat of the type we

are considering. They are not subsumptions under a general rule which we have somehow previously acquired. They are inferences from a character which we rightly or wrongly presume in some group of terms and relations presented to our constructive apprehension, reinforced, of course, by all isolated rules of connection which we have learned before.

My third example I draw from a recent line of speculation which has influenced me considerably in the present argument.

"Propositions," it has been said, "such as '$\alpha + 1 = 1 + \alpha$,' 'a judgment cannot be coloured,' 'of any two tones differing in quality one must be lower and the other higher,'[1] 'a perception is in itself a perception of something'—such propositions are not expressions of empirical fact. On the contrary, we can recognise with complete insight that they at once enunciate and explain matters which have the character of givenness for intuition which deals with essences."

I select from this train of argument what seems to me a striking example as the third illustration of what I mean by an implication which we simply "see" within a complex distinctly apprehended.

It belongs, we are told by the same author,[3] essentially and necessarily to the perception of a "thing" to be inadequate. A "thing" can in principle not be given otherwise than "onesidedly," in such a way as to suggest possible manifolds of perception, which, passing continuously into each other, focus themselves into the unity of an apprehension,[4]

[1] This does not seem to allow for differences of timbre.

[2] Husserl, *Jahrbuch* for 1913, 1, pp. 38-9. [3] *Ibid.* pp. 80 ff.

[4] *I.e.* as I understand him, there is always the single thing before us in perception, but yet we know that it is merely a selection out of infinite possible modifications of its appearance according to points of view.

in which the "thing," having continuous duration, is perpetually exhibiting fresh "sides" in freshly occurring series of modified appearances. . . . "In principle there always remains a horizon of determinable indeterminateness, however far we proceed in experience, however ample continua of actual perceptions of the same thing we have traversed. No God can modify this, any more than he could the truth that $1 + 2 = 3$, or that any other essential truth subsists, whatever it be."

"The tone of a violin,[1] in all its objective identity, is given by means of nuances;[2] it has its varying modes of manifestation. They are different as I am nearer to the violin or further from it; as I am in the concert-room itself or listen through the door, etc. No mode of its manifestation can claim to rank as the absolutely dator[3] one, although one in particular has a certain pre-eminence as normal in the frame of my practical interests; in the concert-room, at the 'right' point I hear the tone 'itself' as it 'really' sounds" (so too of the "real" form, colour, etc.). "But this only points to a sort of secondary objectification within the total objectification of the thing, as we can readily convince ourselves. If we preserved only the 'normal' mode of apparition, and severed off the remaining modes of manifestation and the essential relation to them, nothing would be left of what we mean by the givenness of the thing."

All this is put forward as the content of a necessary or essential insight. It is not *a priori* as inherent in every conceivable universe. It is a necessary connection perceived by distinct contemplation of an object whose character is clear to our apprehension,

[1] *Ibid.* pp. 81-2. [2] *Abschattungen.*

[3] = primary and exclusive source of data.

and holds good in as far as and as long as that object is the basis of our judgment.

The implication here described is of much the same type and degree as that which was illustrated by the two previous examples; and I have emphasised it partly in order to exhibit the affinity of my view with that of Husserl, from whose conception of essential insight, together with Mr. Bradley's of intuition as a factor in inference, it is to a great extent derived. It is of great importance that the theory of inference should do full justice to what we can judge and rationally presume from the structure of objects before us, and not exaggerate our dependence on borrowed premises, the precise conditions of which, by the mere fact that they are borrowed (as in all linear reasoning), are protected against analysis. I believe that throughout the whole region of our daily inferences the element of direct insight into connections is much greater and that of arguing from mere previous experience is much less than we are commonly taught to suppose. By " mere previous experience " I mean to distinguish conjunctions which we accept simply because they repeat what has happened before, from connections which previous experience has taught us to apprehend on their own merits. And now in searching for a conviction based on mere previous experience I cannot readily find one—always a danger-signal in logic that one is giving too much weight to the supposed phenomenon which one is trying to illustrate. I had in mind to allege the occurrence of frosts in April and May as a mere previous fact, as a ground for protecting plants against frost during those months. But it would not do. It is so plain a presumption that in the English climate frosts of a certain type may naturally continue for some time after the

spring equinox that we cannot be said to believe in them simply because they have occurred before.

When we get into the region of the properties of substances and idiosyncrasies of organisms the operation of insight is less traceable; but yet we almost always feel, I believe, that our data of observation are in the main a filling up of places which the general scheme of structure prescribes. We do not know apart from observation how a particular organism breathes and feeds; but we know from the nature of the relation between organisms and their environment that in some way it does both. We do not infer it from having seen it in particular instances before. We have learned from a study of cases under their conditions how organisms must live in the system of nature as given.[1] This is quite a different logical procedure.

2. Where data which *prima facie* belong to a connected group furnish no unambiguous presumption as to the nature of the universal connection between them, it may be possible nevertheless to satisfy in some degree the conditions of knowledge by testing alternative presumptions, supposing that these can be furnished.

This process involves the use of explanatory hypothesis, which may be supplemented by direct observation, or by any procedure which is equivalent to it[2] so far as establishing the presence or absence

[1] Cp. Kemp Smith, *Commentary to Kant's Critique of Pure Reason*, p. 40: "Assertion of a contingent relation is not equivalent to contingency of assertion. Colour is a variable quality of the genus horse, but the individual horse is necessarily determined in some particular mode. If a horse is naturally white, it is necessarily white."

[2] In referring to this factor of inductive procedure below, I shall omit, for shortness' sake, the words "any procedure which is

of particular data. We shall see, however, that explanatory hypothesis and direct observation contribute in very different degrees to satisfying the conditions of knowledge.

We may describe the process at two characteristic levels, understanding that innumerable degrees of operation of the respective factors, and consequently of scientific value, are summarised under these two types.

a. Our knowledge of the data, while not affording an immediate and unambiguous insight into their relations, may yet be sufficient to furnish a rational presumption which may be fused with them by mediate deduction, or to suggest certain alternative possibilities, the decision between which will remain to be made by direct observation.

The former sub-case differs only by its character of a mediate operation, often very elaborate, from the cases of direct insight which have been previously discussed. It does not in principle demand the observation of the presence or absence of data in the sense in which that becomes necessary when a decision is needed between alternative possibilities. It may be expanded by further observation under the guidance of its own development, but there is nothing to prevent it from exhibiting a complete fusion with the data as they stand when the problem is first proposed. Its scientific certainty then rests upon the degree of such fusion, which when complete is called verification. It is on the clear and close inter-connection of data and explanation that the truth-claim of an explanatory theory reposes. We will speak of a view differing

equivalent to it." The reference is to such a procedure as removing an essential condition of a suspected cause, when the latter itself cannot be reached.

from this when we have completed our survey of the cases.

The second sub-case is that in which the specific content of the data furnishes a rational presumption of a general kind, sufficient to guide investigation, but only as a basis of alternative suggestions, for discrimination between which recourse must be had to a further test. This further test depends upon a further rational presumption of a very general kind, not that arising from the specific content of the data, but that arising from demands as to co-presence and co-absence of phenomena, due to the nature of universal connections. Effect is given to these demands by the method of direct observation, and by this means hypotheses which truly represent universal connections of phenomena may be distinguished from alternative hypotheses whose truth is excluded by the facts.

I will refer briefly to a couple of examples from Mr. Joseph's *Introduction to Logic*, not attempting to reproduce his full and clear analyses, but merely noting the points which bear on my argument.

There are frogs which change their colour from time to time.[1] In looking for the cause of this phenomenon, the first step is to establish the occasion on which the change occurs, and here Mr. Joseph points out that the field of suggestion *ab initio* is unlimited, and that the inquirer naturally restricts himself to such suggestions as might occur to a biologist (*i.e.* such as specific knowledge indicates to be possibly relevant), of which he gives several examples. A number of these being disposed of by direct observation, according to the tests of presence and absence of the phenomena suggested to be connected, we reach " the only reasonable suggestion left "—note the expression

[1] Joseph, *Introduction to Logic*[2], p. 445.

—namely, that which connects the change of colour with the colour of the surroundings. Further hypotheses as to the *modus operandi* of this connection are put forward, and one of these, otherwise not unreasonable, being excluded by the same test, it remains that the colour-change involves the stimulation of the eye by light. Here two alternative interpretations of this condition are further suggested, awareness of colour and a reflex mechanism. Awareness of colour is excluded by observed colour-change in a blind frog, and the suggestion of nervous excitation through a reflex mechanism as a circumstance common to the blind frog and the normal frog when changing colour is accepted *pro tanto* as the cause and noted to be in harmony with other biological facts. A further suggestion, partly deductive, is applied to link up the nerve-stimulation with the colour-change, and a fair case for the connection of these two phenomena is held, as I gather, to have been made out.

The abstract scheme repeated throughout the argument [1] is disjunctive. "The cause of x is a or b or c; it is not b or c, therefore it is a." This is applied to successive sets of alternatives, narrowing each of them down to a point at which one, or it might be more, survive and are affirmed (if more than one, affirmed as cases between which the facts as so far known are not decisive). The alternatives proposed, it will be noted, depend in this example absolutely and entirely on biological knowledge, both for being suggested at all, and for being warranted to form an exhaustive disjunction. The elimination of alternatives is due to direct observation together with the rules of presence and absence which flow from the

[1] Joseph, *op. cit.* pp. 441 ff., and see below, p. 84.

nature of universal connections.' But the conclusion from the elimination to the truth of the surviving alternative depends entirely on the specific presumption embodied in the series of disjunctive major premises, that there are no possible alternatives beyond those which are here considered. It is the distinctive character of all ordinary reasoning of this type to depend in this way on the specific presumption which alone can affirm a fusion between the surviving alternative and the phenomenon to be accounted for. An independent negative proposition, disqualifying a wholly different cause, can have no possible effect on the positive intrinsic content of the surviving alternative. The suggestion of a positive connection of content between *a* and *x* is derived altogether from the biological presumption embodied in the disjunctive major premise.

And here, therefore, is apt to be the weak point in arguments of this type. In the example before us a supplementary deductive reasoning is adduced to strengthen this very link—to show by what means nerve-stimulation could affect an animal's colour. And in the case of Brown-Séquard's experiments [1] on guinea-pigs, what is to my mind logically remarkable is not so much that the method is to exclude alternative explanations, as that, in Romanes' judgment, when the alternative explanations seem to be excluded, the hypothesis which was to be established still remains "rather unassailed than proved," or "less probable [because of its imperfect coincidence with the phenomena] than" those excluded.[2]

[1] *Ibid.* pp. 449 ff.

[2] Joseph, *Logic*[2], p. 451, and Romanes, *Darwin and After Darwin*, ii. 113, for the general conclusion about "the Lamarckian interpretation of Brown-Séquard's results." Romanes, *op. cit.* p.

I take it, that is, from Romanes' language,[1] that this is because the facts are, in the one case, "highly peculiar," and in the other, not fully correlative, that is to say, the surviving causal alternative is not in itself a constant and precise relation. It seems as if no elimination which is not corroborative of a clear explanatory theory—none, therefore, which is guided merely by the rules of presence and absence in causality—could so much as establish a determinate conclusion of fact. On the other hand, under guidance of a specific presumption due to the nature of the content in hand, it may lead through the removal of successive irrelevances to an increased precision of explanatory theory, as the awareness of colour,[2] for example, is pruned away in the case of an animal whose colour changes.

When the eliminative or negative judgments themselves acquire a positive content, so that the disjunctive premise under which we are reasoning becomes a disjunction of knowledge [3] instead of one of ignorance, then the disjoined alternatives are read as variations in accordance with a law or obviously continuous system,[4] and we have the highest degree of certainty that an explanation can attain which is not unambiguously given to insight *ab initio*. We have such a precise correlation of the suggested "*a* cause of *x*" with "*b* (the adjacent not-*a*) cause of *y*

119, for the hypothesis which remains less probable, because imperfectly accounting for the effects, after the others had been excluded. He evidently means in both cases that a better unification of cause and effect would be necessary to effect a proof.

[1] *Op. cit.* p. 119. Cp. Joseph, *op. cit.* p. 451 *n.*

[2] Joseph, p. 446.

[3] This is very plainly the case in Mr. Joseph's instance of the bicycle, p. 447.

[4] Cp. author's *Logic*, ii. 143, 147.

(the adjacent not-x)" when we hear a discord passing into a harmony as an organ pipe is being tuned, or when we can analyse the structure of a plant into inherited and climatic features. In such a case the cause or causes which occupy, so to speak, all the adjacent region to the cause to which the phenomenon adheres in direct observation, demarcate its boundary and that of its characteristic effect by a positive system negatively related to them. There is no region where other alternative causes could fall; and there is no room for an explanation of any factor in the several effects other than the explanation which harmonises with the demarcation of the system.

β. At the lowest limit of intelligible connection which is ever found in a proposition worth propounding,[1] there is still, I am convinced, a presumption of implication as between the contents concerned.

I again take an example from Mr. Joseph's discussion. "Excision of the thyroid gland dulls the intelligence." [2] In this case, as I gather, there is no implied connection of the two contents that can be specified on any basis of systematic presumption, or even embodied in a scheme of alternatives such as might guide a further investigation. The fact rests formally on the rules of common presence and absence deduced from the demands of universal connection, and applied by direct observation. In the absence of alternatives suggesting themselves on specific grounds it is not worth while to state a dis-

[1] I mean by a proposition not worth propounding, one in which no presumption of implication can arise. See Mr. Joseph's allusion to Pliny, p. 445, or Owen Glendower's "*At* my nativity" and Hotspur's answer.

[2] *Ibid.* p. 437.

junctive major premise. Its only basis would be the possibility, common to the selected alternatives, of satisfying the rules of co-presence and co-absence. And in such a case we take it, I suppose, that they are satisfied *ipso facto* by the marked and obvious change consisting in the operation and by no other non-persistent circumstances. Here, then, we approach the limit at which the connection between two phenomena would be offered as a brute fact, without any intelligible element of implication linking them together.

Now it is important, I think, for logical theory, to note that if this point were not merely approached but attained—if, that is, the conjunction really were for us a brute fact supported by the rules of presence and absence alone [1]—the proposition would not only be non-significant, but could hardly be held to be established. It would indeed not fulfil the conditions of intelligible assertion.

To begin with, *every* conjunction of contents is intrinsically, however imperfect, a statement of a law,[2] and the relevance which we demand for the qualification employed in propositions is a proof that the instinct of reason—the demand we make for intelligibility in human intercourse—recognises this necessity as a presumption. Hotspur answers Glendower on the basis that Glendower meant to say that his own birth had causal connection with the heavenly and earthly phenomena he mentions, and in reading the passage we take Hotspur's view as a matter of course.

In the next place, the absence of a specific presumption from content affects not merely the intelligibility but the certainty of the proposition. The

[1] A mere *post hoc* or *cum hoc*, ergo *propter hoc*.

[2] Bradley, *Principles*, pp. 38, 105, 286 ff.

absence of any guide to analytic investigation, such as a specific presumption affords, prevents us from determining the precise nature of that very factual connection which we are affirming, so that our assertion, though established in a sense, is for serious application in theory or practice equivalent to little more than "x is the cause of x."

I suppose that the generalisation so popular in times past as to be almost comparable with the proposition that "all men are mortal," namely, that one "catches cold" from exposure to cold, wet, and draughts, was a brute conjunction somewhat of this kind.[1] One catches cold, I take it, from the successful invasion of a bacillus, for which exposure to cold, wet, and draughts may or may not furnish favourable conditions, but are often found to coincide with conditions of safety.[2]

How, then, do we come to find truth and interest in the proposition before us, "Excision of the thyroid gland dulls the intelligence"? The reason is that though it offers no clear and distinct implication of causality between terms precisely stated, yet there exists, as Mr. Joseph very fairly points out, a good deal of knowledge about the constituent terms such as to give body to our natural presumption that the implication is justified.

