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STATEMENT AND INFERENCE

WITH OTHER PHILOSOPHICAL PAPERS

BY

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PART III
INFERENCE

I

THE GENERAL NATURE OF INFERENCE

§ 208. THE main object of the part of logic which precedes Inference is to study the forms and characteristics of propositions and terms (or, as is sometimes said, of judgements and conceptions) when they have been arrived at, rather than the manner in which they are attained, though the latter may require some consideration as subsidiary to the main inquiry. We have given reasons for preferring to speak of judgement, opinion, and apprehension in this connexion, and have maintained that the distinction between judging and inferring is false and, if assumed without scrutiny, leads to difficulties.¹ Logic is, however, also concerned with the way in which we arrive at judgements² and opinions, not with every way—not, for instance, with the processes of perception—but with that which is called inferring.

Before we begin the study of logic we are familiar with the idea of inference. It is an operation we conduct in everyday life and in the sciences. We do not learn it from logic nor did

¹ See the criticism of this doctrine in Part II, ch. I, §§ 39–41.

² On the use and abuse of the word judgement see Part II, ch. 2.

Chapters 1–4 were part of the Logic Lectures, though from time to time given as a separate course with the chapters on Induction. This accounts for some confusion in the opening which was never properly reconsidered. The chapters were continually revised in manuscript note-books of pupils, and new sections added. The structure goes back, however, to an early period and retains marks of what may be called the Kantian period of Wilson's thought. The criticism of the syllogism and of modern mathematical theories (Chapter 7) is, however, as Wilson would have left it in principle. Chapters 5–7 are from a separate course on Hypothetical Reasoning. Substantial additions and modifications were made in 1906. I have supplemented them from the original manuscript.

Wilson nearly always put the minor premiss of a syllogism before the major. I have altered it throughout as he nowhere justifies the breach of convention, and it is very confusing where, as in this part, the argument is largely formal.

logicians invent it, though they have often affected to teach it. Words like conclude and conclusion, proof and prove, are not part of a technical vocabulary invented by philosophers; they belong to the inferences of ordinary life. Although, then, some of the technicalities of the schools do make their way into the language of ordinary men, most of these terms are the familiar product of a certain natural logic and come simply from the fact that men have gradually been led to reflect upon the operations of their own thinking.

§ 209. If we consider instances in which we should naturally speak of concluding or inferring, we shall find that they are not instances of experiencing. Our attitude in experience seems to us to be mainly receptive, but in inference we appear to exercise an originaive activity either in the discovery of truth or in probable conjecture. It is this originaive activity of ours, as opposed to experience, which is one of the main characteristics of inference.

But we do not suppose ourselves entirely originaive. In the first place, we do not think that we originate truth but that we discover it. Secondly, we do not think that our method of discovery, in the process of inferring, is entirely independent and unassisted from without; we think rather that our activity consists in deriving the truth discovered from something already known and ultimately from experience. This brings us to another main characteristic of inferring; the knowledge it gets is derived from other knowledge. Hence we again have the idea that this kind of knowledge is in some way dependent. Thus, from the subjective side, inferred knowledge comes to be looked upon as indirect, as not immediate knowledge but mediated, while on the objective side the inferred facts are sometimes looked upon as dependent for their existence on those from which they are inferred. We sometimes even tend to put inferred knowledge on a lower level, somehow, than that from which it is derived. This is a natural outcome of the idea of dependence. It happens that an inferred opinion may be called a *mere* inference; and, with an implication of defectiveness, we may say of some kind of knowledge or opinion that it is only inferential, implying a want of something we think better and should probably call direct apprehension of the subject-matter.

Thus, it is often said, whether rightly or not, that we can only infer the existence of other people and do not directly apprehend their being. And here it must be pointed out that the depreciation of an inference as a mere inference seems to be confined to cases where the inference is not a certain one but a probability because of the uncertainty of the matter, so that the defect is not here caused solely by the *inferential* character of the process. It is otherwise in cases like our belief in the existence of other people, for there we do not doubt the truth which we say we arrive at only by inference, and yet we do feel a want of direct apprehension.

§ 210. Now this very dissatisfaction may so react upon us when we reflect upon it that we may incline to think that the inference in such a case is after all not really certain. We may reflect that it is somehow not like mathematical demonstration and suppose that therefore it is not certain. Yet, to take an everyday illustration, we should under ordinary circumstances be sure from the expression of a man's face that he was angry and show the firmness of our conviction by acting upon it, committing ourselves perhaps in consequence to some serious line of conduct. Here we should naturally call our thinking an inference. We inferred his state of mind, where we could not have the direct knowledge which he himself has of his own emotions.

On the other hand, we find no such depreciation as this in the sciences. There the highest value is given to what claims to be proof, that is, to what is rightly inferred. Nevertheless, in reflection upon the method of science, though the inferred knowledge is not depreciated as being inferred, the idea, nevertheless, of a dependent character in what is inferred often persists, as well as the idea of a certain indirectness and want of immediate apprehension.¹

Whether all these ideas and tendencies are justified or not we shall be better able to judge when we have advanced further in our study of the subject. We must at the threshold be prepared for the possibility that the problems we have indicated may involve different kinds of inference, and that the answers to them may therefore be divergent. It might be a question,

¹ This subject is resumed in ch. 4, *infra*.

for example, whether there is the same directness, or even the same sense of the word, in a probable inference about an object of experience (say the inference that the pea is under the thimble) as in certain geometrical proofs. The inference about the pea and the thimble seems to point to a real difference in kind between inferential opinion or judgement and another method of framing a conclusion on the same subject-matter.