It is of no use for a layman to speak in detail on such a point; but I understand, in general, that glands are found to possess in their secretions quite specific properties for promoting or arresting organic processes,[3] that the organ to which the thyroid gland

[1] Of course, if my argument is right, it could not be a perfect example of the kind, because none such would be worth making.

[2] In the trenches and in Arctic expeditions.

[3] I suppose the whole theory of Hormones and Enzymes is relevant to this kind of action.

belongs has evidently peculiar and profound relations with crises of bodily development, and that in medicinal use the thyroid extract shows a favourable effect on the intelligence correlative to the unfavourable effect of the gland's removal.

It is obvious that we have here plenty of justification for the pregnancy or relevance of relation—the presumed implication—apart from which we hardly admit a proposition to be either intelligible or more relevantly true than the gossip's discovery in one of Disraeli's novels, " I have found out all about him; he is the son of some woman or other."

Other examples point to the same result. Jevons' theory of the connection of sunspots with commercial crises would never have been conceived, or at least would not have received serious notice, if the rules of presence and absence alone had been concerned. It was the suggestion of a rationale through the connection of a deficiency in solar heat with a deficiency of harvests that made the hypothesis worth embodying in a proposition.[1] So with " the properties of chemical compounds, which are not for the most part intelligible from a consideration of the properties of their elements." [2] I suppose, speaking as one ignorant of the science, that it is true that you cannot deduce directly the properties of carbonic acid from those of carbon, confronting the element and one of its compounds each to each. But there seem to be promising initiatives towards arranging both elements and compounds in series and classes,

[1] " *Post hoc*, ergo *propter hoc*" and the apologue of Tenterden Steeple express the world's opinion of judging causation by the mere rules of co-presence (including sequence within a train of events).

[2] Joseph, *op. cit.* p. 438.

certainly with some reference to an orderly development of properties. And where you can arrange things in series, having laws of connection of properties either within each series separately, or corresponding as between more series than one, you can hardly say that the conjunctions are hopelessly irrational. I imagine that when a chemist has determined the composition of a new substance he knows pretty well what kind of behaviour to expect from it, though I can see that perhaps it does not follow from direct comparison with its elements. But he has enough for a presumptive implication between composition and properties, and that is all we need for a rational proposition.

3. If we make a fresh departure, just above what we spoke of as the middle region of implication, and search for complexes which are the bases of implications approaching more nearly to absolute and not relative *a priorism*, it is natural to take examples, as we did at first in passing, from the regions of mathematics or logical ideas. Now the relation of these to the whole of experience which is our ultimate standard of knowledge is in one sense very direct and intimate. To deny the law of contradiction or the axiom that two straight lines cannot enclose a space would bring us in the first case, *ipso facto*, and in the second or any analogous instance by a very brief argument, to asserting a contradiction in terms which would destroy any whole, and therefore *the* whole.

On the other hand, there is something peculiar and unsatisfactory, if we judge by what a complete conception of knowledge seems to demand, in the very transparency which makes such implications so directly certain. They seem to depend on com-

plexes which, however intricate (and we know that many minds are almost wholly unable to cope with them), are constructed out of restricted features of experience such that the constructions analyse themselves as they proceed. The analysis is here notably and visibly one with the synthesis.[1]

Therefore, when connections self-evident after this manner are taken as the type of *a priori* implication, an undue bias is communicated to the theory of inference; so that we are inclined in ascending the scale of cognitive value to deviate as we rise, and to place the climax of the whole at the apex of what is really a divergent branch.

For the fact is that there are two aspects, and not one only, in which an intimate logical dependence on the whole of experience may display itself. One, as we saw, is the ready and open self-contradiction which avenges a breach of implication within systems whose nature is, so to speak, self-analysing, like numbers or triangles. But there is, I suggest, another side to the question, which receives less attention, and demands, perhaps, more. This is the character of implications which are connected with the whole system of experience by ramifications both wide and deep. If any one, I mean, were to deny that civilisation, or beauty, or religion, were inevitable components of a human experience, and that their respective leading implications belonged to the most irrefragable class of truths, he would easily be shown to be in a self-contradiction by the test of "This or nothing."[2] In denying a "this" inherent in the general order he would have denied that order itself, and abolished all positive basis for

[1] Author's *Logic*[2], i. 91 ff.

[2] Above, p. 3. Cp. *Individuality and Value*, p. 44.

his own denial. The contradiction would be of the same type, though less direct in expression, as in the hackneyed example of the proposition "There is no truth." If you deny truth, you deny the basis of all assertion, and so of what you are asserting. And so, if you deny, for example, the existence of the joy of expression—that is, beauty—your denial if true cuts out of the world at least both man and nature and their relation, and with them, necessarily, our experience as a whole. Therefore, again, in denying beauty, as in denying truth, you deny the whole which alone gives assertion its basis, and in the dilemma "This or nothing" you have elected for "nothing." The steps of the deduction would roughly be "No beauty, no self-expression; no self-expression, no self nor responsive world; no self nor responsive world, no experience of the kind we possess." The argument is a little more circuitous than the self-contradiction which depends on the special nature of truth. On the other hand, it uses as the first term of the dilemma "This or nothing" a phase of the whole not less vital to it than truth, and apprehended, just because less immediately, in a wider and deeper intimacy of interconnection. A distinction is often drawn between what holds good for every possible universe, and what might, in another universe than ours, be otherwise. I suggest that this distinction really can mean no more than that our knowledge is limited. What exists, say, our colour scale, *is* in *the* universe. Certainly we cannot deny that there may be in the universe endless colours and other sensations unknown to us. But that possibility cannot undo the fact that our sensations *are*, and qualify *the* universe. "Another" universe could only be additional to "ours"—strictly another world within *the* universe. It could

not undo any facts of "ours." They would still be necessary under their conditions, as any others under theirs. It is a confusion to think that somehow you might have some others in lieu of our own. They could only be additional qualifications of *the* universe.

Thus, passing upwards from the reasoning on accepted complexes with which we began this chapter, we are led to what we might call a substantive *a priorism* on a line divergent from the *a priorism* of logic or geometry, but commanding a truth in many ways higher together with a certainty at any rate not less than theirs, though of a different type. The great examples of complexes on which such a certainty could be founded would be those which have already been pointed out, that is, the concrete worlds of religion, morality, truth, and beauty. When the apprehension of these is seen in its true logical context, involving in every case the complex existences which are necessary to make their universal character intelligible,[1] we should perceive the irrelevance here of objections to intuition or insight, which are just when these are considered as detached procedures of the mind possessing no logical context. Intuition or insight means looking at an object intrinsically systematic and distinct, and discerning its constitutive terms and relations. So far from being illogical, it is the essential feature of the higher form of inference, and even that lower or second-hand type which works with a borrowed premise and which we have distinguished under the name of linear inference may be shown to come under it, in part directly and in part indirectly.

We have arrived, then, I believe, at an important

[1] Above, p. 7.

logical conception, and that is the substantially *a priori* character of judgments of value, considered as the central example of propositions which sum up the implications of highly individual systems deeply interdependent with our whole experience.[1] Simple examples of this are the apprehensions of what is "right" for aesthetic perception. "An artist might say, 'These two colours, or these two lines, cannot be thus combined, for they contradict one another'; and this expresses a principle the same in kind as that expressed in the statement that two straight lines cannot enclose a space." . . . "But any one who assumes the existence of laws in anything, or who speaks of a 'right' and a 'wrong' in regard to it, really commits himself to the principle that the right in that sphere is equivalent to the conceivable. To say that a combination of two tones is musically wrong is to say 'I cannot, consistently with the laws or principles of musical thinking, conceive or hold together those two tones.'" [2]

The commonplace dispute about the function of feeling and of intellect in the apprehension of value is thus seen to be irrelevant. What is necessary is

[1] It would be outside the present argument to discuss how far all judgments are judgments of values. I should be inclined to suggest that it is a question of degree, and that in principle every judgment affirms some value *qua* satisfactory as a harmonious reading of a whole. But of course the degree may be inappreciable. What about *negative* values? The principle must be that of ugliness in aesthetic; the same thing as value must be sought for, and its opposite found, *i.e.* a discrepancy or discord. The difficulty constantly urged about feeling and not intelligence being the source of value springs, I think, from not realising the involution of the two. I should say, however, that the feature of satisfactoriness or wholeness involves some sort of sentience at least. I think it not improbable that the scale of *a priori* truth would be found to be one with that of values.

[2] Nettleship, *Remains*, i. 119.

the appreciation of—the sense of the specific difference made by—complexes of particular kinds, with their intrinsic implication on the one hand and their degree of inherence in the whole of experience on the other. If you say it is thinking that does it, it is, you must add, thinking geometrically or musically or artistically or morally or religiously as the case may be. If you say it is feeling that does it, it is, you must add, the trained sensitiveness of the geometer or the musician, the painter or the man who cares for conduct or who possesses the religious frame of mind. It is a mind absorbed in these different modes of being which at once sees the connections, and, necessarily, feels the difference they make to life. The common objective basis in the actual complexes may be called the quality of satisfactoriness, that is, the character which logically and in every form of experience gives necessary satisfaction; not mere actual satisfaction of a sentient being, which may be in any degree partial or accidental.[1]

The traditional division of logical grounds of certainty into axioms at one end and particular data at the other, due to the predominant linear conception of inference, has done great injustice to the most central and most exalted certainties of life, as well as to the commonest and most practical. I believe that a recognition of the true nature of systematic inference will do much to restore the balance, and

[1] Cp. Professor Pringle-Pattison, *The Idea of God*, p. 336. I adhere to my view that, to put it in current language, satisfactoriness is objective and satisfaction subjective. If you elect to say "Actual satisfaction so far as right," that comes to the same thing. The point is to lay open the basis of satisfaction to criticism. A man may be satisfied when he is drunk; but his satisfaction is not satisfactory.

to make logical certainty seem a more natural thing, and more in harmony with the experience of life.[1] I shall attempt below to point out a similar liberation as regards our methods of argument.

4. I will here touch briefly on Mr. Joseph's rejoinder [2] to some observations of mine regarding a point in his inductive theory.[3] So far as our divergence of opinion is merely what part of a process about which in the main we are agreed is to be more particularly called inductive, it might be considered a verbal dispute. Yet I am anxious to say a word about it, because I think there is concerned a principle of some importance, and I wish to make clear how it strikes me. I begin by saying that I have learned very much from Mr. Joseph's book, and owe to him a clearer insight into the points [4] on which the present work is largely founded.

Mr. Joseph's view on the point at issue is given in the statement that "inductive conclusions are established disjunctively by the disproof of alternatives." [5] "Where we have to rely purely on induction there is none of this 'naturalness'; I stand on my conclusion because 'I can no other,' and not because I see any *intrinsic necessity* in it. Necessity I do see, if I am right about my facts, *and am to reason in this case consistently with what I know to be involved in the causal relations*;[6] but that necessity is not intrinsic;

[1] Cp. the argument of Kemp Smith, *Commentary to the Critique*, especially the quotation, p. iv above.

[2] *Introduction to Logic*[2], p. 524 ff.

[3] My *Logic*[2], ii. 174.

[4] Especially the difference between syllogism and deduction or demonstration.

[5] *Op. cit.* p. 444.

[6] My italics. Cp. p. 430: "Thus inductive reasoning rests upon understanding what is involved in the causal relation."

had the facts been otherwise, and for all I can see they might have been, I should have concluded otherwise; and then I should have been just as content to accept that as I am to accept this conclusion." [1] Therefore explanatory theory or a general explanatory presumption is not essential to the proof or intelligibility of an inductive conclusion. "Induction turns out at last to be the blind alley of the reason." [2]

The difficulty of principle which I find in this position will be plain from my treatment of examples above. I do not believe that inductive proof can really be separated from explanation and intrinsic implication. I do not believe that an intelligible proposition can exist without a connection present between the factors of its content. I do not believe you can establish a disjunctive major merely on understanding what is involved in the causal relation. I cannot convince myself that facts can be inductively established which are so blank or so absurd as Mr. Joseph's theory seems to make them.

The ground of my perplexity is in principle as follows. I do not see how you can prove a proposition without modifying the apprehended intrinsic implication of its contents with one another. And I do not see how you can do this by any negative proposition with a different subject from that of the first. "But," I suppose it would be replied, "in induction by simple elimination, the negative proposition which rejects a competing alternative is married to the surviving affirmative, though their subjects are different, by a disjunctive major premise. And this enables it to react on that alternative and exhibit it in a new light which may amount to proof."

But my perplexity remains. I understood that

[1] *Op. cit.* pp. 436-7.

[2] *Ibid.* p. 439.

the purely inductive disjunction was to be built solely on the rules of presence and absence derived from our knowledge of the nature of causation. Now this does not seem to me to be the case. The disjunctive major premise, in all *e.g.* of Mr. Joseph's instances in which its operation is assumed, depends wholly on the specific explanatory presumption drawn from relevant knowledge (note "the suggestions that might occur to a biologist," p. 445), which suggests the alternative causes embodied in the disjunctive major, and is the only guarantee of their exhaustiveness. Hence the force of the exhaustive proof is furnished by the explanatory presumption, and not by our knowledge of the nature of causation (or of universal connection) and the rules derived from it. Thus the certainty of the surviving alternative is limited by the certainty of the whole special belief expressed in the disjunctive major. No exhaustion of the alternatives can confer on one of them a higher certainty than that conveyed, by the original presumption, to all of them together. And this rests entirely on the implication due to special knowledge that the cause or reason is to be found somewhere within these. The absence of the alternatives which are ultimately rejected could have added nothing to this, and their suggestion and rejection could not possibly augment the truth value of that which is left unless these procedures implied some alteration in its own inner grounds of certainty.[1]

[1] This seems to me very strikingly brought out in the bicycle example (p. 447). Why is the conclusion so plain and certain (that if there is a noise it can be located by moving each of the movable parts while the others are kept still)? Because the disjunctive major enumerating the movable parts, rests on an absolutely certain explanation, which the method of elimination is able to apply in detail.

The essential proof, then, as it seems to me, remains in the capacity of the explanation to explain; to fuse the hypothesis so with the data that the one cannot be affirmed without the other. It seems to me almost a neglect of the spirit of logic to regard a reliance on verification *qua* proof in the light of a fallacy of the consequent.[1]

Implication is in its nature reciprocal, and the better the explanation the nearer it approaches to this standard. This approximation seems to me to be in principle a positive or intrinsic quality of a conclusion's content and cannot, so far as I see, be affected by a negative proposition about something other than the subject of that conclusion. For the disjunctive major, which rests as a whole on the same connection of content with its best established alternative, cannot possibly by any manipulation give rise to a higher degree of certainty than that connection furnishes.

In Mr. Joseph's three references to the eliminative method (p. 526) he does not seem to me quite precisely to touch the point of difference between us. It is surely self-evident that if explanation *a* or *b* fails to explain all the relevant facts it must be rejected on that ground. But such rejection does not, as I see the matter, bear on the point at issue between us.

[1] *Op. cit.* p. 523. Cp. p. 596, where the fallacy I mention below is called the fallacy of the consequent. In other words, you can get at the required exclusiveness of your explanation by fair means or otherwise. By fair means, is to fuse it with the data; otherwise, or the short cut, is to disprove actual offered alternatives, whose value is contingent. Might I not retort that this is to affirm a conclusion from the disproof of the arguments against it? It is a form of the fallacy of the antecedent. If x is a, x is not b; but x is not a, $\therefore$ x is b. Of course under the disjunctive major you can do it either way, but then the result rests wholly on the major and that can only rest on positive connection.

Rejection is not elimination in the sense of the eliminative method of induction. Elimination means not merely that you reject an imperfect theory *b*, but that by its rejection you contribute to the support of another theory *a*. But unless the evidence on which *b* is rejected is accompanied by fresh evidence through which *a* is reinforced, I do not see how this is possible. *b* is struck out and drops out of question; *a* stands as before on whatever intrinsic evidence made it likely that the truth was either with *a* or with *b*. We noticed above the determining effect of a positive intrinsic link by its presence or absence on an intrinsic implication, and it appeared as if no exclusion of alternatives could dispense with it.

Thus I am not able to see that there is in fact a process in which an inference from exhaustion of alternatives, founded only on the rules which flow from our knowledge of causation, can establish a causal theory, or, strictly taken, give rise to an intelligible conclusion. And I therefore feel compelled to reserve the name of induction for the composite procedure in which the rules of presence and absence co-operate with presumed intrinsic implications in shaping explanatory theory by pursuing series of alternatives within alternatives, which present them as the progressive analysis of a causal complex.[1] The difference is between the competition and rejection of theories, and the precise modelling of explanation by the pruning of irrelevances, so as to get the full value of the intrinsic presumption embodied in each succeeding disjunctive major.[2]

[1] See the example of the animal changing colour, above.

[2] You begin with a choice between *a*, *b* and *c*; you disqualify *b* and *c*, and start again with alternative causes for *a*, or operative features within it.

I venture further to suggest that the demand for establishment of formally exclusive explanation by negation of alternative theories may be favoured by the desire to establish a formal level of truth, something which would enable us to say, for example, whether or no there is any law of nature that can be set down as absolutely true. A question of this kind is sometimes raised in logic books,[1] and betrays to my thinking an unreal attitude to the question how truth is to be estimated. The conception of an absolute class or rank of true propositions which can be treated as fixed possessions of knowledge, opposed to a class of another kind which are fixedly or totally false, is, I believe, a chimaera. Truth I believe to be the degree in which the character of reality is present within a proposition or system of propositions; it is the life of knowledge, as various as beauty or goodness, and no less impossible to recognise by formal tests. That is why I have said that it is only to be verified by the self-criticism of the system to which it belongs.[2] I do not care how in detail this is applied. The point is that nothing can tell you whether a thesis is true until a substantive extension of the system to which it claims to belong has shown you whether and how far it needs to be modified. The character of relativity and non-finality, which attaches to mere verification and causes it to be called the fallacy of the consequent, is really inevitable in the pursuit of truth.

Is it not the demand for a class of truths which shall be simply and finally true, which makes us look for typical truth solely in two types of proposition; one of an axiomatic character, which is reckoned

[1] Cp. Joseph, *op. cit.* pp. 416-7.
[2] Joseph, p. 526.

unconditional at the price of demanding only the conditions of wholes very simply conceived, which conditions are therefore easily seen to be included in the axiom; and another which has passed through the formal test of being comprehended in a list of alternatives—the best available at the time—of which all but itself have been disproved by comparison with facts in the light of the nature of causation? But the former feature touches indeed the essence of truth, yet only in facile and transparent cases, not the most valuable; the latter does not, strictly speaking, touch it at all because it deals with no positive intrinsic nexus within the propositional content itself. The higher values of truth lie apart from either.[1]

A conception such as I am suggesting saves us at least from inferring, if no final truth seems anywhere in concrete experience producible, that therefore there is no truth in it at all. It is, I repeat, most unsatisfactory and misleading to allow ourselves to be forced into accepting as the nearest thing to final truth either the law of contradiction or the law of gravitation.

I do not think that Mr. Joseph and I differ very profoundly in our view of induction. He actually describes a process which is pretty nearly that to which I should have preferred to confine the name—a process in which explanatory theory is supplemented by elimination.[2] In what he takes as pure induction on the other hand, he is prepared for a degree of irrationality in the conclusion which I cannot reconcile with my conception of any actual logical result. And he cares less than I do for the more limited task of the negative instance in demarcating and confirming, as it were by concomitant

[1] See above, section 3.

[2] *Op. cit.* p. 521.

variation,[1] the selection of alternative possibilities progressively suggested by explanatory theory.

Our difference of opinion may contribute to determining how it is best on the whole to characterise induction; and it in no way diminishes my sense of the debt which the present volume owes to his work, and my admiration alike of his knowledge and acuteness and of his courtesy in discussion.

[1] Cp. p. 86 above.

V

NATURAL PROCEDURE IN ARGUMENT, ITS LOGICAL GROUND, AND ITS CLIMAX IN "DIALECTIC."

1. THE natural procedure in argument does not appear to resemble linear inference. It is a common observation that syllogisms do not occur either in conversational discussion or in argumentative treatises. "If we will observe the actings of our own minds," says Locke,[1] "we shall find that we reason best and clearest when we only observe the connection of the proof, without reducing our thoughts to any rule of syllogism." When a barrister opens his case, or a theorist introduces us, in his initial statement, to the basis of his doctrine, we do not as a rule find ourselves confronted with the first premises of a chain of syllogisms. We find something quite different. An exposition is set before us which at first sight reads more like a description than an argument; and it is only as we enter further into the proposed construction that we observe it to be in fact the development of a subject,[2] intended to introduce us to a scheme of consequences which, if we accept the initial description, we shall be unable to deny.

[1] *Essay* IV. xvii. sect. 4.

[2] Both in the sense of an individual being and of a single theme.

In estimating this *prima facie* appearance, which in the passage referred to Locke has insisted on so successfully, we must allow of course for what logic calls "the enthymeme." You may be using a connection which is essentially syllogistic although one of the premises, or even the conclusion, is suppressed in the explicit statement. When Medea asks Jason, "Servare potui, perdere an possim rogas?" the argument requires and implies the major premise "Qui servare possunt, perdere possunt," and also puts the conclusion only as a rhetorical question.[1] This, I think, makes no difference to the nerve of the argument. Yet the informality to which Locke himself is leaning in his examples of inference non-syllogistically stated, seems to me not to depend, like the enthymeme, on the omission of any formal link, but rather on a mode of statement which disregards the prerogative of the major premise and arrays the terms so as to facilitate a direct insight into their "agreement," as he calls their systematic connection.[2] No doubt there is all the material needed for a chain of formal syllogisms in his argument from "Men shall be punished in another world" to "Men can determine themselves."[3] But I think it would hardly be fair to treat Locke as merely preferring syllogisms incompletely expressed to those in more correct and cumbrous form. It looks as if

[1] Joseph, *Logic*[2], p. 351.

[2] When we look back from this arrangement to the enthymeme, it certainly seems as if an appeal to direct insight might be operative in some cases of this type, *e.g.* the example just given.

[3] *Essay, loc. cit.* He gives the steps as "Men shall be punished; God the punisher; punishment just; the punished guilty; could have done otherwise; freedom; self-determination"—"each intermediate idea agreeing on each side with those it is immediately placed between."

he had, unlike the modern critics of the syllogism, some idea of escaping from the subsumptive process, and arraying his material so as to facilitate direct insight. "Now I ask, whether the connection of the extremes be not more clearly seen in this simple and natural disposition than in the perplexed repetitions and jumble of five or six syllogisms?" Still, it is plain that the *de facto* absence of formal syllogisms in literature and conversation does not by itself establish the absence of syllogistic reasoning.

Nevertheless, I believe it to be true, as the example from Locke partly suggests, that syllogism or subsumptive inference from a borrowed premise is not common in literary or scientific discussion, and that the natural procedure in argument is not of such a type. It is rather akin to what I have called systematic as opposed to linear inference. Another of Locke's instances illustrates this characteristic, perhaps without his precisely noting how far he was suggesting a departure from syllogistic principles. "Tell a country gentle-woman," he writes,[1] "that the wind is south-west and the weather lowering and like to rain, and she will easily understand that it is not safe for her to go abroad thin clad in such a day, after a fever; she clearly sees the probable connection of all these, viz. south-west wind, and clouds, rain, wetting, taking cold, relapse, and danger of death, without tying them together in those artificial and cumbersome features of syllogisms."

This is a complex situation, built up of several co-operant conditions and circumstances; it is presumably meant to be apprehended as a whole,[2]

[1] *Essay, loc. cit.*

[2] Though from the order in which Locke enumerates the terms, I suspect he thought of the argument as a sorites.

and its danger to be seen from the concentration of its features on a single person. Of course you could analyse it into arguments with major premises borrowed from previous experience, "South-west wind and clouds are a sign of rain," and so on. But these are not the points that make the gist of the argument; it is the central situation produced by all the conditions being present at once in a single case that needs appreciation; and that you get more easily, I think Locke means to urge, when you bring the whole before you descriptively than when you draw it out as a set of connections in a linear scheme.[1]

I will insist briefly on the contrast between what the linear theory of inference would lead us to expect in the development of considerable arguments, and what we actually find.

(i.) I believe that we do not often find in an important theoretical discussion a syllogistic deduction however informal from premises assumed *ad hoc*, or taken as self-evident. Some such sequences there are in Plato's *Dialogues*; but rather in the way of testing "hypotheses" according to what Plato regarded as the dialectical method,[2] than of positive deduction whose conclusion is intended to stand as starting from indubitable axioms. Setting aside, as

[1] It is an interesting meeting of extremes that Hegel is in the habit of indicating the modes of syllogistic connection by the mere juxtaposition of the terms in order of mediation, marked as Individual Particular Universal—*Encycl.*, sect. 183 ff. Cp. Locke, *l.c.*, on "Homo—Animal—Vivens," or "Punishment—Just—Guilt." It thus becomes a question whether they strictly recognise our distinction between Syllogism and Deduction. There may be a deductive element in syllogism.

[2] Burnet, *Greek Philosophy from Thales to Plato*, p. 164; Taylor, *Varia Socratica*, i. p. 78. The postulate, I gather, was not self-evident but merely conceded.

of this nature, the great arguments of the *Parmenides*, we find in the first book of the *Republic* some reasonings from admitted premises which appear intended to lead to substantive conclusions.[1] But Plato represents Socrates as fully aware that by this method he is not elucidating his point. These abstract deductions, he complains, do not tell him *what* the subject *is*. As we might say, they give no complete construction of it. The further development of the argument in the *Republic* offers a contrast to which I will return.

Mr. Joseph [2] cites from Leibniz a prolonged sorites proceeding from the premise "The human soul is a thing whose activity is thinking," with ten successive major premises subjoined to it, to the conclusion "The human soul is immortal." I hardly think that a parallel would be found to this in philosophical literature subsequent to Kant. I am unable to prove the point, but should think it likely that the fashion of demonstration in philosophy was much more formally linear before Kant's attack on the ontological argument than it subsequently became. Fichte's "construction" was not a deduction "from above." It was an ideal experiment by which a whole was seen to build itself up.[3] The same is true, of course, of Hegel's *Logic*. The remarkable misconception about metaphysical argument from above which prevails in recent German criticism of their own post-Kantian writers,[3] indicates, I presume, a failure to perceive this change of fashion and to grasp its reason.[4]

[1] *E.g.* the inference from the affinity of justice and knowledge or from the unity of goodness as a principle of strength.

[2] *Logic*[2], p. 355.

[3] *Germany in Nineteenth Century*, chap. on "History of Philosophy," p. 194 ff.; and see Wallace, *Prolegomena to Hegel's Logic*, p. 125.

[4] See Hegel, *Encycl.*, sect. 184.

In speaking of deductive demonstration from premises assumed or self-evident, it is impossible to omit the case of Spinoza's *Ethics*. But I take it that here, concealed under the apparently geometrical method, there is an impassioned vision of the universe as a single substance, and that the content of the treatise amounts to a construction in accordance with this vision of the whole, and an intuition of its intrinsic consequences.

Even in actual mathematical reasoning, I gather, it is not always easy to say whether the argument is syllogistic or in a truer sense constructional or deductive, that is systematic. "So far as (the geometrician) thus appeals to the conclusion of a previous demonstration, and applies it to the figure before him, he syllogises; but when he realises the necessity of that conclusion, he does not syllogise, but sees immediately that it is involved in the truth of other space-relations."[1]

It is interesting in this connection to consider the gradual complication of algebraical statements as described in Mr. Whitehead's *Introduction to Mathematics*. We seem to begin with tautologies, and then to find ourselves, through very slight modifications, compelled to assent to immensely far-reaching affirmations. Thus we pass it as a tautology that $2 + 3 = 3 + 2$,[2] which corresponds to one of Husserl's examples of essential insight.[3] When stated in algebraical form, in which x and y stand for *any* two numbers, it still seems to us much the same, and

[1] Joseph, *Logic*[2], p. 545; cp. p. 311. His footnote on p. 294 implies, I take it, that Euclid was wrong in stating the argument from "Things that are equal to the same thing"—in syllogistic form. Cp. Bradley's *Logic*, p. 227.

[2] Whitehead, *Introd. to Mathematics*, p. 15.

[3] See above, p. 78, and Husserl, *Jahrbuch* for 1913, p. 81.

we go smoothly to the formula that $x+y=y+x$. "Again[1] in the place of saying that $3>2$, we generalise and say that if x be *any* number there exists *some* number (or numbers) y such that $y>x$. We may remark in passing . . . that this latter assumption is of vital importance both to philosophy and to mathematics; for by it the notion of infinity is introduced."

Now from a logical point of view, what are we doing when we are thus smoothly carried on from apparent tautologies to statements which assume grave importance, and shortly become too complex for the layman to follow? Nothing can come of nothing. You could not get a significant science by simply considering a tautology. In speaking of arithmetic as a source of mathematical propositions Mr. Whitehead says,[2] "The nature of the things is perfectly indifferent. Of all things it is true that two and two make four. Thus we write down as the leading characteristic of mathematics that it deals with properties and ideas which are applicable to things just because they are things, and apart from any particular feelings, etc." These properties are "the abstract formal properties of things."

Now why, on the basis of properties like these, is it self-evident that $2+3=3+2$ or, generalising, that $x+y=y+x$? It is not self-evident that $15=51$. We cannot say that the order of elements is never significant. It is simply, is it not?—that we are reading off the character of a series defined by a simple operation which the sign + indicates. And we know, by insight founded on ideal experiment, that a series of this kind can be applied to all distinguishable things, because the peculiar nature of

[1] Whitehead, pp. 151-6. [2] *Ibid.* p. 13.

different things cannot affect their distinctness.[1] And we further know, from the nature of the operation, that the order in which the elements are set down makes in this case no difference, while in other statements of steps in a series it may be all-important. And when we pass on to the statement which brings in numerical infinity,[2] it is obvious that we are affirming the definite nature of a series which we can see, by trying, to be rooted in the formal properties which have been mentioned, and to find in them, as we discover by trying, nothing to contradict it.

To the layman it is one of the most extraordinary things in all experience that a series possessing, as it seems to him, all sorts of oddities and startling idiosyncrasies,[3] should arise in this almost immediate way out of the mere distinctness of everything from everything else.

But in truth the arithmetical propositions and algebraical generalisations are features of a whole which has a perfectly definite structure and character, whose texture is very simple, though its entanglements are extraordinarily intricate. We are not deducing something significant from tautological premises; we are building it up according to the definite law of a certain system, which reveals itself as we experiment, and which we see to admit of no alternative.

[1] It is arguable, as I think Dr. Schiller has urged, that there might be experiences which should not admit of numeration. Mr. Broad has put a case of the kind. But it makes no ultimate difference.

[2] I do not see why this should be called an assumption. It seems visible in the nature of the series.

[3] I am thinking, *e.g.*, of the problem of prime numbers. And there are the brute facts of the multiplication table, which seem to make it hard to say that formal principles alone cannot give facts, if you hold to the traditional view of Deduction and treat the formal premises as the real source of all the conclusions.

That is all we want for our logical purpose. We are not being tricked into inferring determinate facts from a tautology. Mr. Whitehead's statements have each its individual meaning from the beginning, which becomes more marked and complicated as he proceeds. The connection is in essence systematic and not linear. Though gradually developed, it is intrinsic to an individual whole or "subject." [1]

(ii.) Thus I believe that our natural method of "opening the case" descriptively, and placing the reader or hearer within the system which is the development of our "subject," not merely follows an instinct of common sense, but is a well-grounded logical procedure and ultimately fundamental. It seems to me probable that it is, as explicitly employed, a peculiarly modern method, owing to the feeling for impartial system and the repugnance to deduction "from above," which have grown up with the empirical attitude and have indeed been exaggerated by it into falsehood. I will refer to this method briefly, for it is normal and familiar.