§ 211. The most general account, then, of the problem of logic in Inference is perhaps this: to study the forms and the nature of that activity of the mind by which we advance from given judgements or opinions to new judgements or opinions necessitated or made probable by the former, not by experience but by some other operation of the mind. Yet here also there are difficulties. This operation would usually, perhaps always, be called thinking as opposed to experiencing; yet there is often considerable vagueness as to what 'thought' should precisely mean,¹ and difficulties arise if it is realized that perception is somehow intimately connected with what would naturally be called thought, though the nature of that connexion has not yet been cleared up or investigated. This at all events is true, that the advance in knowledge which is meant is, as we saw, not one made by getting some new perception to add to the given statements from which in some sense the advance is made. For when inference is supposed to be due to the operation of thinking we find a tendency sharply to distinguish this thinking as pure thought from both experience and imagination. This is undoubtedly the case with the formal logicians, who suppose that formal reasoning, which really means reasoning from the mere forms of statement without any matter, proceeds entirely by pure thinking.

Yet imagination is absolutely necessary to the processes of those sciences which seem to be the most perfect type of what can be produced in the way of new and certain judgements by inference. Geometrical thinking, and indeed all mathematical inference, is impossible without imagination, and it is even true that the abstract reasoning treated of in formal logic (which consists of syllogisms in which the premisses seem to be mere forms of statement and can therefore be expressed symbolically),

¹ Part I, ch. 2.

reasoning which is often taken as the type of pure thinking, is quite impossible without the use of imagination. Again, imagination depends upon experience, and thus inference stands in essential relation to experience. But notwithstanding this connexion with experience and imagination, it still remains true that what is really meant by inference is that the new knowledge we reach we do not reach simply by getting fresh experience.¹

In view of these very real difficulties the best way to form a correct idea of inference appears to be to study first those inferences which are certain and which constitute knowledge, or which at least we suppose to be certain, for it seems obvious that we can, in a given subject, only understand the imperfect type from a consideration of the perfect. We shall accordingly begin with a consideration of this kind of inference.

§ 212. It will be observed that the above general account, in common with the usual definitions of inference, has an important presupposition which is not always sufficiently reflected upon. Thought in this inferring process is spoken of not as absolutely originating truth,^a but as starting from some truth, whether that is given in experience or not. In the technical language of logic the judgements or opinions from which the thinking process thus starts are called premisses. The judgement or opinion to which thought advances by its own operation is called the conclusion. Now it is obvious that the conclusion must be different from the premisses and in some sense really new. The propositions 'all A is B' and 'some A is B' are different, but the latter is not new if we have the former. That this should be so is self-evident, but that it is also recognized explicitly in logical treatises is shown, for instance, in the objection to the syllogism that it is a *petitio principii*. For the meaning of that is that the conclusion does not seem to be new as compared with the major premiss. It should be observed that this demand is made even in an empirical logic like that of Mill.^b He will not allow an argument to be a true inductive

¹ Evidence of the really distinct character of inference as a form of apprehension may be drawn from the hypothetical statement. There we have at any rate knowledge or opinion expressed which can be got only by inference. Cf. §§ 102 and 298.

[^a Cf. my note to § 39.

^b 'Cases of inference in the proper acceptation of the term, those in which

inference unless it contains more than is contained in any single premiss. Now this involves a presupposition which he has not reflected upon: it implies that the new knowledge is not the result of experience and must therefore be due to the inferring process itself. Thus, the conclusion is unavoidable that in some important sense a mental process which is not experience can originate knowledge. It is futile to object that the mind merely works on the material which is given in experience, for this implies that we are able in the process to get on to new knowledge not in the material. This then must be due to the mental process which brings the new result. Such origination contradicts the very foundation of an empirical philosophy like that of Locke and Mill.

Here we are not so much concerned with this criticism as with the light which it throws on the important principle presupposed in the ordinary idea of inference, in so far as we find that it forces itself even upon those philosophers whose doctrines make it, one would have thought, impossible to admit it.

§ 213. Inference is usually divided into mediate and immediate. To judge from the instances by which the distinction is illustrated, the idea at bottom of it seems to be that in immediate inference we pass directly from one premiss, i.e. from one given judgement or opinion, to the conclusion by a mere reflection on the given premiss. In mediate inference something comes between a given premiss and the conclusion, that something being another judgement or premiss. Thus, immediate inference has only one premiss, mediate has at least two. We may represent this mediation in another way. In a given premiss it would be said ordinarily that we have two conceptions in a certain relation. To be more accurate, the premiss states a relation between two objects of apprehension.¹ The inference is immediate if we arrive at some other relation merely by considering the given conceptions themselves, by considering, that is, what we apprehend in these two objects in the act of apprehension represented by the given premiss. It is mediate if we get a new relation by the help or mediation of some new

¹ See Part II, ch. 14, on the use of the term conception.

we set out from known truths to arrive at others really distinct from them. *System of Logic*, II. i, § 3.]

conception not contained in the premiss; by the help, rather, of the apprehension of something else not contained in our previous apprehension.

Now clearly this latter can only be done by relating the given conception (so called) to this other conception, and such acts of relation are judgements or opinions, and hence we get more than one premiss. We get exactly two if we represent the process as follows: we find ourselves unable in a matter of two conceptions, on the strength of the knowledge which makes them what they are for us at the moment, to relate them in some particular way. Thus (we should say), we cannot connect them directly. We then mediate their connexion by a new conception to which each is related: each relation is the matter of a judgement or opinion, and thus we get two premisses.