Bishop Butler's approach to the subject of human nature explicitly adopts and defends this method. He heads his argument [2] with this sentence, "*A nature is an integer; its parts having reciprocal relations needful to be known,*" and proceeds, "whoever thinks it worth while to consider this matter thoroughly, should begin with stating to himself exactly the idea of a system, economy, or constitution of any particular nature, or particular anything; and he will, I suppose, find that it is an one or whole made up of

[1] We may note that this can often be shown of so-called *a priori* apprehensions, by the simple reminder that "you must understand the terms," *i.e.* you must place yourself within the individual system. Cp. Whewell, *cit.* in my *Logic*[2], ii. p. 227.

[2] Butler's *Sermons*, Preface, sect. 10.

several parts; but yet, that the several parts even considered as a whole do not complete the idea, unless in the notion of a whole you include the relations and respects which those parts have to each other. Every work both of nature and of art is a system."

There is however one ancient example which anticipates this method, an example of immense importance in the history of thought. And this is Plato's appeal from inferences based on abstract premises in *Republic* I. to the constructive argument from a whole which supplies in the rest of the treatise the typical environment necessary to make man's nature intelligible. That no inferences about man's nature are sound which neglect the fact that he is a social being, and that you get to understand him by observing the play of his functions and not by applying moral axioms to his conduct, is so obvious when suggested that it easily seems commonplace. But it is really the primary type of a sound logical method. You draw out a construction, supplying the relations necessary to make your subject intelligible, and you read off your conclusions from the result.

There is something of a similar contrast between the first book of Locke's *Essay* and the remainder of the treatise. The first book is essentially a syllogistic argument. Locke had got it fixed in his mind that inherent ideas would be explicit *ab initio*, and argued that as no ideas are explicit *ab initio* none can be inherent. When he comes to develop his positive view of the structure and working of the mind, whatever we may think of his conclusions, his method is a more fruitful one.

It seems unnecessary to furnish further examples. I had thought of adducing the first four chapters of the *Origin of Species*, as a whole, together with such

special cases of interrelation as those of the woodpecker with trees and of the mistletoe [1] "with its relations to several distinct species of organic beings"; or, again, the familiar story of the dependence of clover upon cats.[2] Or in another sphere one might have referred to Professor Dicey's book, already laid under contribution,[3] and insisted again on the intrinsic relations and properties which become necessary when the complex of the British Constitution, with its governing principle of the rule of law, is exhibited before us.

But more does not seem necessary, and we shall see below that "the development of a subject" [4] is not only the natural method of everyday argument, but is also pronounced by logical theory to be the central feature of inference.

2. The above suggestion is confirmed when we bring before us in a single survey the phases of this development, as it embodies itself in the several special shapes assumed by inference. It is here that in an enquiry which has been unaccountably neglected by logicians,[5] Mr. Bradley has practically laid the foundations of a "New Logic."

Here, so far as I know, for the first time, the rules of syllogism and of the kindred methods which share its limitations were flung to the winds. What was

[1] *Origin of Species*, p. 2.

[2] *Ibid.* p. 57.

[3] P. 71 *supra*.

[4] Bradley's *Principles of Logic*, p. 454.

[5] What, then, was the present writer about when, in earlier days, he attempted to follow Mr. Bradley's lead? He can only answer, that while he believes himself, in his *Logic*, to have embodied truly the most significant principles of the enquiry, he now recognises that he ought to have apprehended more completely the plot, so to speak, and spirit which made the story of inference a new thing. This section is a belated attempt to do it partial justice.

brought before us in their place was an inspiring vision of the expanding subject, alive with the implicit system of the mind. We see it first as the given minor term which passes unchanged into a new relation with another given term in the conclusion of a common subsumptive inference. And we apprehend it more pregnantly through its working at the other extreme, where the implicit whole of mind forces us forward through the dialectic process from less complete to completer affirmations about the real world.

From the very first, in the formal syllogism itself, of which the data are furnished *ab initio*, and cannot be modified without a formal fallacy, there is yet a fusion and an enlargement which develops their meaning. The subject of the conclusion, the minor term, appropriates to itself an import and an amplification which, as first presented, it did not possess. Even here we can see the three phases which we shall find to be characteristic of all reasoning: "the starting-place, the operation, and the modification of the starting-place."[1] And in the operation the original subject has begun to expand, and prepares to appropriate its new predicates through this expansion.

In the more plainly constructional reasonings where we are outside subsumption and the category of subject and attribute, we begin further to note an increased vitality springing from the juxtaposition of the original data. A fresh datum—a premise which partakes of the nature of a conclusion—may arise out of the necessities which impose themselves when the original facts are synthetically grouped. A new interpretation arises which transforms them, and along with that a new demand which forces us

[1] Bradley's *Logic*, p. 396.

to affirm of reality something not observed and therefore not a primary datum. Such was, in our example of Harvey's discovery, the passage of blood through the capillaries from the arteries to the veins; or, in a different field, the discovery of Uranus; or, again, all the detail, so far as new to a given enquirer, which arises from the supremacy of law in the British Constitution.[1]

The feature of a conclusion seeming to arise among the premises is natural to the aspect of inference which we are now considering, and it will be found to characterise especially those procedures in which the expansion of the subject is most strikingly exhibited. In an early and unrecognised form it is responsible for a good deal of misconception, as when, in what professes to be enumerative induction, we are offered conjunctions as constant in experience, whose alleged constancy is not actually observed but depends, for example, on causal presumption. "Again, the uniformities which are said to be the basis of our generalisation, are not really matters of direct experience. We have said above, that the particular connections which we believe to prevail in nature have been inferred with the help of the assumption that all changes occur in accordance with laws. But if any one likes to question this, he must at any rate agree that most of the uniformities in which we believe have been inferred somehow; very little has come directly under our observation. We believe that winds are caused by differences of atmo-

[1] I may note that it is cases of this kind which fully justify my definition of inference in *Logic*[3], ii. p. 3, as affirming of reality in the conclusion differences only mediately referred to it before. When all your terms are given, as in the formal syllogism, all have been as data immediately referred to reality, though not all immediately to the subject of the conclusion.

spheric pressure: difference of atmospheric pressure is itself inferred rather than observed; but waiving that, for what proportion of winds have such differences been noted? We believe the sounds of a piano to be caused by the striking of strings; for what proportion of such sounds have we first seen the strings struck by the hammer?" [1]

In these constructional inferences, then, the conclusion need not be simply a new relation of those terms which were explicitly there at the beginning. And if it is so, as it still may be where the synthesis demands no new term or quality, the expansion of the subject is nevertheless obvious and necessary. For indeed there may be among the explicit original data two or more given subjects, seeing that with the rejection of the major premise there ceases to be a single predestined subject of the conclusion. So, too, in a comparison of distinct subjects. In all these cases the true implicit individual centre of the inference is what comes out in the synthetic operation—in the argument "A to right of B," for instance, the total space within which the subjects A, B, and C are fused into one; in qualitative comparison the unity of quality within which the subjects to be compared are identified or discriminated; or in a construction like Harvey's discovery, the whole "circulating system" which exhibited itself in the progress of his reasoning and gave connection and significance to his eight new data or conclusions, thus, moreover, confirming their truth, or re-establishing it in an extended sense.

It is necessary, of course, that the change in the original subject or the apparent emergence of a new one should be due simply to the vision of what is

[1] Joseph, *Logic*[2], p. 422; see above, p. 52.

necessary to make the one or the other intelligible. If the change is more and other than this; if, in drawing the conclusion, we omit, for example, elements from the full construction without special experiment to ensure that nothing material is removed, then the change comes to be due to our interference and not merely to the subject's necessary expansion, and the result is falsified. Thus, if in constructing the conception of freedom you assume that the environment must necessarily be oppressive, you will get an emphasis on caprice or rebellion in the idea—on its negative side—which does not really belong to it. And you can see that this is so, not merely by the fact that environments can be observed which are not oppressive or hostile, but by your insight that in the construction the work of an environment can be done and its place be filled by an element which is not negative towards the agent, but is ready to forward its expansion. Erroneous assertions of implication are very common, and they depend in this way on the failure to discriminate the true lines of connection in a construction—to see what really depends on what. The proof of the true relation can only be afforded by a distinct envisagement of the system in question. Is there a moral government of the world conducted by rewards and punishments? No, because when we look close at the system which we call morality, we see that such inducements cannot be adapted to its functioning, but rather destroy its nature. The important point is that we are not convinced of our error by mere instances which appear to indicate the contrary, though such instances may be the first thing which calls our attention to it.

As in recognition we get an inference from

reproduction, so in the hypothetical judgment we get one from supposition. As a face, given in perception, recalls a name, which being a new datum becomes the predicate of a conclusion, so a quality or relation, attached to reality by a supposition, gives a further quality or relation which again becomes one of the equivocal premise-conclusions we have noticed. We are familiar with the analysis of the hypothetical judgment. It stands for one of the commonest of our everyday inferential procedures.[1] We are in presence of a real thing or situation more or less explicitly given, and we wish to judge how it is likely to react to our manipulation. We ideally apply a condition to it, and get a conclusion which claims to be true, subject to that condition. So what is positively asserted is not exactly our conclusion. And yet we have acquired some knowledge. What is positively asserted is something which underlies our conclusion and is not necessarily made explicit. The old simple instance is the clearest: "If you ask him he will refuse." The conclusion as it stands affirms no actual fact; it is conditional. The categorical conclusion is about something in him. You have brought to bear your mind on him and the situation seen in a certain light, and the subject—the theme or situation—as a whole has responded and carried you to a result.

In these latter cases, such as recognition or the hypothetical judgment, the self-development of the subject is plain. You apply to it your mind, which is itself naturally a system, carrying with it in these cases a sense-perception or a supposition as a stimulus to the given complex to rearrange and requalify itself, and you get a response consisting of a new predicate which was not given at all in any data at the begin-

[1] Bradley, *Logic*, pp. 378-9; Bosanquet, *Logic*, i. p. 267.

ning. You have invited the subject, the complex which constitutes the situation inspired by the living system of your mind, to react in view of a special modification, and it has reacted, giving you something new. Or, one might say, in the procedure of construction the nature of the subject has "taken charge," and has not needed to be put together out of data accepted *ab extra*. Thus the synthetic principle which was present even in the most formal and apparently analytic types of inference has in the end become unmistakable. Inference is the life of a "subject." All that it needs in the way of premises or data is, in principle, a stimulus to the special line of development which interests us at the moment as promising the answer to our question. This is what has been so much insisted on as "the purpose of the argument," as though it were something by which our wishes could influence the inferential nexus. But it is evident that such a purpose is merely selected within a total necessary development, and cannot affect the conclusion otherwise than by selective attention.

A problem seems to arise whether, if this is all the premise or datum need supply, the subject could not develop itself without any such suggestion—whether you could not infer without a premise or datum. The answer is simple. You cannot infer without knowing on what basis you are inferring. Now the premise or datum, however slight and simple, is all that indicates to you both what subject you are dealing with, and in what direction it is possible or desirable for it at the moment to develop. If you had no premise or datum you could find no starting-place. But, on the other hand, you might say that in a sense you need no special datum, when your

starting-place is in any way indicated to be the implicit whole itself in a certain phase. Such a case you have in a stage or situation within a science. Then the whole conation of your mind is as nearly as possible identified with a comprehensive body of organised data and relations, and these of themselves dictate their further development. You have, you may say, no single datum, because the developing whole is itself in union with you, and is, indeed, in so far as it comprises particular terms and relations, itself your total premise and datum. Here the true insignificance of the special purpose of the argument becomes evident. In presence of the whole there is no special or partial purpose. The scientific conation defines its own purpose as it advances, and *your* only purpose, as a man of science, is to follow its evolution as completely as you can. You want no new single premise to start you on a special argument in the middle of a treatise on logic or economics or biology; nor would any single premise be of service to you. What you want is to apprehend the whole up to a certain point, and then to carry it forward in the way it demands. Of course an amateur can put, say, to an economist, a special case, such as, "In what sense is a payment thus and thus defined to be called rent?" That would give an arbitrary special purpose to his answer, namely, to convey to you the information you require. But left to himself, he would develop his theory of rent in its natural place in his system, treating it in all its senses, and starting, not from a question like yours, but from all the considerations which the largest survey had presented to his mind. The subject, in one complete phase, would be the only datum necessary for an advance to a further phase.

3. It will complete the line of thought which we have been pursuing if I indicate briefly the continuity between what we have seen to be the commonest and most natural procedure in argument, and the rationale of a method so rare and difficult that its very existence has been doubted. The latter method, I shall suggest, is merely the pure spirit of the former, being the complete expression of the inferential movement which we have traced as the self-development of the subject.

What has been called Dialectic, then, may be exhibited as the essential principle which is obscured in the formal syllogism, but is tolerably obvious in the natural course of argument as it is introduced by complete exposition.

(i.) We saw at the beginning of this chapter that the impulse of the natural man in opening an argument is not to lay down a first premise but to explain the situation at large. Here, it appeared to us, the natural man was right, and the argument "from above," we thought, was only valuable when it summed up the essence of the situation, or led to its revelation by gradual increments. When it is put before us among the foundations of mathematics that $3+2=2+3$, this is no heaven-sent revelation *per se*, but the expression of our judgment upon a certain kind of operation within a certain type of complex. When at the other extreme of single thought-operations we infer that if a man is beheaded he is killed, this is not merely a fact which we accept because facts like it have occurred before. It is an overwhelming presumption drawn from our knowledge of the structures and relations by which life is carried on within the organic world in general and among vertebrate animals in particular. It represents, once

more, our judgment upon a certain kind of operation within a certain type of complex.

When, again, a barrister opens his case, undertaking to exhibit a situation from which, if he proves his facts, only one conclusion can emerge, the root of his argument is the same. A complex, a whole of the relations and properties of things, is to be established before us, and it is expected that taking it all together we shall be carried without alternative to a certain determinate insight. The systematic character of our mind unites itself with the systematic material laid before it, and, aspiring to complete and harmonise the system, necessarily proceeds—such is the reasoner's hope and expectation—in a certain way to a certain result. What governs the procedure is the unity of the "subject"—the interrelation of circumstances round a common centre—it may be a personal, geographical, financial, military, or any other complication. The only necessity is—and I am aware that I am merely illustrating the same point by a different expression—that it must be such that from terms or relations included in it you may hope to read off something about other terms and relations included in it. They must all fall within the universal nature of a single subject, although as we saw the single subject may not be any one of the terms apparent at first sight, but may only emerge, as in Harvey's discovery, or in any detective story, in proportion as the operation of inference begins to succeed, and the centre of the plot, so to speak, to reveal itself.

Such a doctrine may appear to have the effect of exempting inference from criticism.[1] My insight

[1] Pickard-Cambridge in *Mind*, no. 102, pp. 207-8. Cp. Bradley's *Logic*, p. 479; Bosanquet, *Logic*[2], ii. p. 36; *Knowledge and Reality*, pp. 316 ff.

carries me to this conclusion, and yours to that, and how are we to reason upon them? But this point has often been discussed, and the answer is, I think, quite plain. There is a medium between the universal form of the formal syllogism, and the total absence of appeal to any principle beyond the given complex. The syllogism "professed to control from a central office every possible event in all parts of its kingdom. It issued some two dozen forms of reasoning, to which all inference was expected to conform."[1] This pretension is self-contradictory, because it would imply that all possible combinations of relations had been exhausted and classified along with their results. But, on the other hand, an inference always proceeds *on* a general principle, though not necessarily *from* a general principle. When challenged, you could always exhibit the form of your argument[2] and illustrate it by a parallel instance. You could point out that if a man would deny the one he must be prepared to deny the other, as *e.g.* with the arguments from a spatial series, so often referred to in recent logical discussion. The point is not that there is in inference no principle, but that the principle is established by the observed working of the inference, and not the inference by the independent assumption of the principle. This has been sufficiently explained above.[3] How can you prove that $12 \times 12 = 144$? Only by working out the combination in all possible ways, and showing that to deny the result upsets the multiplication table.