§ 214. The above account of mediate and immediate inference is not offered as a satisfactory definition of what such terms ought to mean, or even as implying that inference is properly so divided. It is intended rather as an explanation of what the traditional distinction amounts to. Thus, if we find it stated that an immediate inference is one in which a judgement follows immediately from another judgement, it might well seem a more natural construction to put upon the distinction of mediate and immediate inference to say that if a judgement A necessitates another judgement B directly, that is immediate inference; and if that judgement B in turn necessitates another judgement C directly, the inference from A to C is mediate, because the connexion of A and C is only acquired through B. But that is not the traditional sense of mediate inference, for, in the ordinary deductive logic, the syllogism is the main type of mediate inference, and such a definition does not suit the syllogism because in the syllogism the first premiss is not supposed to necessitate the second. In the end we shall depart so much from tradition as to show reason for calling all inference in an important sense immediate. No doubt such a view seems at first sight paradoxical, if we are under the impression which the account of immediate inference in formal logic naturally makes upon us; for we should not expect that such so-called inference is real inference at all, but that immediate inference only gets its name by a kind of analogy.

§ 215. The syllogistic logic in treating of inference has only before it the general form S is P or S is not P , with the quantitative distinctions all S , no S , some S , and this S . What it does in effect in the case of immediate inference is to ask, given a certain judgement or proposition in one of these merely general forms, what relation can be inferred between the subject and predicate conceptions (more accurately, between what corresponds to them in reality) or their negations,^a besides those stated in the given proposition? Further, it is an element in the problem as usually conceived that the conclusion of the inference should be restricted to the form in which the so-called original subject and predicate conceptions and their negatives are to make up the subject and predicate conceptions in the conclusion. For example, from all A is B , we may infer some B is A , or no A is not- B , but not, for instance, that A and B are compatible; for the predicate 'compatible' does not occur in the premisses. Again, the inference from all A is B to some B is all A is not recognized as an immediate inference, because a restriction is made that the so-called predicate is to have the original adjectival form, or at all events is not to be preceded by a quantitative word like all, or some.

Such restrictions are clearly artificial, but so, too, is the whole account of immediate inference. It is not meant that these restrictions are formulated and consciously made; they are at first simply the result of an uncritical tradition. The inference B is less than A from A is greater than B conforms indeed entirely to what is essential in the definition of immediate inference as it seems to be understood in syllogistic logic, and we note also that it is this kind of immediate inference which is most frequent and important in ordinary life, and in the procedure of the sciences. According to the doctrine of the syllogistic logic, it would be said that in such cases the immediate inference is from the matter of the proposition, not from the form, whereas in the immediate inferences treated of the inference is from the form and not from the matter.

Now even if this were true, as it is not, it would not be any reason for neglecting the 'material' immediate inferences, unless it could be shown that they are comprised under various kinds

[^a viz. what formal logic names their *contradictory* terms.]

of immediate inference from the form merely. Now clearly they are not so comprised; the relation of A to B in the proposition all A is B is neither the same as A is greater than B nor does it include this relation, for in 'A is greater than B', A and B cannot be represented as subject and predicate respectively, nor as subject and attribute, nor could the given inference from A is greater than B be derived from it by any rule of immediate inference given in the syllogistic logic.

Nor, again, can these material inferences be represented as syllogistic; the attempt to represent them as such would result solely in stating as a premiss of the given inference that if A is greater than B, then B is less than A, and next in subsuming under it a particular A and a particular B; whereas of course it is not the proposition that this B is less than this A which we are concerned with. The inference is the alleged premiss itself.

The fallacy of such verbal reductions to the syllogistic form will become more apparent when we criticize the traditional reduction of all demonstrative reasoning to the syllogistic form. There it will be shown that this form is but one among many of a certain class and that the other members of the class cannot be reduced to it.

We can now see what the general notion is which is common to both of these kinds of immediate inference, and we can see that the type of immediate inference studied in formal logic is but one among many. The general type is, that from some given relation between two elements X and Y we infer directly, and without the addition of any other statement about them, some other relation between X and Y. Now the syllogistic logic confines itself to one only out of many possible relations, that which is usually expressed by the term predication. The term, however, is used uncritically, for subject and predicate do not here mean logical subject and logical predicate proper. In this reference, the proposition is supposed to have the form S is P, or S is not P, and it is meant that in this form P is the predicate. Now the true relation of S and P (the relation which the syllogistic logic has here in view) is this: P-ness is a kind of being which S, the so-called subject, is stated to have or not to have. The relation therefore is an objective one.¹ But any other

¹ Part II, § 68.

relation between two such objects upon which an immediate inference can be grounded is equally entitled to a place in any theory of immediate inference.

To return now to a previous point, it might be said that our ability to infer immediately from the statement A is greater than B that B is less than A depends, as it really does, upon our knowledge of the *matter* of the relation, in other words, on our knowledge of the special character of the relation greater and less, whereas the other kind of inference depends upon the general *form* of the judgement or statement without any matter. Now this would be a false distinction. The one kind of inference is as material as the other. Just as from the statement A is greater than B, our inference that B is less than A depends upon our knowledge of the relation of magnitude, so also our inference that some B is A from 'all A is B' depends upon our knowledge of the nature of the special objective relation which has here, through a confusion, got the name of predication (which properly designates a merely subjective relation). Moreover, as we shall see hereafter, the rules of the syllogistic logic depend upon the special nature of this relation, and, in this sense, are as much material inference as any other. The subject of immediate inference is treated in the ordinary logic manuals under such heads as conversion and opposition. We are not, however, here concerned to follow this in detail, but only to consider in general the relation of the conclusion to the premiss in such immediate inferences, to ask how far they constitute a real step in thinking and what claims they have to be called inference at all. We shall also have to speak of other kinds of immediate inference besides these so-called 'formal' ones.

§ 216. The statement some A is B might be called an immediate inference from all A is B, but it does not satisfy an essential characteristic of inference: it is less than we knew in the premiss. Consider, however, the relation of some B is A to all A is B (the only form of immediate inference by conversion from all A is B allowed in formal logic). The inference in the form some B is A appears no longer to be, like some A is B, a mere part of what we knew before, in the sense of being less than what we knew before, for the true full inference is some

B is all A.^a We ask, then, the verbal form being different, is there a difference of meaning such as we require for inference? In the facts expressed by statements such as all A is B, or A is equal to B, or A is a friend of B, the realities to which A and B refer stand in a reciprocal relation to one another, and the nature of each is affected by its relation to the other in the obvious sense that the being of each includes the relation. But the relations included in the complex fact of the reciprocal relation of A and B are various. Sometimes they are different in species, and then the difference is seen at once, as in A is the father of B and so B is the son of A. But the same is true even when the relations are the same in species; if A and B are friends, A's friendship for B is different from B's friendship for A. Even in such an instance as A is equal to B the same holds. Each of these different relations is expressed by a separate verbal form of statement, e. g. by all A is B and some B constitutes all A. Even if we confine ourselves to the traditional form some B is A, that expresses a relation of B to A different from the relation of A to B. Such difference of relation we may illustrate more concretely, thus: A is half B; in that way A is related to B; an immediate inference is that B is twice A, representing the relation of B to A. These two relations are obviously different, the half and the double. But now the relation of A to B and the relation of B to A being different, they nevertheless necessitate one another and the act of judgement or opinion involves in either case, for the person forming it, the other relation, though he does not express it verbally. The objective fact, indeed, to which the first statement relates is a unity, having two sides represented fully by two statements; the two sides are not merely parts of an aggregate, but are inseparable; the complete fact to which the statements refer being their unity. The expression, however, in either of the two statements is as expression one-sided;^b which side it will happen to take depends on what we have taken as our starting conception or logical subject.

We see, then, that the so-called inference is in a sense not

[^a This is to adopt the extreme view of one school of formal logicians. But then, in Wilson's sense, there is no inference since all A is some B and some B is all A are statements of identity.

^b 'Consider the implications.' *MS. note.*]

new; and this is what causes us our difficulty and makes us doubt whether the inference should be called inference at all. It is not new; the conclusion is involved in the act of thought which makes the premiss; the truth being that the premiss brings out one side of the act of thinking, while the conclusion brings out the other side. Yet we cannot call one of these statements identical with the other, nor is one a part of the other: each of them involves the whole, which gets its expression verbally in both together. Now it is because of their difference, which, as we have seen, is not that one is merely part of the other but that they express two different relations, that such inferences are entitled after all to the name of inference. They satisfy this definition, that the one is different from the other and necessitates the other. The process from the one to the other is not on that account the less inferential that it is so simple, and it will actually turn out in the end that this immediate necessitation by one element, or complex of elements, in a whole, of another element, or complex, in the same whole is what always constitutes inference.

Inasmuch, however, as the simplicity of the process tends to mislead us and to make us think that in the immediate inference there is merely a repetition and at most only a change in the verbal expression, it is useful to observe certain examples. Consider the immediate inference^a from all A is B to no A is not-B. Suppose we start from all A is B: that necessitates no A is not-B, and the latter states explicitly an element in the whole thought to which the first statement, as a partial statement, corresponds. For we ask first whether A can, or cannot, be B, and have before us the possibility both of all A is B and of some A is not-B. In deciding for the first we exclude the second.

The two, then, are inseparable aspects of the same truth, but the difference between them appears at once when we consider how each can be got. Though each is necessary to the other, they are not in our thinking co-ordinate, for we find we can only possess the universal negative in the form of an immediate inference from the affirmative. We might think at first that we could get each independently; that, while we get all A is B by finding that the nature of A necessitates B, in getting the

[^a 'Rewrite this more clearly.' *MS. note.* See Part II, ch. 12.]

negative we might, though ignorant of the reason why all A is B, have arrived at no A is not-B simply by finding that there was no A outside B. But, as we have already seen, in many instances (and indeed in every instance of a scientific universal), this last process cannot be performed independently, because the area of not-B is infinite, and hence we can only tell what is in this sphere or not by considering positively the nature of A and the nature of B. In the cases where we seem to form no A is not-B without the affirmative all A is B, we really depend entirely upon affirmations, which divide up exhaustively the indefinite sphere of not-B. Thus, the exclusion of A from not-B could not be an independent act involving mere negation; there is no way of arriving at no A is not-B except by establishing all A is B. Hence, we cannot arrive at the negative statement in question at all except as an immediate inference from all A is B. All A is B may be immediate in the sense that I see immediately that A necessitates B; no A is not-B cannot be itself an immediate apprehension, but can only be acquired as an immediate inference.

§ 217.^a It is sometimes said that the inconceivability of the contradictory of a statement is the test of its truth, and specially that it is *the* test from which we really derive the certainty of axiomatic truth. Now the preceding discussion of the relation of no A is not-B to all A is B gives us one criticism of this theory. The theory at bottom assumes that we can start with the negative A cannot be not-B, and upon that are able to ground the statement that A must be B; for the assertion that we cannot conceive the contradictory of A must be B really means that we affirm that A cannot be not-B and that we apprehend that directly, together with the implication that this judgement is acquired immediately. That is what is meant by calling it the *ultimate* test. But, as we have seen, we can only pronounce this negative judgement because we have already seen that A must be B. That is to say, this inconceivability of the contradictory supposed to be a test of the axiom is only the consequence of our already having apprehended the truth of the axiom. All that is true in the doctrine is this: that, if

[^a Referring to Mill's controversy with H. Spencer. *System of Logic*, ii, ch. 7; cf. *infra*, §§ 355 seq.]

we really see the necessity of a thing, we cannot conceive it otherwise.