Thus we recur without misgiving to the description of inference as in its essence the self-development of a single subject. And we see that this is a character

[1] Bradley, *op. cit.* p. 245. [2] *Ibid.* pp. 472 ff.

[3] P. 34 *supra*; Joseph, *Logic*[2], pp. 311 and 345.

common to the natural procedure of reasoning from wholly given data—from a whole which is *prima facie* entirely new to us—and to reasoning which requires only a suggestion to set the development in motion. If an agent is to be free, we say without hesitation, he must have a will. We are here appealing to a whole so far one with our mind's own nature that a supposition conveyed by a single word places us in the central track and is all the data or premises that we need. "Free" implies "will"; "will" implies something more; and we could build up a complex construction on this single supposition. We have seen that the self-supplying premise, the premise which is half a conclusion, cannot be kept out of inference even when very much more dependent on what is given *ab extra*.

In a development like the above we have something which in principle is not far removed from dialectic. External data are not needed more than to let you know just at what point you are. Then you pick up the development as a matter of course, like a mathematician or economist whom you "put on" at a certain knot in a problem familiar to him. The whole, in its relevant phase, awakes as one thing with his intelligence, and he is prepared to proceed as by a native impulse. This, but for its limited material, is the pure essence of inference to which our account of it carried us forward. The external data, necessary where no whole had been constructed, showed themselves superfluous when the whole was intrinsic to us. But none the less, when no whole was present to us, the natural impulse to build one up before our mind was right and logical. Exposition of a case supplies the same demand which dialectic copes with out of the mind's own resources. It is of course not

implied that these resources are independent of experience. The *a priori* is merely what comes clear and connected out of the mass of the *a posteriori*.

(ii.) There is one distinction which calls for a moment's consideration. In a normal and natural inference you remain, subject to a very limited reservation,[1] within a single category. You argue from relations in space or time to a relation in space or time; from relations in degree to a relation in degree; from effect to cause, or from cause to effect, alike within the category of causality. In the dialectic the opposite rule prevails: you pass at every step, if not from category to category, at least from sub-category to sub-category. You do not remain at the same level of thought-connection for two steps together. You do not argue from a given effect to a hypothetical cause, but perhaps you may argue from one sense or usage of the correlatives "cause" and "effect" to another which is different and treats them, it may be, as more of a unity than they seemed at first.

How is this difference compatible with that essential identity between dialectic and everyday inference which has been suggested?

In the first place, we have seen sufficiently that in no inference do data and conclusion abide on the same level of unity. Even the argument in *Barbara* leaves the minor term larger, more concrete, and more articulate than it found it. You begin with sporadic facts and you end with a concentrated "plot" and its "solution," to borrow dramatic language. You begin with related points in space

[1] See Bradley's *Logic*, p. 241, on types of synthesis, and on crossing from category to category if one of them is that of subject and attribute.

and you end with a figure which relates points for you that were previously unrelated. The fact seems to be that every category admits within itself of an advance which is of the same type as the advance from category to category, but so much less in degree as to show a marked difference of kind.[1] The spatial figure which introduces new relations is a simple case. Or you may track a causal relation from non-reciprocating to reciprocating causality, and find yourself at the end in possession, no longer of a chain of events, but of a solid system thoroughly apprehended. The distinction between mechanism and life seems strikingly relevant to our problem. Can the most thorough reciprocating connection between the elements of a causal whole give as a conclusion the relation or unity of life? The doubt whether it can or cannot is precisely our question whether there is a limit of principle which separates everyday inference from dialectic. If spatial data cannot give a conclusion in terms of time, nor temporal in terms of causation, nor causal in terms of life, then dialectic can do what everyday inference cannot. Dialectic, it would seem, marches with seven-league boots, passing an interval of kind at every stride. Everyday inference begins, one might suggest, before any category is discerned as immanent in the facts, and reaches its limit when the completest unity is attained which some single category can offer. Dialectic begins, on the contrary, with an explicit category, presses it to its failure, and proceeds necessarily to another. So that, supposing the dispute about life and mechanism in biology to turn in favour of the former, we should see a case

[1] Every difference in degree is also a difference in quality, though it may be negligible.

where everyday inference, by its failure to construct out of its premises, chosen on *prima facie* appearance, the required solution, has been forced to make an advance on the grand scale from phase to phase which is in its nature dialectical.

So here a further difficulty is very simply solved; that is, the peculiarity known as the negative factor in dialectic. This negative factor is what blocks the way, as we saw just now, when everyday inference can get no further. "I have done all I can," common logic seems to tell us in face of certain experiences, "with space or time or quantity or mechanism, or with all of them together, but I cannot get a conclusion which represents what the movement of experience at a certain point demands." There is an intractable element in the problem, an element of totality, in which the whole seems to find itself and to answer for itself. We can go no further till we have brought freedom—by itself again, an inadequate idea—together with causal necessity in a conception which will enable us to fuse all our data in conclusions adequate to them.

But in the end the two procedures are the same. Each of them consists in a subject, inspired by the implicit totality of the mind, developing itself whether from sporadic given suggestions into a unity within a single category, or from a given category, through considerations establishing its inadequacy, to one more complete. It is easy to see the different position of *a posteriori* data or single premises in the two, and in the procedures which rank between them. In the one extreme the inferring mind has to discover unity, and evaluate a whole given only in fragments; in the other, the mind is set going at some critical point of the system which is one with its own implicit

nature, and ascends the great stairway of that system by the force of considerations which the nature of each given step brings automatically into operation. All through, in both cases, the method is ideal experiment, and the driving force is the operation of the mind, as an implicit system, on a definite complex or situation. This may be suggested *ab initio*, through isolated data, more or less complete, or may grow naturally out of a mere suggestion sufficient to indicate the track and phase of the necessary advance.

VI

"THREES" IN INFERENCE

1. Is it, as has been said, altogether a superstition to attach importance to the tradition which finds in every inference three terms only, and three propositions; two premises, that is to say, and one conclusion? Taken in a rigid sense, it may be a superstition; for example, the syllogism itself admits that a weaker conclusion may sometimes be drawn where a stronger one is possible. From a complex inferential context more than one conclusion may certainly be drawn.

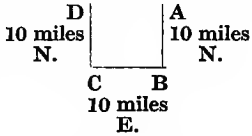
This may be so, and yet all the possible conclusions really rest on a single insight. And a discussion of the place of triplicity in inference may at least throw light on the process analysed in the previous chapters.

2. We may begin by looking at the connection between "data" and "terms."

a. We might suggest as a limiting conception some such idea as that of sheer data or *data datissima*. They would be the actual starting-point of an inference, not yet modified by investigation. "Not yet modified," but selected at least they must be, or how and why treat them more than anything else as data? Well then, grant that they must be selected, but by

a *prima facie* selection; they constitute the situation in face of which the cognitive impulse first emerges.

In Harvey's argument, for instance, it appears to me that the *data datissima*, or true starting-point, must have been his predecessors' alleged facts and ideas, which he must have found before him on entering upon the subject, *e.g.* the alleged porous septum of the heart. Here at once we are led to a remark which, if I am right, has importance. Knowledge does not merely find and accept; from the very beginning it modifies and constructs. You would not set to work to know, if given ideas and appearances satisfied you. You would never proceed to infer, if your data were satisfactory as they stand.

Now, of these data there may obviously be any number; and indeed what the number is becomes a verbal question. Is a full description of the heart's functioning one datum or a dozen? And if you call these data terms the same is true of them. "Perhaps we may say without exaggeration that a man who cannot use more than three terms in reasoning, is unlikely to do much in any subject. But however that may be, the limit is psychological and not logical."[1] Take "A to right of B" in space. As mere distinct points in space A, B, and C are all logically on the same level, and there is no possible reason for limiting their number. Note Mr. Bradley's construction 

; this uses four spatial points, and there can be no reason why such a construction should not use a hundred. Observe

[1] Bradley, *Principles of Logic*, p. 239.

however in passing that "we first complete our construction and then go on to D–A." This cuts both ways. We do not stop at three terms (or two premises). But all the terms and premises belong to one section of the procedure, and this has a sequel which is different from it. And one more remark. The number is not restricted, but a difference has already appeared which affects the number. B and C are peculiar and pre-eminent as points of junction; and each doing double duty operates to reduce the number of distinct terms which can be used.

β. Obviously some of the *data datissima* may fall out the moment we apply serious consideration to them; and it might be convenient to say that terms are what can enter into a construction relevant to the logical purpose,[1] while data are still subject to criticism and rejection. The distinction, no doubt, is one of degree. Terms remain modifiable throughout the inferences. Still data are rejected at the outset of every enquiry. Irrelevant symptoms in view of a medical diagnosis are a sufficient example. Or if you say A and B are both greater than C, these are not terms in a construction to tell you whether A and B are equal. Or there is such a datum as that which by its inclusion vitiates the argument that if *a* is due N. of *b*, and *b* E. of *c*, then *a* is N.E. of *c*. For if *a* is at the North Pole, it is due N. both of *b* and *c*.[2] The terms would have to be selected so as to omit this datum. Detective stories, as I observed above, have made these distinctions familiar to us all. We are accustomed to ask, "*Is* this or that *datum*

[1] It is very necessary to distinguish logical purpose, *i.e.* the nature of the problem proposed, from subjective purpose, *i.e.* personal interest which may or may not incite to consideration of a certain problem. See *Philos. Review*, May 1917, pp. 266-7.

[2] Pickard-Cambridge, *Mind*, 102, p. 206.

datissimum a term in the enquiry, or is it, so far as that is concerned, a blind alley ? "

We come to this then. Terms are data which are selected as bearing on the logical purpose. There is no theoretical limit to their number, but the very criterion just mentioned, of their claim to be terms, is connected with their character as points of junction or centrality, which again has a certain bearing on their number. This character may lie either in the given relations of the term, as if it is central in a spatial figure, or in its intrinsic properties if these involve external relations, like the working of the heart in Harvey's problem. Terms are not all on the same logical level, as *data datissima* are. The points of junction have a significance beyond the others.

3. The last observation suggests to us a comparison between terms and premises.

You must have judgments in order to posit either data or terms. But not every judgment is a premise. " Socrates existed ; there are men ; there are mortals," would state facts, possible data or terms, but would not be premises in reasoning. Premises do not posit single terms only, but allege conjunctions between them, or properties which imply conjunctions. Indeed, premises are got at in some cases by working back from a given construction or conclusion, and asking what premises are necessary to account for it. Thus, though they may be on the same logical level each to each, taken separately, and their number thus unrestricted, yet they can hardly remain so. Their order may be indifferent, as in A to the right of B, etc. ; but any order will reveal a progress which confers importance on the later by mere accretion. As we saw, in the combination of your premises there may even arise a new

quasi-premise which was not in the data at all, just as drawing a + over a × gives a * which has a quality of appearance not in the least like either.[1]

And, as in the old idea of the syllogistic middle term, this complication of the premises modifies one or more of the terms, or unites some of them into one.

The premises must be read together; that is what they are there for, and the grammatical separation of them is really deceptive, or may be taken as indicating a preliminary phase of the procedure. So read, they advance towards the specification of the construction, and the construction towards the conclusion. All the terms tend to fuse and at the same time to articulate themselves till we see the self-development of a subject, of which we have said so much. In Harvey's enquiry, the eight "conclusions," which might just as well be called acquired data or secondary premises, illustrate this phase of the procedure. With some of these "conclusions," as the results in the main of appropriate observation, are connected as on the same logical level others which are unobserved necessary consequences of the rest taken together, as we noted in the case of the passage from arteries to veins. We called this a premise-conclusion. It is not in the *data datissima*, and it is not the whole conclusion of the problem. It is a partial novelty, arising by the way. We found the same kind of thing in many of our supposed premises which are received as *data datissima*, *e.g.* the deaths of all men who were born, say, before 1800. The alleged datum is at least half of it a conclusion and not a datum. So it is as we begin to discern why a Euclidean construction takes the form it does, or to get on the track of a Sherlock Holmes discovery.

[1] Cp. Bradley's *Logic*, p. 367.

Our premises, especially as connected in an order, embody an advancing insight.

4. We may go on to consider the connection between Premises and Phases.

So far the number of terms and premises has not been taken as restricted, although in terms which were junction-points, and premises which embodied constructive insight, we saw a tendency to a certain economy. But now, as we have noted a movement of liaison in the premises, with a corresponding expansive character in the terms, we are led to compare this movement with the recognition that in all inference there are three main phases to be distinguished ; [1] the starting-place, the middle operation, and the modification of the starting-place.

And to do justice to the formal syllogism at its best, we can see that a recognition of this character of inference was the ground of its three terms, and three propositions. "Three propositions," for the assimilation of the conclusion to the premises is a consequence of the way in which we have stated the inferential development. The minor term gave the starting-place, which might be a more or less accidental datum ; the middle term, recurring as a point of junction, and emphasised as such in the two premises, represented the content and process of a middle operation ; and the major term, attached to the minor in the conclusion, was taken as a modification whose attachment to the minor was rendered possible by the process-content which the middle term, as cause or reason, represented. That the three propositions contained, not each of them a single separate phase of the whole inference, but the typical advances which we have noted from phase to phase,

[1] Bradley, pp. 396-7.

and finally the penetrating connection or attachment which is the axis that binds the two extremes together, seems really a merit and not a defect. It is so; the construction is a transition from the starting-place, and the modification a transition from the construction. The three propositions represent the connections, and the three terms the connected phases.

Thus we can see what the "threes" of terms or propositions indicate. And it is a verbal question whether we treat all data terms or premises as belonging to the starting-place, and say that their number is unrestricted, and that the subsequent phases are beyond the stage of premises and data, and above their logical level; or whether we recognise them as retaining or attaining an identity as they fuse and advance. So that the triple rhythm, which seems after all inevitable, may be represented in two parallel forms. (i.) In three terms, viz. α the whole set of constituents [1] of the immanent subject given in a fragmentary form, β the explicit construction of the immanent subject, γ the modification with which α as defined through β must now be read. (ii.) In three propositions. α. The proposition which exhibits the constituent fragments passing towards unity in the immanent subject. β. The proppsition which ex-

[1] Compare, for the different ways of regarding premises, the comment on Lotze's inductive syllogism in my *Logic*², ii. p. 53, note 2. The point is that he treats each inductive instance with the same predicate as a separate premise, and so speaks of the premises as being unrestricted in number. I am inclined, on the other hand, to treat as a single premise all the data s_1m, s_2m, s_3m, etc., which supported the same general proposition ΣM; that is, to take it, ΣM, one whole limb or link of the argument, as a single premise. The old syllogism, I suggest, was right, or at least significant, in attempting to treat the several premises as on different levels of the reasoning.

hibits the subject as involving the final modification, and γ the proposition which refers the modification back to the original constituents α in the unity which they have been found to imply.

In dialectic, and the direct inferences compared with it, such as recognition, the principle is obviously the same. You may consider for instance some datum which is simply actual, and not *prima facie* self-contradictory. This is so far "contingent"; that is, for all you can say anything else might have taken its place. In pursuing the track of the whole, immanent as we saw in mind, the intelligence cannot help passing to some connected factor, which justifies the first actuality by the nature of some system which includes it, and is related to it therefore as a "ground"; and finally, attaching the possession of a ground to the original datum which was pronounced "contingent" you affirm it to have revealed in itself as thus connected the character no longer of contingency but of "necessity." Your first premise leads you to a second, and the result of the second attaches to the original starting-point.