§ 218. We may now give another kind of example of the reality of the step made in immediate inference. In what is called pure formal reasoning—the simplest of all—we sometimes find it either necessary or convenient to draw an immediate inference from one or more of the premisses in order to get our conclusion. Now this shows the reality of the process that we go through; that it must be something more than a merely verbal change. It will indeed sometimes be found that a complex of formal premisses, though obviously dealing with the simplest relations possible, causes us considerable difficulty, and we see our way through a complicated system of premisses by help of a number of mere immediate inferences. Indeed such difficulty is sometimes found with quite a few premisses. For instance, given that no AC is B, and no D which is not-B is A. The solution becomes quite easy if we first transform by immediate inference the second premiss, and put it in the form

All A which is not-B is not-D (= No A-not-B is D).

The original first premiss, then, being transformed into all AC is A-not-B, we have a simple syllogism in Celarent with A-not-B as the middle term, and the conclusion is that no AC is D.

Or, again, given that all AB is C, and all A-not-B is D. This is solved simply by immediate inference from the first premiss to all A-not-C is not-B, that is, all A-not-C is A-not-B. This gives us with the second premiss as major a syllogism in Barbara of which A-not-B is the middle term, and the conclusion is seen to be that all A-not-C is D.

§ 219. There are certain processes which we should on reflection not be inclined to call inference (nor are they usually recognized as such in logic) which yet have the verbal form of an inference and, if judged by the test which we have just applied to immediate inference, appear entitled to be called inferences because the argument seems to require the first step which is preceded by the word 'therefore'. Moreover, they seem sometimes to exhibit in the conclusion a real difference from the sum of the premisses. For instance, if we know that $a\beta$ is C and find first that A is a and then that A is β , it follows that A is C. This would usually and naturally be expressed as

follows: A is α and A is β , therefore A is $\alpha\beta$. But $\alpha\beta$ is C and therefore A is C . Here, while the step A is $\alpha\beta$ appears necessary, it yet seems to be only the two premisses together. Again, suppose AB exists, and we have A is α and B is β , therefore AB is $\alpha\beta$; but we know $\alpha\beta$ is C , therefore AB is C . The step AB is $\alpha\beta$ seems necessary. Further, it seems this time to differ from the premisses, because from it given alone we could not get the premisses. It is compatible, for instance, with A is β and B is α . Euclid in the first proposition of his first book uses an argument of the form $A = B$, and $C = B$: therefore A and $C =$ the same thing B ; but things equal to the same thing = one another: therefore $A = C$.

Here the first inference seems a mere restatement of the premisses, yet the step is in fact made and also seems necessary to the complete argument.

Again, it differs from the premisses either singly or together because the term 'the same thing' occurs in neither, and this seems got by a comparison of the premisses. This again seems a new act and not a mere restatement.

§ 220. To solve such difficulties certain distinctions have to be made which ought to be preliminary to any theory of inference, and are yet commonly, perhaps always, neglected, to the confusion of certain parts of the subject.

We must distinguish first between the thought which the verbal form given to a judgement expresses and the whole thought which produced the expression, for the former may not be the whole of the latter. As the judgement really is the whole thought which produces the imperfect expression, if the latter is taken as the true expression of the judgement, there arises the fallacy, common in logic, of distinguishing the judgement as a result from the thought said to produce it; an impossible abstraction, for this thought is the full judgement. What is called the process of arriving at the judgement is really the act of judging. Thus, in B is C , A is B : therefore A is C , A is C is represented as a judgement resulting by inference from the other two. But this inference is exactly the judging that A is C , and thus A is C expresses only a part and not the full judgement. The full expression is A is C because B is C and A is B . This solves the difficulty just raised about the proposition AB is $\alpha\beta$,

namely, that the premisses cannot be got out of it. AB is $\alpha\beta$ is only judged on the ground A is α and B is β , and so the full expression of the judgement (that is, of the thought which is necessary to make the verbal expression AB is $\alpha\beta$ possible) is AB is $\alpha\beta$ because A is α and B is β . Thus the premisses must appear in the only way in which AB is $\alpha\beta$ can really be a judgement, and the difficulty raised is a fallacy caused by the false abstraction of a judgement from the way in which it is judged.

We must again distinguish between the apprehension and the fact which is apprehended. It will be found that much depends upon the question whether the premisses are taken to represent the one or the other.

Thirdly, we must distinguish between our apprehension of a fact and our memory that the fact was apprehended (which is not necessarily a memory of the apprehension itself). Observe that if the apprehension was an experience, the memory of the experience (not the mere memory that it was experienced) is not itself an experience and is not a repetition of the previous experience. If, however, the apprehension was a process of proof, the memory of the full proof is itself the process of proof, or we may call it a repetition of the proof.

By help of these distinctions we shall see that in the cases under consideration the fact represented by the conclusion is equivalent to the facts represented by the premisses in conjunction and not something different from them necessitated by their conjunction, and that in this sense the conclusions are not inferences. On the other hand, we shall see that the apprehension represented by the conclusion, or corresponding to it, is not the same as the apprehensions represented by the so-called premisses, nor is it the same as these in conjunction, and the difference is not merely one of verbal expression.

§ 221. The difficulties may be resolved in this way. Consider first the premisses as representing the facts apprehended. The fact of A 's being α , and the fact of A 's being β , that is, the co-existence of these facts, does not necessitate A 's being $\alpha\beta$ as something different from itself. On the contrary, it is the fact that A is both α and β . And the other cases may be treated similarly. Consider next the premisses^a as representing acts of

[^a 'Change the example, since α here necessitates β .' MS. note.]