Thus too the traditional syllogism seems to have a typical value, and it is impossible altogether to get away from "threes" in inference. It is the number of synthesis. And we may end by admitting that in a certain practical and rhetorical sense the old syllogism will probably never pass out of use. Besides typifying in a crude and naïve manner the triplicity which we feel to be inevitable in inference, it, and I think it only, justifies unambiguously and directly the plain and central answer to the plain and central question which every assertion raises about which we can ask "Why?" For a practical and rhetorical answer we do not want an elaborate demonstration depending

on complete and necessary insight. We want a sufficient clue to the cause or reason of the conjunction asserted, to indicate the line of demonstration that would be followed if we were to complete the proof. We want to discriminate the general nature of the real cause or reason from wholly false or superstitious suggestions and to show our awareness that the principle which justifies a universal connection must be a universal principle. Every direct answer to the demand for an adequate cause or reason implies a possible syllogistic form, and is false if it cannot meet the test imposed by that form. "Why does spraying with sulphate of copper cure potato blight? Because it kills the fungus." This appeals to the major premise, "Whatever kills the fungus will cure potato blight." "Why does the blood circulate? Because the heart is a force-pump which propels it." That is, "Whatever acts as a force-pump can maintain a circulating system." "Why is man a social being? Because his mind is a general centre of relations." That is, "A general centre of relations is a centre of social relations." "Why do you hold that war is murder? Because God has said so" (*Biglow Papers*). That is, "Whatever God has said is true." In cases of this kind, the distinction between a borrowed premise and an insight at the moment is of little importance, for the purpose is only popular, and probably the reasoning is always of the former or true syllogistic type. You do not in this way get a full and accurate demonstration. But you do get clearly selected the main point on which the disputant relies, along with a plain understanding that unless he can affirm it as a universal connection of the attribute it is no explanation, no rationale. I am not harking back to the

ancient syllogism, but I am doing justice to the point which Mr. Pickard-Cambridge raised in *Mind*,[1] and which I have argued previously, that however original and individual may be your demonstration or insight, you ought to be able to say in a few words what is the leading plot or principle of your argument as distinct from other arguments which you reject as inadequate or fallacious, and in common with arguments which you regard as sound. The rough and ready demand of the old syllogism with its "Why?" comes to me at least as refreshing from this point of view. Every sound argument has a core or special type of connection, and though the core is an abstraction and useless by itself, the special apprehension of it is a very desirable factor in addition to the detail of a complicated demonstration.

[1] No. 96. Cp. *Knowledge and Reality*, p. 316.

VII

IN WHAT SENSE LOGIC APPEALS TO THE STUDY OF MIND

1. Professor Mackenzie, in his *Elements of Constructive Philosophy*,[1] censures the practice of mixing up psychological enquiries into the process of thinking with the strictly logical theory of implication. Professor Husserl, in his very brilliant *Logische Untersuchungen*, has directed an acute criticism against the doctrine that logic is founded on psychology, which he finds exemplified not merely in Mill and Spencer, but in Sigwart and other distinguished countrymen of his own.

I wish to discuss the question in what sense the study of logic must appeal to mental experience ("Erlebnisse," experienced facts and operations of mind). To deny that logic is founded on psychology is one thing. To deny that "pure logic" involves propositions about mental process is quite another thing. The former negation seems to me unquestionably true, but the latter unquestionably false.

2. For the sake of argument I will take Husserl's indictment of "Psychologismus" in logic at its face value. I should suppose that at least as far as

[1] P. 103.

Herbert Spencer is concerned the indictment is just. With regard to Mill, Sigwart, and others whom he mentions in the same light, I believe that a critical discussion would be troublesome and unremunerative.[1] I do not want to burden my treatment with historical controversy. The nature of my contention will show how very difficult it is to avoid misunderstanding in this discussion. In justice, however, to English logic after Mill, with which Husserl does not appear to be acquainted, I cite a passage from Bradley's *Principles of Logic*[2] (1883), which is decisive of his attitude: "A simple method of stating the principle [of Contradiction] is to say 'Denial and affirmation of the self-same judgment is wholly inadmissible.' And this does not mean that if a miracle in psychology were brought about, and the mind did judge both affirmatively and negatively, both judgments might be true. It means that if at once you affirm and deny, you must be speaking falsely. For denial asserts the positive contrary of affirmation. In the nature of things (this is what it all comes to) there are certain elements which either can not be conjoined at all, or can not be conjoined in some special way; and the nature of things must be respected by logic."

But to illustrate Husserl's contention I cite part of the passage from Herbert Spencer which Mill has certainly quoted in two places[3] with complete approval, and I italicise the sentence which Husserl has selected as typical. "The Law of Excluded Middle, then, is simply a generalisation of the universal experience that some mental states are directly destructive of other states. It formulates an *abso-*

[1] For my view of Mill's attitude to necessary truth see *Logic*[2], ii. p. 229.

[2] P. 137. [3] *Logic*, II. vii. p. 184; *Exam. of Hamilton*, p. 475.

lutely constant law, that the appearance of any positive mode of consciousness cannot occur without excluding a correlative negative mode, the antithesis of positive and negative being indeed merely an expression of this consciousness. Hence it follows that if consciousness is not in one of the two modes it must be in the other."

By such a doctrine, the obvious criticism runs, the laws of pure logic, say, the Law of Contradiction or the Law of Excluded Middle, are based upon alleged psychical phenomena. They would then have to be regarded as empirical laws of fact, and this fact would not be a fact about the real world, but about the mental habits or constitution of a certain species of animals.

But this is not the sort of thing that logical laws affirm.[1] The Law of Contradiction does not say, you cannot entertain at once the idea or belief that A is *b* and that A is not *b*.[2] It says nothing about your states of consciousness and their correlations. What it says is that "A is *b*" and "A is not *b*" cannot both be true. It is an "ideal" law, true timelessly and apart from the facts of your thought or of mine. A timeless law, it is urged on the side of pure logic, can make no primary statement about facts in time, nor can it be derived from them.

This gives in a single case the whole indictment against "psychologism." It amounts to this, that by it the laws of logic are taken as founded on the observed psychical habits of minds in a certain species of animals.[3] The consequence seems inevitable, that these psychical habits might be accidentally

[1] Husserl, *L.U.* i. p. 99.

[2] I add, what Husserl does not say, that taking them as mere ideas entertained, it is arguable that they must, or at least may, be complementary parts of the same thought.

[3] Husserl, *L.U.* i. p. 125 ff.

related to the real world, and that either for us, or for some other species, it might happen that the laws of thought were not in harmony with the laws of things. The basis of all logic would be an *Inductio per enumerationem simplicem*, without a principle behind it.

Obviously, such a doctrine is fatal. That is to say, if we take psychology as an empirical or natural science, and logic as founded on the mental habits which that science observes and treats by induction, we have cut the connection between the laws of logic and the real world. No laws which speak in the tone of first principles of thought and reality can be founded on the observation of the psychical habits of a species. It seems impossible to hold in this sense that logic is founded on Psychology.

3. "Pure Logic" represents an opposite extreme. It relies on the distinction between truth or necessity and the mental apprehension of truth or necessity. Logic speaks about concepts, judgments, and inferences, which sound like mental facts; but in so speaking, it does not really refer to the facts of psychical life, but to the meanings, propositions, and necessary connections which, true independently of mental apprehension, are discovered and accepted in the mental processes just referred to. "Its laws are all the ideal laws which are grounded purely in the meaning ('essence,' 'content') of the notions truth, proposition, object, constitution, relation, connection, law, fact,[1] etc." They include the so-called laws of thought, the principles of syllogistic reasoning, of the calculus of probabilities, of arithmetic and ultimately of mathematics." [2]

All these truths depend in one sense on psychical

[1] Husserl, *L.U.* p. 122. [2] *Ibid.* p. 63.

processes,[1] some on activities of reference and connection, some on addition and multiplication, subtraction and division. But no one suggests that for this reason arithmetical or mathematical truth should be brought within the scope of psychology. And the same applies to the principles and combinations of pure logic, which are of the same general character if not absolutely one with those referred to. Pure logic deals always with meanings, not with mental processes; and, as I understand, with the more formal properties of possible collections or complications of meanings. Thus, for instance, the conjunctive, disjunctive and hypothetical interconnection of propositions [2] will be considered by it, not as types of reasoning which we habitually adopt in our thoughts, but as necessary steps in the complication of propositional forms. The ultimate goal of the science would be, as I understand, a general theory of the possible types of theories, or a construction and survey of all conceivable systems of order which a consideration of the formal properties of objects would generate.

All this is opposed to the consideration of Logic as the study of "our thinking," and to the treatment of pure principles, such as that of Contradiction or of Ground and Consequence as "Laws of Function" or as "Fundamental Forms of Movement" of our thought.[3] Such language involves an "anthropologistic" fallacy, and, as we saw above, makes truth dependent on the mental characteristics of certain classes of beings.[4] It is incompatible with the subsistence of valid truths which nobody knows.

The point of view implies a sharp distinction between real and ideal, and, in a certain sense, a

[1] Husserl, p. 169.
[2] *Ibid.* pp. 243, 247.
[3] *Ibid.* p. 126, on Sigwart.
[4] *Ibid. L.U.* i. p. 127.

rehabilitation of apriorism. Apriorism, indeed, as a mere necessity of our mental process, is rejected (rightly in my judgment) as a form of relativism;[1] but a different kind of apriorism, which rests on the ideality of truth and the severance of real and ideal, is the foundation of the doctrine.

"If all the beings of a genus[2] are by their constitution compelled to identical judgments, then they empirically agree together; but in the ideal sense of the logic which is exalted above everything empirical they may yet be in that case judging not unanimously but contrary to the conditions of meaning (widersinnig)." Sigwart does not carry out "the most essential discrimination, which precisely presupposes the sharp severance between ideal and real.[3]

This is enough to explain the attitude of Pure Logic so far as concerns the connections between logic and psychology. It is obvious, of course, and Pure Logic fully accepts the necessity, that in order to the discovery and demonstration of truth the human mind in its operations must in some way discriminate true from false, and some account must be given of this discrimination. And when we come to estimate the justice of its contention on the whole, it will be necessary to speak of what it postulates under the titles of "insight" and "self-evidence." But *prima facie* there is reason in its argument that if we can see that $2+2=4$, which involves a process of addition, without psychological analysis of that process, we should be able to do the same for the Law of Contradiction or the principle of the syllogism. It is not the habits of human thought that Logic investigates or depends upon; it is the content of ideal truths—truth founded upon the characters of con-

[1] Husserl, i. p. 124. [2] *Ibid.* i. p. 131. [3] *Ibid.* p. 133.

ceived objects and the laws and structure of their interconnection. Ideal truth is valid and immutable, whatever capacity for its apprehension this or that thinking being may display.

4. We admitted the falsehood of the extreme psychological position, according to which the fundamental truths of logic depended upon the facts and habits of a species of animal mind. But when we look again at the correlative extreme of doctrine which has just been sketched we seem to discover between the two a remarkable affinity. Is not the root of both these rather startling contentions actually one and the same, that is, the severance of real from ideal, or the suggestion that what operates in mental functions and in the conjunctions of temporal fact may be something other than what is revealed in the structure of ideal truth ?[1] Pure Logic seems to involve *the same* Psychologism as it charges upon others. It is a postulate common to both contentions that functions of actual thinking are not necessarily to be considered as expressions of the truth of things ; that the processes of mind are one thing, belonging to the facts of nature ; and that the first principles of truth are another thing, belonging to the ideal system, severed from facts in time and compatible with differences in these facts to an unknown degree. It is one and the same thing to say, with the psychological logician, that thought has its own necessity which gives no warrant that its truth is true of being ; and to say with pure logic that the truth of being is a self-subsistent system which does not necessarily

[1] Husserl, *L.U.* i. p. 122. " Facts are contingent, they might just as well not be ; they might be different." I understand Husserl to adopt this assertion, using it of course as an argument that logical principles cannot depend on facts.

reveal its character in the facts of mind.[1] Truth is inherently two-sided; and each of these contentions divorces its essential factors of reality and ideas.

Ideas, the former says, may be psychically necessary without being true of what is real. Truth, the other says, may be logically necessary, the ultimate nature of the real, without appearing in facts either of a given world or of mind.

What impresses me in this situation is that any reasonable account either of truth or of reality has been made impossible. Truth seems to me to have no meaning unless (1) it is reality;[2] (2) is in the form of ideas. It is the form which reality assumes when expressed through ideas in particular minds. It is unintelligible if this unity is broken up. If you suppose a course of ideas inexpressive of reality, or a reality which has no expression in ideal form, you have destroyed the essence of truth. This is the only way of understanding the paradox about the making of truth and its discovery. You can hammer upon either side of this antithesis for ever; but you cannot possibly make sense without both. Certainly truth comes to be when we find it out; the very determinations in which it consists, the selection and connection of things and relations, had for all we know no emphasis, no distinguished place in the scheme of the universe before or apart from our mental operations. But no less certainly it was true before it was found out; if it was not true before it could not be true when it was found out. It is of no use to deny either of these paradoxes; they naturally affirm

[1] Dr. Mackenzie, for instance, seems to me bound to hold both these views. *Elements of Constructive Philosophy*, p. 83.

[2] The phrase "it is *about* reality" suggests that its quality depends on representing something outside it. But this is upside down; it is reality which becomes truth when it takes ideal form.

themselves if we insist on dismembering an essential unity.

Thus we are led to reject both the positions we have considered. You cannot have truth except as reality in ideal form. And you cannot know reality except by apprehending the ideal form in its concrete spirit and all its detail. This does not mean that reality is qualified as or by a series of psychical events. The qualification of reality by ideas is from the beginning a qualification by meanings. This is the significance of thought, which is in its essence an effort to define the universe by meanings adequately conditioned; to reconstruct the unity of the real in ideal or discursive form.

This is why, as it seems to me, there can be no complete account of the system and structure of truth apart from an exhibition—not merely of its general forms by enumeration, but of the vital effort and process by which the needs of apprehension express themselves in the succession of forms, while and because they are wrestling with types of content in their concrete peculiarities. The forms, in short, must be interpreted as the spirit which, operating within the content, creates the system.

I will attempt to draw out this conception in detail, and to explain why logic has to take account of mental process in a way which is not necessary for special sciences. I may say at once that in the main it is merely because logic claims to deal with the whole system of truth-forms in connection, while any particular science only applies a few of them. Write down the whole system of truth-forms and you have, *ipso facto*, a large-scale though very diagrammatic map of the thinking mind. To connect them together by noting their vital process, to observe their critical

and complementary reactions on one another, and the suggestions which they furnish as to the possibility or the reverse of isolated or interdependent validity—to do all this is *ipso facto* to study logic in the light of the mind.

5. I proceed to indicate a view of truth in its relation to mind and reality which may, I hope, prove less one-sided than either of those from which we started. Truth, we suggest, is reality as it makes itself known through particular minds in the form of ideas. Ideas are pronounced by discursive thought to belong to or express the nature of reality; and this character of thought, which claims the title of truth, is a mode in which reality, the nature of the universe, manifests itself, and is present and living; just as it does in other modes, such as volitional and aesthetic experience. I will point out some considerations which support this view and illustrate its significance.

a. The essence of the judgment is the adequate and coherent qualification of reality by meanings, that is, by ideas apprehended as conveying meanings. The term adequate conveys that the impulse of thought is to include in its affirmation as much as possible of the nature of the real world. The term coherent conveys that this same impulse involves the requirement of systematic connection between the ideal determinations employed in the expression. Every judgment which is inadequately determined by the standard of the whole as recognised *ad hoc*, or which is inadequately conditioned by the standard of the system as recognised *ad hoc*, is suspected to be error, and is received, when so suspected, with an uneasiness and dissatisfaction which develop into the awareness of falsehood. Although in practical life

the demand for adequateness of conditioning is largely obscured by what appear to be conjunctions of bare fact, or adapted to special needs, yet it is always present in the mind, and much of the aptness and force of idiom depends on it. We do not say "the horse runs" or "the man gallops," "the donkey neighs" or "the jay sings." The conditioning subjects would refuse to justify such predicates. Nor do we say "that liar said you were here" when it was the truth he told, nor "that stupid ass has brought the car" when it was the right thing to do. And yet in bare fact, but for the demand of relevance, all these statements might be correct. We may indeed insist on a counter-relevance. "That villain really loved his wife"; but that is a relevance still. We are expressing surprise at a counter-condition which presents a problem. As we approach the precise formulation of knowledge the demand becomes more imperious. It is an error, though it may be a "fact," to say "a metallic object attracts the lightning" if you only mean that it attracts it as any other object may, perhaps in virtue of being in motion; or to say "an isosceles triangle has its three angles equal to two right angles," when the condition isosceles has nothing to do with the matter. It is inaccurate to say "water boils at 212° Fahrenheit," though we constantly see it do so. An essential condition, the atmospheric pressure, is omitted.