How many facts are there here?

apprehension. The facts A is α and A is β are in themselves not separate, but the apprehensions of them may be separate and, more than that, in some cases it may be impossible to have these apprehensions together. For example, the triangle formed by the diameter of a circle and by two straight lines drawn from its extremities to a point in the circumference is a right-angled triangle. It is true of the same triangle that the square on the diameter is equal to the sum of the squares on the other two sides. The apprehension of the first property is the proof given by Euclid in Proposition 31 of his third book. The apprehension of the second property is the proof given in the 47th Proposition of the first book, and nothing shorter. Neither of these apprehensions contains the other, nor can we have them simultaneously, as we cannot conduct two proofs simultaneously. Here then the judgement A is both α and β , which we undoubtedly ground somehow on the apprehension of A as α and the apprehension of A as β , is not the same as these apprehensions nor the same as their conjunction. It is therefore in some sense a judgement which is different from them but which they necessitate. It is on this account that the process has a resemblance to inference, and on this account also it is natural in the statement of the argument to add to A is α and A is β the statement, *therefore* A is $\alpha\beta$.

To see whether there really is an inference we must ask what exactly the apparently new judgement, A is α and β , is. Suppose we prove that A is α , and then prove that A is β . It would probably be said that in the proof that A is β , or at the end of it, we remember the result of the proof that A is α , though we have not the proof. The word *result* is somewhat misleading: it rather implies that we remember the mere fact that A is α without reference to the proof, because it is something different and resulting from the proof. But this is quite impossible; the accurate expression is, that we remember neither the proof that A is α nor the mere fact A is α , as a result, but the fact *that we proved* A is α . To put it otherwise, we are not really apprehending A 's being α but remembering that we once did apprehend it.¹ In the proof of A 's being β , *if it is all before us*, we have the apprehension that A is β . If we have this together with

¹ Observe, *not* remembering the apprehension.

the memory that A was proved to be α , this would be verbally expressed in the two inadequate formulae of judgement, A is α and A is β simply. And now is the judgement A is $\alpha\beta$ an inference from the apprehension A is β , and the *memory* that we apprehended that ' A is α '? It is not such an inference, for it is obviously nothing but having these two judgements together. The same is true if the verbal form of judgement A is β also represented not the proof that A is β but the memory that there was a proof. But again we may ask, is it an inference from the original apprehensions or apprehension? If ' A is β ' happens to represent the second apprehension, and ' A is α ' the memory that we had the first, the difference is only in what ' A is α ' stands for, and this is only the difference between apprehending that A is α and remembering that we once apprehended it. But now no one would call the memory that something happened in our apprehension an inference from the apprehension of it, though it is true that the apprehension here conditions something different from itself, that is, the memory that it happened. For an inference is always understood to be from what we have before us, what we are now apprehending. Now by hypothesis the given apprehension is not before us. The same is obviously true if both ' A is α ' and ' A is β ' represent memories that there were proofs of them; and if one or both of the original apprehensions was an experience and not a proof, exactly the same treatment applies. Thus, finally, though it would follow that the judgement ' A is $\alpha\beta$ ' is not properly called an inference from ' A is α ' and ' A is β ', we seem to have the explanation why it is natural to put in this step (therefore A is $\alpha\beta$) expressly. The reason is that when it is *naturally* introduced it represents a stage of consciousness which is different from the apprehensions (in the proper sense of the word) that A is α and A is β , is indeed a step necessary to the proof.

§ 222. The preceding investigation seems to bring out the reason why we hesitate to call certain processes inferential even when the step taken seems necessary, or at least natural, and therefore not a mere restatement of what has preceded. In the processes which we do not hesitate to call inferences the facts or fact apprehended in the premisses necessitate the fact apprehended in the conclusion as a fact different from them-

selves, and the latter fact is apprehended as thus necessitated. Now we have seen that this definition at once decides the cases under consideration not to be inferences. Again, it is these processes (i.e. such as correspond to this definition) which are those actually recognized in logic as inferences, though without a clear consciousness that this is so and of all that it implies. Now a principle which is correctly used in particular instances is not always clearly recognized in the abstract or correctly formulated. This has happened with regard to what seems the true principle of inference; the apprehension, one may repeat shortly, of one fact as necessitated by a different fact or facts. For inference in general is sometimes incorrectly represented as the necessitation of one judgement by another or others. If this were so, a memory, as necessitated by a given apprehension, should be regarded as an inference. But, as we have seen, nobody thinks of maintaining *that*; the real reason being that we are guided in this particular instance by a sound instinct and are using the true principle. For though in the given case the memory is necessitated by the apprehension, the memory itself is not an apprehension of this necessitation.

§ 223. The account given of the process A is α and B is β : therefore AB is $\alpha\beta$ would, from one point of view, make an inference in the third figure of the syllogism into an immediate inference.

The form of the figure is M is P , M is S , therefore some S is P (or some P is S).

The conclusion follows because the same thing M is both S and P . We have then M is P , M is S , therefore M is both S and P . The latter we have ruled not to be an inference from the premisses, but merely a statement of them as both holding together (which, we must notice, does not differ from the simple statement of them), and the inferences from it of some S is P and some P is S are immediate. Thus there would be nothing in the third figure but immediate inference. The syllogistic logic is committed to this anyhow, if ' M is PS ' is regarded as one judgement, because that logic does not recognize ' M is both S and P ' as an inference. But now this analysis is not confined to the third figure. Consider the first figure: all B is C , all A is B , therefore all A is C . The premisses, all B is C and all A

is B , may be combined in one statement, just as in the third figure. Thus some B is all A and is at the same time C , or some B is C and all A , and from this the inference to all A is C is obviously immediate. This, however, is only an anticipation of what will be maintained later, that the relation of the conclusion to the complex of premisses (whether syllogistic or not makes no difference) is always immediate, is not mediated by anything intervening.

§ 224. We have been led to recognize a principle which holds not only in the non-inferential processes we have been considering but in inference proper. What we have said of two proofs each with a single conclusion, that the apprehensions which they constitute may possibly not be present together, may hold within one of these proofs. For it may have parts which cannot be had as simultaneous apprehensions. The verbal form of a premiss A is B , used in drawing an inference, may correspond not to the apprehension of A 's being B , but to our memory that we have had such an apprehension; so that in the strict sense we are actually not judging the judgement ' A is B '. This, though not the exception but the rule in the vast majority of proofs, seems quite ignored in the usual treatment of inference. It has important consequences and, among other things, it seems to be a part at least of the key to the possibility of a kind of error in the exact sciences which is a stumbling-block to theories of knowledge and error.

§ 225. We may return to the contention that the judgement A and C are equal to the same thing differs from the judgements $A = B$ and $C = B$, because the term 'the same thing' does not appear in either of these two latter, which may be accounted premisses. It is true that it does not appear in the verbal expression, but it is contained in the thought which corresponds to this expression. For in judging $C = B$, we must recognize B as the same B which $= A$ or we should not use the common term B at all. If we had forgotten the judgement $B = A$ this would not be true, but by hypothesis we have not forgotten it. The reason for introducing the step in the verbal expression is that which we have already given for the introduction of the step A is $\alpha\beta$ or AB is $\alpha\beta$.

§ 226. Inference is often spoken of as if it were essentially

a connexion of judgements, as though the premisses were judgements which necessitated our forming another judgement. Shall we say simply that the judgement of the premisses (that is, the judging of them) necessitates the judgement of the conclusion? We have seen already that this, whether true or not, is too wide to be taken for a definition of inference, for it would include memory.

Now first observe that whether this is true or not it is in any case not the meaning of our verbal statement. If we say A is C because B is C and A is B, we do not mean that our judgements B is C and A is B necessitate our judgement that A is C, but we mean that the *facts* B is C and A is B necessitate the *fact* 'A is C'. In science again the value of such inference is not that somebody believes the conclusion because he believes the premisses, but that an objective necessitation is actually apprehended. Thus it is the connexion of the objects apprehended which is meant, it is this which is apprehended in inference and which is of interest and importance to science.

Secondly, we may truly say that I apprehend the conclusion, or have the apprehension represented by the conclusion, because I have the apprehensions represented by the premisses. In this sense one apprehension may be said to necessitate another. But, though true, this statement has a form which may mislead. Apprehension, we have seen, cannot be abstracted from what is apprehended, and there is a danger in separating them, as we have seen in discussing the *a priori* view of knowledge and the theory of the inconceivability of the opposite as a test of truth. There we have maintained that a necessary apprehension is only intelligible as meaning an apprehension of an objective necessity. We shall find this account verified in the case before us. How is it exactly that the apprehensions B is C and A is B can be truly said to cause or necessitate the apprehension A is C? Only in this way. I apprehend the facts B is C and A is B and then apprehend these facts as necessitating A is C. Now that means that the necessitation of the apprehension A is C by the apprehensions B is C and A is B is after all just the apprehension of the necessitation of the fact A is C by the facts B is C and A is B. Thus, as before, the necessary apprehension is only necessary because it is an apprehension of a necessity, and the

question as to how necessity in the thinking can correspond with necessity in the object cannot arise.

Finally, suppose that one or more of the premisses of an inference is not an apprehension proper of the fact that B is C or that A is B, but our memory that we apprehended the fact (experienced it) or proved it. If we remember proving that B is C and A is B, even though it be said that memory is uncertain, yet at least we *know* that, if we remember rightly that B is C and that A is B, the facts would necessitate A's being C.

§ 227. The definition of inference that we have given does not state that the connexion on which it depends is always one of universals, and yet we know that we always find it to be so.^a Now this is not because we define inference beforehand as only dealing with such connexion. We find in any instance where we could be said at all reasonably to apprehend the necessitation of a particular fact by another particular or particulars, that such necessitation is only a particularization of a necessary connexion of universals, and in the inferences which we are about to examine we shall always find that we have to do with this universal necessitation. Aristotle recognizes the universal character of inference in so far as he makes the reason or ground¹ to be universal, but he recognizes this fact as familiar without reflecting on it and without realizing the necessity of asking any questions about it, as is often the case with facts with which we are familiar. Clearly the question must be asked why inference should have this character. There is a danger of avoiding the difficulty by somehow including universality in our definition of inference, as some modern treatises do,^b thus over-

¹ αἴτιον, καθόλου. Cf. § 237.

[^a 'Consider and embody the fact that we seem to infer sometimes from what is peculiar to the individual.' *MS. note*. I have put in a foot-note (p. 434), from a hasty scribble, what was the difficulty Wilson felt. Cf. p. 481.

^b I am not sure of the reference. 'The universal in its differences is then the basis of mediate judgement or inference.' Bosanquet, *Logic*, II. i. 1.

'The general principle on which the validity of every conclusion rests may be expressed by the formula: "What falls under the condition of a rule, falls under this rule itself".' Kant, *Logic*, § 57. Cf. § 58. (See also *infra*, § 262.)