How can we know that our judgment is thus an expression of reality through our mind? How can we know that the habits of our mind are not merely ways of conjoining particulars, which are accidental facts of its life, and quite other than connections valid in the real world?

Here there are several points to note.

First, my mind does not come to me as a separable source that judges by connecting particulars *ab extra*. It comes to me as a full world which reshapes itself by its own impulse, involving, as it does so in certain respects, more or less of a peculiar satisfaction which attends upon adequacy and coherence. So far from misrepresenting the world, my mind as a volitional or capricious being cannot in the least affect that reshaping by the world of its own meanings which is judgment. If I am in a motor collision I shall probably be badly hurt. How am I to think otherwise? I only wish I could.

Further, my mind has nothing but the world's reality to draw from; and, again, the world has no way of becoming ideally determinate but through it.

β. There is something more. The separation of Psychology from Logic has largely been due to a vicious doctrine of Association. Mind, it has been thought, begins with chance conjunctions of particulars; and the laws of association are mere causal laws of conditions under which presented particulars come to be conjoined and reproduced in connection. If this were true there would be a chasm between logic and psychology which could hardly be bridged, and it would be true that the facts of mind were mere causal conjunctions of facts caused by some inscrutable natural mechanism or spontaneity. But this is not so, and with the refutation of this point of view the plausibility of the severance between real and ideal vanishes, as its truth has vanished before. It would be true in the main and in principle to say that no judgment can express a mere fact, and no association can reproduce one. What operates from the first in mind, long before explicit judgment, long before memory or the discrimination of particular

facts, is the reproduction of universal connections. "Association marries only universals."

Every judgment expresses a law of systematic connection. The explicit conditioning may be in any degree false or irrelevant, and may appear in the guise of a mere factual conjunction. But the spirit of the ideal is always there, and can be traced if not awakened by appropriate research into implications and by proper introspection.

This is all-important for the connection of psychology and logic, of mind *de facto* and reality *de jure*. The logician takes over, so to speak, the mental development from the psychologist at the point where instinctive self-guidance and self-adaptation by universal connections within reality [1] pass with the development of explicit thought into the act of qualifying reality by meanings, systematically connected and complete. He traces the spirit of the real operating through the mind not merely in every "form" or external shape of judgment and inference, as assertion, negation, conjunction, hypothesis, or disjunction are forms, but within every connection of content which is typical of actual affirmations. The apparent facts are only conditions within this system. They are means of specifying the laws. In every such typical connection the germinating system makes itself felt by peculiar demands, peculiar directions of satisfaction and dissatisfaction, peculiar pressures towards advance. It is essential to an account of truth to know by careful reflection what in every kind of judgment we really want to say. Great systems indeed separate themselves off, and profess to be independent of the real which is determining itself as a whole; but when held together with the self-

[1] As in a bird's behaviour on the recurrence of spring.

completing totality they evince their pretended independence, though practically actual, yet as ultimately precarious and conditional. There is no truth which does not qualify the real, and no real apart from that which shows itself ideal in truth. There *is* no other truth and no other real. Where else should they come from or reveal themselves ? Where is the positive something which not being a qualification of the one reality could appear as predicated through mind and constitute a falsification of our thoughts out of some private and peculiar spring or source ?

γ. Thus an intelligent view of the relation between logic and the mind demands, in addition to a right analysis of association as the marriage of universals, a true theory of error as the qualification of reality by genuine meanings inadequately systematised. The problem of error is just as urgent in the shape of the question " How is it possible to be wrong ? " as in the question " How is it possible to be right ? " It applies to the situation in this way. We suggest that all mental affirmation of meanings qualifies reality by something discriminated within its system. The mind is not a creative factory of error and has no private source of unrealities. But then the question stares us in the face, " Why are not all your judgments right and your conclusions sound ? " " If you say there is nowhere for error to come from, why are you nearly always wrong ? "

If it were the case that truth and falsehood were scattered through our assertions and reasonings like black and white squares on a chess-board, some absolutely one thing and some absolutely the other, and no gradation between the other and the one, the situation would indeed be inexplicable. But it is not so ; and the full answer in principle to the problem

set by error is that the mental determination of reality by ideas is never wholly wrong and never wholly right. It is never wholly wrong, because there can be nothing in experience which falls outside reality and so fails, under one condition or another, to qualify it. It is never wholly right, because in every determination—in every judgment—there is operative the life of the whole, and in it the ambition to qualify the whole completely, carrying with it the conviction of failure because of the shortcoming which it confesses. I am strongly convinced that introspection emphatically confirms this principle. Think of any serious effort to formulate complicated truth. Not only the poet and the truth-seeker, but the commonest man in the street, constantly feels tongue-tied before all that he wants to say.

The theory of error has to deal with the various degrees of inadequate qualification of reality within the world of abstraction, of imagination, and even within the world of self-contradiction. In all error a reality is qualified by a meaning, but the condition of the qualification is in various degrees inadequate and therefore resists literal inclusion in the total system of experience. This is the only method on which justice can be done to the status of imagination and of the various and conflicting systems of working ideas. If you set up a disconnected triple scheme—say of absolute ideal truth, of contingent fact, and of pure falsehood chimera and self-contradiction (which latter is intelligible but does not qualify reality)—it is altogether impossible to deal with the demand for justification of the limits which you assign to the real world. Is there, for instance, an unreal world outside that which is real and additional to it in some fantastic way ?

Clearly this will not do. Error is a side of truth, and truth implies error. Error is truth inadequately conditioned in the statement. But every assertory thought qualifies reality by a connection of meanings which in some degree belongs to it; and this apprehension of typical or universal nexus is the central feature of mind throughout from the point where its self-guidance first makes its appearance.

δ. Thus then in the assertory and inferential thought-function, from beginning to end, we are dealing with, and, I reiterate, we are distinctly conscious of and inspired by, an impulse to the ideal and adequate qualification of reality. When we have mentioned the word "thought" we have disposed of the distinction between psychical occurrences and the assertion of meanings. To think *is* to mean—to direct the mind's intention to an object through the instrumentality of a psychical state.

But having admitted the practically unlimited scope of error—though in every error the impulse to truth is implied, which, ordering a finite experience, must obviously proceed on the *cy près* principle, using what it has—we are obviously bound to indicate how truth can be discriminated from or within it. There are certain conceptions which are nominally common to all sides in this discussion. But the question is who really has a right to them, and can demonstrate it by giving an adequate account of them.

Necessity, intuition *a priori*, self-evidence; these are the typical phrases which are used to indicate the character by which assertory truths or sound reasoning vindicate themselves.

But when employed by the extreme psychological logician, whose conception we sketched at starting, none of these terms can convey a satisfactory indica-

tion. We are confined *ex hypothesi* to the characters of our private mentality, or of that which we share as specific, it makes no difference. Therefore our intuition is a mere apparent clearness in our private mind; our necessity is a subjective or nature-caused compulsion; our self-evidence is some kind of feeling which attaches *ab extra* to some of our assertions for unknown reasons, perhaps merely by habit and familiarity. Such is the criticism launched at them by pure logic and it can hardly be denied.

In the mouth of pure logic itself we hope to find that they have a more pregnant significance. Truth is now something which subsists, independently of the apprehensive process, and we may expect it to present characters by which it may certainly be distinguished. But so far as I have seen, pure logic is not strong on this side of the matter. Intuition which perceives self-evidence seems in the first place to be confined to abstract principles—the unity of the character of implication throughout knowledge cannot be appreciated where the character of judgment as a law of connection is ignored; and in the second place to seize in its act of perception the convincing character of truth, but what this character is does not seem to be distinctly determined. The crucial question, as I argued long ago, is whether self-evidence is conceived as belonging to principles as they stand within their own four corners, or whether it is a perception or presumption of some further relation which they hold to the entire system of knowledge.[1]

[1] My *Logic*[2], ii. pp. 224 ff. Mill's theory of "evidence" is of course his "larger logic," the doctrine of Induction or Logic of Truth (*Examination of Hamilton*, pp. 459 ff.); it has not, as Husserl supposes, to do with "evidence" = self-evidence. So far Mill's doctrine is opposed to that which Husserl ascribes to him (*L.U.* i. pp. 181, 189). There is nothing "psychological" about it.

For us the question of self-evidence is entirely one of the presence and presumption of implication, and applies in its degree to systems of fact, being all ultimately alleged connections of laws, no less than to abstract principles. How far in judgment we ultimately affirm mere facts is again a point on which introspection is helpful. Implication is, in other words, a relation of any determination to the whole to which it belongs, and ultimately to the whole system of experience, such that the assertion of the latter affirms the former, and the denial of the former denies the latter. It follows that self-evidence in isolation is really a *contradictio in adjecto*, and it is not difficult to show [1] that the fundamental law of thought and those elementary truths which affirm themselves in being denied derive their character from the simple alternative between the affirmation of a coherent system which directly implies them, and the impossibility of maintaining any affirmation at all.

ϵ. Thus implications which are rooted in very general or abstractly formal properties of objects may confer an appearance of self-evidence in isolation which a more complete consideration would dispel. Practically, I take it, we do not care on what grounds we assert the necessity of the Laws of Thought or of such propositions as $2+2=4$ or "two straight lines cannot enclose a space." If they were challenged, we should probably answer to the effect that if you are prepared to deny them you are prepared to deny anything, so that it is futile to enter on an argument. But this does not mean that each of them is a separate vision or intuition or revelation, standing within its own four corners and upon its separate merits. It means that we are aware that what these propositions

[1] *Logic*[2], ii. *loc. cit.*; *Principles of Individuality*, pp. 44 ff.

assert amounts to such a minimum of reality that, if it can be denied, there is nothing that will be left standing. So that the character of being affirmed by its own denial, which belongs ultimately to every proposition that can be proved, is in them especially visible with the least possible mediation or with none at all. But if such propositions could be truly denied, the Law of Contradiction would have to go, and it could not be the fact that things are one way only; it becomes an open chance that they may be two or more ways at once in the same respect, and so the conception of determinate experience would have to be, though it cannot be, abandoned.

It is a very significant feature of pure logic that it insists on the importance of highly formal characters and of apparent trivialities, *e.g.* $a + b = b + a$.[1]

It is just these which present the delusive appearance of isolated self-evidence or necessity, so as to support the idea of an intuition other than the insight into implications. Thus, *e.g.*, the sciences of mathematics or of symbolic logic may claim an independent status of necessity, which is incompatible with the real basis of truth.

At the other extreme of knowledge the same may appear to be the case with simple hard facts. What has happened here is that a very limited but apparently self-contained system has been erected *ad hoc* by a practical interest or an arbitrary intellectual objective. Then the reply, which satisfies this interest or attains this objective, appears to be complete in its isolation. The growing point of the serious judgment is artificially broken off.[2] A conventional end

[1] Husserl, *Jahrbuch*, 1913, p. 38; cp. Whitehead, *Introduction to Mathematics*, pp. 15 ff., on which see above, p. 110.

[2] See p. 122 above.

is imposed upon the aspiration of knowledge. "What is your brother?" "A college tutor; really a distinguished man; he has written——" "Thank you, a college tutor; that is quite enough." Or again, "How do you know that is so?" "A. B. told me; of course he may be wrong." "Oh, well; A. B. is good enough for me; his authority will justify me, and I need not enquire further." This is really the type of absolute facts which set up to be true by themselves, both as to their completeness and as to their evidence. They are true because they are all we want to know in their direction. Their isolated necessity means that they are good enough for our immediate purpose; but of course the connections motived by them are at the mercy of criticism.

When we come to the concrete sciences—biology, politics, philosophy—the theoretical unity of the system of experience awakens and becomes practical, and we find that we know nothing at all worth speaking of unless we know it in its full systematic connections. In economics, it has been said, you know nothing if you do not know it all.

Apriorism then has no meaning unless it indicates connection with the system of experience as organised and understood. Intuition and self-evidence, though they may appear to characterise isolated principles and provinces of knowledge, really refer to the vision of implication in the system of experience, and nothing more nor less.

6. In what sense then are we to conclude that Logic is concerned with the mind? We held that, in truth, reality and ideas are inseparably conjoined, and we suggested that, even by pursuing to the end the scheme of a pure logic, and arraying in order and sequence the constituent forms of truth, we should

obtain a large-scale map of the mind, though in its detail a mere outline, and moreover a mere diagram instead of the experience of a life.

Therefore, for a complete logic, it appears to me essential to trace and master the thinking function which elicits in ideal shape at once the nature of reality and its own, throughout all the nexus of its working, and not merely in its given results ranged side by side in the sciences and disguised in their detail. This is not to base logic upon psychology in the sense of accepting mental facts and habits as the evidence for real laws; it might rather be described as exploring the psychological field in search of the complete and continuous developments in which the thinking function proper reveals its nisus and ideal—the spirit of truth.

And, as I have urged, introspection is here necessary. The grammatical forms of sentences are framed for particular purposes, and never give a full and balanced conception of the truth-value they are employed to formulate. The categorical and hypothetical sides of affirmation are striking instances of this. We mean more than the sentence allows us to say, and sometimes less than it forces us to say. Propositions beginning with "all" are a well-known case of this.

I give, almost at random, some examples.

α. The truth or thought-function works from the beginning through identity in difference. It seizes a universal or typical connection, and modifies it, as a law including a range of cases, in adaptation to the data to which it is newly applied. All dealings of thought with universals are anticipated, and may be illustrated, by an intelligent animal's behaviour in face of a recurrent situation. This identity, operating

as a law, is a central character of thought, is revealed by a sound psychology of association, and is one with the character of the truth-function from beginning to end. If by a vicious psychology we fail to appreciate it, we miss the central unity which grows out into all the forms of truth, and confuse it perhaps with the similarity between particulars, which cannot really be developed into the principle of judgment or inference.

β. The identity which is the thought-function is inherently systematic, being an identity in difference. And it is impossible to understand the part played by coherence or consistency in every detail of truth unless we trace this characteristic as it shows itself in the relevance of idioms,[1] in the kind of satisfaction offered by an answer which mentions an additional fact in removing a doubt—showing that the question implied an inchoate system,[2] in the complex bearings of a significant negation, or in the conditions under which, failing to be systematic, differences conflict as contradictory. These considerations may not be technically psychological, but they demand careful observation like that of psychology; and apart from them we simply neglect a great proportion of the features by which truth reveals itself in characterising reality.

γ. You cannot safely affirm any logical law as self-evident *per se*. This follows from the systematic nature of truth, and is evident in such discussions as those which deal with the principles of the syllogism, of causation, of disjunction, or of hypothetical judgment. It is necessary to survey the meanings employed in actual thinking, and not to abandon yourself to the first formula which seems, taken in isolation, to do the work required.

[1] See above, p. 151.

[2] "Is that a dagger that I see?" "Yes, you can touch it."

Pure Logic seems apt to be careless about such things as the principle of the syllogism or of induction, the reciprocity of judgment, the exclusiveness of disjunctive alternatives. The reason I take to be that it is not in earnest with the systematic unity of the thought-forms as developments of a single function, but thinks of them rather as pre-existent laws which have isolated being, and may be discovered by the independent need for them in this part or in that of the system. As we have seen, pure Logic does not easily handle the truth-forms needed for the more concrete achievements of thinking, but is inclined to identify itself with highly complex combinations of relations founded in highly formal properties. It deals neither with the content of particular judgments, so far as this raises problems of relevance, nor with the conditions which connection with the whole suggests as essential to systems which claim independence. The relation of quality to the numerical system is an example. Truth, in short, is not merely an antecedent framework, but a spirit and a function. You cannot understand it unless you explore its operation and identify yourself with its effort.

δ. Particularly this is the case with Inference. Inference is the recognition of systematic implication, and its forms are differentiated by the influence of data and their character on modes of this recognition. Pure Logic, it appears to me, hankers after the Leibnizian ideal of arguments conclusive by their form only. But this ideal depends on the treatment of inference as a combination of completed and admitted types of implication, in contradistinction to the problem which can never really be banished, of recognising the growth of implication in wholes freshly constituted *ad hoc*. With a true conception of form

we can here observe the nature of reality establishing itself as a central identity of ideal determinations, among data previously disconnected for our apprehension. And though we can recognise the "form" at work, and apprehend it in our impulse and ambition by introspection, we cannot antecedently prescribe the conclusion, because the form is the spirit of the matter, and the matter is inexhaustible. In a word, the form of truth is individuality, and cannot be reduced to specified combinations of premises or to reasonings under principles. We can only apprehend its nature by ample experience of its typical operations analysed from the point of view of that identity in difference which reality manifests through the mind by ideal qualification.

Therefore I hold that whatever isolated and abstract lines of investigation may throw light upon aspects of truth, the whole must ultimately be checked, controlled, and systematised by explorations of the inherent pretensions and modes of operation which thought pursues, in connection and interdependence, within the focus of actual mind. Truth *is*, no doubt, as well as *does*. But you can only know and understand what it is by experiencing what it does, and controlling every experience of this by every other.

I am not competent to deal with even the general principles of the theory of order. But if, as I understand, it involves an antecedent determination of the forms of all possible theories,[1] I should have thought that it must be liable to the same objections which apply to the syllogism as a universal schedule of inferences. The sense in which an argument can be valid in virtue of its form only, and the limitation under which this is possible, have been sufficiently

[1] Husserl, *L.U.* i. pp. 247 ff.

elucidated in principle and in detail by our whole discussion of the problem how implication is operative in argument from the *prima facie* unmodified transference of a predicate in Barbara, to the creative construction of dialectic.

VIII

JUDGMENT AND SUPPOSITION

THE entire preceding argument involves the thesis that in the end nothing short of reality as a whole can be concerned in assertion and justify it. Every affirmation, every conclusion of an inference, rests ultimately on the basis, " This or nothing."

An opposite view is involved in Mr. L. J. Russell's contention (*Mind*, October 1918) that a supposition may suffice to carry a conclusion. And therefore it seems desirable to examine his position with care.

He traverses my essential argument first in the anticipatory statement on p. 437, " in his account of the element of fact in judgment we shall find a transition from ' posited system ' to ' real system ' depending on arguments which we shall have to reject " ; and in the argument in support of this statement, beginning with p. 446 and the footnote, and continuing over the three following pages. I quote from p. 448 : " We should, therefore, conclude that every judgment is relative to some system, whether real or supposed, which is sufficiently complete to render the judgment necessary ; for we hold that it is possible to construct various systems of this kind without finding it necessary to draw on any unspecified portions of reality. If we specify the

precise portions of reality on which we are drawing, then not reality, but the system we have specified, is the ultimate subject of our judgment." The last sentence is particularly noteworthy, and we shall find it, I think, untenable.

Mr. Russell thinks that you can draw conclusions from contents which are merely "posited" (supposed), and that they need neither be real (I disclaim saying that they need be) nor have any basis in reality. Here, I join issue. For him, the only question is whether you suppose *enough* to make a whole which is sufficient as a basis for your judgment. (Footnote p. 446, and pp. 447-48, especially *l.c.* and, commenting on my instances of illegitimate suppositions, "*in all these cases we are not supposing enough.*" His italics.) If you suppose *enough*, you need borrow nothing from actual reality, and your judgment does not depend upon it in any sense or degree.

Now my primary answer, which is given I may say in the whole structure of my *Logic* and notably in the discussion of supposition and of the basis of the hypothetical judgment (i. 266-67, 271-72), can be stated in four words. Judgment *must* transcend supposition. It is so simple and fundamental a matter that it is, certainly, difficult to explain further. It is a question of the distinction between two absolutely incompatible logical functions.

Make a supposition, as complex as you please; say, consisting in the total rules of a game like chess or noughts and crosses. Put into it everything you think necessary to determine the consequences you mean to draw. So far, of course, you have no affirmation, you have only a very complex antecedent of a hypothetical judgment, without any consequent. So long as you are merely supposing, the data or contents

you suppose, one might say, lie dead side by side. They do not combine or affirm anything about anything; they do not modify or confirm one another or exclude one another or the consequences of one another.

But now make a judgment, draw a conclusion, affirm consequential bearings of one supposed element on another, *e.g.* that given certain suppositions, certain alternatives are possible or impossible. It is clear, surely, that now you have done something quite new. You have, so to speak, infused the life of reality into your suppositions. It is like the nursery story, "The cat began to bite the rat"—the train of consequences begins to affirm itself. The contents of supposition wake up and begin to operate in the spirit of the laws of identity and non-contradiction. You begin to infer from the joint world of supposition and reality as in categorical inference you would infer from the real given world. You are drawing, that is, on the whole of what is in reality, of what may prove to be relevant anywhere in the universe, to sustain your conclusions, and you are challenging it to contradict them. Your supposition when it has been allowed for can draw no magic circle by which anything further in the universe can be barred out.

In other words, every judgment is inherently absolute. "How so, when we are expressly speaking of such as are conditional?" I answer, it is just the explicit condition which makes the judgment as such absolute. The explicit condition, by being stated, is discounted or transcended. It exhausts the conditionality of the assertion. When it has been allowed for, then, we are *ipso facto* saying, there is nothing else in the world that can interfere with the truth of the judgment. We are postulating, that is, that whether

all the ways are known or some not known, in every relevant way the universe supports our judgment.

If this were to be denied, as I hardly think it can be, it would no doubt be difficult to prove. One would have to appeal to the obvious implication of the judgment form. If there is anything necessary to its truth (or any hindrance to its truth), then that we intended either to assert (or to remove) in the explicit formulation of its condition or to postulate as the indispensable belonging of such a judgment. Otherwise we could not propound the assertion as true. Its truth would be liable to be interfered with by some just cause or impediment. Every one would admit, I suppose, that if a condition could be pointed out indispensable to the truth of our judgment, but unspecified in its explicit antecedent and not otherwise guaranteed, the uncertainty of such a necessary condition must make the judgment doubtful. Now every judgment affirms its own truth. Therefore it asserts that there is no such uncertain condition. And this establishes the point that when conditions are specified and conclusions drawn from them, the resulting affirmation presupposes *all* conditions, known or unknown, indispensable to its truth, and therefore claims a support from the real universe which cannot be measured or limited.

Now an indispensable condition of a conclusion from any world of contents is at the very least what I have called the life of reality; that is, the unity which constitutes a world, typified by the laws of thought, and by all such characters and categories of reality as may be employed in the suppositions in question. Mr. Russell manages to rule out space and time from the antecedents in the game of noughts and crosses; and more easily we can rule out the

existence of persons able and willing to play the game. These reductions are quite feasible; but it is significant that they *are* subtractions from the natural implication of the supposition, and that they are necessary if we are to get conclusions from it without the most obvious dependence on reality. But still we should have to recognise as a basis the "laws of thought," *i.e.* the coherent life of the universe, and at least the most formal properties of things, identity and distinctness and the rest, on which I think it is admitted that all mathematical truth reposes.[1] And perhaps more properties are involved than these. Perhaps the numerical system is not completely (though it may be provisionally) conceivable apart from distinctive quality, nor this, again, apart from the whole concrete universe. In any case finally, when we have drawn a conclusion from anything about anything, we have demanded support and challenged contradiction from anything relevant that the universe may anywhere contain.

I am exceedingly interested in the way out of this reasoning which Mr. Russell adopts. Dozens and dozens of times I have tried it myself. And of course I do not say but that he may succeed where I have failed. I will tell my story, and the reader must judge.

He urges, I "have not supposed enough." If your suppositions cover all you want to determine your object, then you can draw your conclusions from them without appealing to actual reality. This is so, we are told, in geometry (p. 446, footnote, *cf. l.c., supra*), "A genuine supposal if completely expressed must stand the test of self-containedness."

Here I always found two difficulties.

[1] Whitehead, *Introduction to Mathematics*, chap. i.

First, in principle, can any perfection of self-containedness cancel the contrast between supposition and judgment? Is it not inevitable that whereas the supposition "stays put" as you took it, the judgment, in virtue of the very spirit and laws of thinking, appeals to confirmation or challenges contradiction by whatever may be relevant in the universe?

Secondly, the manœuvre by which Mr. Russell tries, as I have often tried, to escape from this necessity, inevitably, so I have always found, brings one back to the ordinary partial supposition, obviously based on a surviving reality which it modifies.

The manœuvre is this (see *l.c.*, *supra*, from p. 448). You note certain factors of the real universe, of the nature of things, such as the "laws of thought" and the formal properties indispensable as the basis of mathematical reasoning, and probably other characters, according to the nature of your inference, together with the general assent or non-contradiction of the real universe. All this you may *include in your supposition.* Then you go on to say, "Now my supposed world *is* a world by the hypothesis, and works as a world, for I have supposed the life of reality to be in it. And it cannot fail to work as a world, for, tell me any character of the real universe which you think indispensable to my inferences, and I will include it in my supposition. So that my supposed world *must* include in itself, without any general appeal to reality, all of reality that is necessary to my drawing my inferences."

But at this point in the manœuvre it used to occur to me, "but can I really transform the function of supposition into the function of judgment by increasing the complexity of the former?" And it would

seem on scrutiny that now, under cover of supposing, I am really recognising and postulating. I am ostensibly including in my supposition certain elements of the real universe; but I do it, not because they are factors indispensable to the unique determination of the imaginative structure which I am creating, but because I recognise them as elements of reality which, very likely along with others of which I am not aware, are implied in the function of judgment which is the operation by which my conclusions are drawn.

Therefore, after all, in trying to suppose *enough* I have only set myself a task which cannot be achieved by supposition. My ostensible supposition falls into two parts. First, there is the side of genuine and normal supposal. I am positing such rules or data—wholly arbitrary so far as fact is concerned—as I desire to consider in their consequences and to make the basis of my game. As Professor Hobson, I think, has said, and Mr. Russell implies, a science such as mathematics may be looked at as just such a game. But then, secondly, there is the element of what I should venture to call abnormal and controversial supposal. I am including in my supposition, *of malice prepense*, those factors of the real universe which I recognise as indispensably implied in the function of judgment when occupied in drawing the consequences of such a world; factors which it would never occur to me *bona fide* to include in the essential determining rules of my game, such as the laws of thought and more or less of the properties of real things, together with the general condition of favourableness on the part of the universe in matters which may be unknown to me.

Now this second factor of so-called supposition is not genuine supposition. It is recognition or postula-

tion. It is not, in such a case, on the basis of my supposal that I am inferring. If it were, I could suppose these factors to be otherwise and modify my inference accordingly. But these factors I cannot suppose to be otherwise, for they are the basis of implication, and if I did I could draw no inference at all. They are the implications *ad hoc* of a function —the judgment—which, as we saw, makes an absolute claim to be true of the real universe when its conditions are once accepted.

It is the same case as if we tried the same manœuvre with any single partial supposition, by supposing, say, that I go to town to-day and act in a certain way, and then further professing to *suppose* that the world goes on otherwise as usual, and nothing happens to interfere with my acting in the way first supposed. It is obvious that the second part of the so-called supposition is an appeal to the actual nature of the world, apart from which and unsupported by it the earlier portion could give no result. For, say that it is not so, but is a mere supposal. Then it may seem to carry the first part a step further. "If so, I can drive; I can walk." Make it a tautology at once; "supposing I can drive, I can drive." This certainly seems to work, but can it be called a conclusion? Or if it is one, as passing from supposition to affirmation, is it not an appeal to underlying rules in the shape of the law of identity, "If black is white (reality is such that) black must be white?" But if you go a step beyond the bare repetition of your supposal, you find yourself again making a synthetic judgment which needs the manifest support of the whole reality. "Then I can drive to Hampstead." "Oh, well; that is as may be" is the answer; "that depends on many more things just now." The extra-supposition, *qua*

supposition, will never carry you all the way. Our attempt to suppose *enough* has resolved itself into just such a spurious extra-supposition. It is parallel to the postulate, on which every conclusion from inductive experiment depends, that the huge unknown environment, which no possible contrivance can exclude, is irrelevant to our inference, or, if relevant, favourable. These are not suppositions, but assumptions about reality, and to take them as absolute is indispensable to making judgments which claim to be true.

I believe, therefore, that this way out is a cul-de-sac. However plausible it may seem, there are two ultimate difficulties which cannot be got over: (i.) Whatever suppositions you may lay down, you can use none of them to draw conclusions except by a function of judgment which brings them into relation within reality. You could not reject a self-contradictory supposition by *supposing* the law of non-contradiction. The one *qua* supposition is as good as the other. It is only when you come to judge of reality that you are compelled to employ the law of non-contradiction as ultimate, whether you have supposed it or not.

(ii.) Every judgment, just because, after its conditions are made explicit, it is absolute and universal in its challenge to reality, is conditional on the unknown. It asserts itself to be unconditional, but obviously, for this very reason, its truth depends on the absence of hidden obstructions in the universe of unknown reality. Every judgment must transcend supposition.

"And hence," Mr. Russell says on page 445, "not reality, but some form of reality as modified by the supposition, would be the ultimate basis of such a

judgment." I agree to this, and I do not see that it involves me in any difficulty unless the words "some form of" were interpreted as cutting down the operative reality to what is specifically supposed. I should prefer, therefore, to say "not reality apart from the supposition, but the whole of reality as modified by the supposition." The suppositions are explicit; "the surviving reality" is to some extent known, or I could not use it in judgment. It operates as a universal in the new matter of the supposed content which is read as one case with it, as Mr. Russell has described on pages 444-45. Why should it not? Only because I am supposed to hold that the new matter must be "real." But I have explained that I do not hold this. What I do hold is that the "new matter" must be intelligible in connection with a real system, because, if not, you cannot judge about it.

Thus from my point of view it is not correct to say that "the exploration of a relational system must take the system in some one particular setting" (p. 437). This assumes that you can establish relational systems pure and unattached, and then move them about from setting to setting. It is not setting, but indispensable basis, that my view demands; or setting, if you like, *qua* basis and indispensable to the system. You can only judge a relational system, *e.g.* draw conclusions about the alternatives it permits, on the basis of the reality which survives in it, including at least "the laws of thought," *i.e.* the ultimate factual characters of things. If I was wrong, *e.g.*, about the character of actual space being represented in Euclidean geometry, it makes not the least difference of principle. All mathematics admittedly repose on the ultimate formal characters of things, not to

mention the general presumption which, as we have seen, is involved in all judgment as such.

To elucidate the operation of the "surviving reality" in the most completely imaginary of creations I recur to the example of artistic fiction, on which I laid stress both in an earlier discussion and in the *Logic*.[1] In a work of artistic imagination, though you could hardly conceive a supposal more complete and self-contained, yet at every point the creative thought is determined by a "surviving reality," and the degrees in which the consequences of the suppositions are moulded by the universal of this reality operating within the imagined content illustrate every possible relation of supposition to its basis in reality. This is what is referred to when we speak of the fundamental truth of poetry or fiction—truth to philosophical insight, to life, to dramatic character, to the laws of artistic coherence. The reality lives and operates in the supposition, and is expressed *mutatis mutandis* in every judgment to which the supposition can give rise.

[1] *Logic*, i. p. 274; *Knowledge and Reality*, pp. 140 ff.

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THE END

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