The statement about Aristotle is obscure. The general reference may be

looking an important point and evading a difficult investigation. We may defer the question until we have further examined the nature of inference in science.¹

¹ § 262. The nature of the universality is evident when we argue from a mark of what is of a certain kind. But there are instances where we argue from what is a mark of a particular individual alone, so that if there is a universal proposition implied it is of a different sort from the other, and it is important to see whether the view that inference is universal can here be vindicated.

το ἐν ᾧ παντί (συλλογισμῷ) δεῖ τὸ καθόλου ὑπάρχειν (*An. Pr.* i. 24). This is the formal rule *ex mere particularibus nihil sequitur*, but the reference to the cause appears to relate to the doctrine of the *Posterior Analytics*, that the aim of ἐπιστήμη is to connect the predicate with the subject through the proximate cause of the predicate. The major premiss, Aristotle therefore insists, must be καθόλου. Moreover, science is the search for primary, i.e. most universal, causes (*An. Po.* 72^a 4-5). But, on the other hand, the *Posterior Analytics* is full of reflection on the question whether demonstration is or is not universal, and on the superiority of true demonstration because it is universal (see e.g. *An. Po.* i. 13 and 24). In fact the *obiter dictum* would perhaps have been reconsidered.]

II

THE SYLLOGISM

§ 228. THE problem which a syllogistic logic proposes seems to be to discover the general forms under one or other of which all demonstrative argument must fall. This may obviously become the problem, from this point of view, of determining the general type of inference from two premisses. Now, in order apparently to get a quite general solution, this logic makes abstraction of the so-called matter of the propositions and deals only with what is called the form of the propositions. The premisses and conclusion, that is, are treated only under the general form of the relation of subject and predicate (where subject and predicate have the special meaning which has been criticized above), and appear only in these shapes: all S is P, no S is P, some S is P, and some S is not P. Singular judgments such as this S is P rank as universal. But the generality thus sought for is by no means attained by this method. In actual working the syllogistic logic has unconsciously taken quite a limited problem about a special kind of inference and of that problem itself has given but a limited solution.

§ 229. Even if the problem proposed were correct, namely, to find general forms for all inference (and we shall see that it is not), yet we shall find that the rules of inference laid down as preliminary to the discovery of valid syllogistic forms show that the solution actually offered is not the most general solution of the problem which is proposed. For instance, a rule of syllogistic logic is that no conclusion can be drawn from two negative premisses. Yet from no P is M and no S is M we do get a relation of S and P not given by either premiss alone, and that relation might be important. Again, if the middle is not distributed in one premiss at least, we are supposed to get no conclusion. Thus from all P is M and all S is M there should be no conclusion. Yet here again a relation is established

- ? not in Aristotle.

conclusion is not in Aristotle?

between S and P which may be of importance for some further inference. The fact is obvious that wherever there is a common element in any two judgements, that must serve to relate the elements in the two judgements to one another.¹ The truth is, that this logic does not inquire what inferences in general can be drawn from two premisses in the given general forms. It really asks: given two premisses with a common term (i.e. having the same conception as subject-conception or predicate-conception in each), when can we conclude from these to a proposition of which the subject-conception is one of the subject-conceptions or predicate-conceptions in the given premisses while the predicate is the remaining subject-conception or predicate-conception. Thus from no P is M and no S is M the problem really is to find a conclusion such that the subject-conception of that conclusion is either S or P and the predicate-conception either P or S. Now there is no conclusion from the given premisses which can have the given form, and that is the only justification of the rule that inference from two negative premisses is impossible. The same may be said of the rule about an undistributed middle. With this proviso, then, this special restriction as to the form of the conclusion, the rules of the syllogistic logic are correct; but as usually stated, without the necessary proviso, they are incorrect because they violate the elementary principle of all reasoning whatever, that things related to the same thing are thereby related to one another.

§ 230. The syllogistic theory is often spoken of as if it were an analysis² of the forms of demonstrative reasoning, but the striking thing and one which has not been sufficiently observed by logicians is that its method is by no means what is usually called analytical. It does not take arguments and abstract from them their universal forms, which is what would be understood by analysis. Indeed, if it did so, it could not have the kind of completeness and certainty within its own limits which it

¹ Observe that in § 219 the contention was that A is both α and β is not a real inference, not that there is no inference as to the relation of α and β . In fact α and β are related in the conclusions some α is β , or some β is α , in consequence of their relation to A, as in the ordinary view of the third figure of the syllogism. What was pointed out about this was that the inference is immediate from A is both α and β , not that there is no inference at all.

² Cf. the Aristotelian term $\tau\acute{\alpha}$ ἀναλυτικά.

undoubtedly has. It might show by examples the evidence for a form of argument, but its judgements would be empirical, wanting in universality and necessity. Its actual method is as much *a priori* and 'constructive' as that of any pure mathematical science. It starts with the general conception of a proposition, with a distinction of subject and predicate; it then distinguishes the possible varieties of proposition exhaustively *a priori* and not by any analysis or empirical examination of actual propositions. Then, again, it determines *a priori* all possible combinations of two premisses and determines from them *a priori* all possible varieties of conclusion of the limited kind described. This is exactly parallel to the method of a mathematical science, and it will become clear as we go on that the determination of the rules, figures, and moods of the syllogism, which occupies so large a part of this logic, is no part of true logic whatever, though valid enough in itself, but is a science in the same sense as pure mathematics.

§ 231. It must not, however, be supposed that this *a priori* thinking which we have been describing can proceed by pure abstraction only, although it does deal with forms which to a certain extent are abstract. We may perhaps think that in this kind of logic we work with the general form of the syllogism from the first and that we derive from that any application to particular cases. Now that is altogether impossible; we cannot understand these forms except by taking definite instances to show what the symbols mean, that is by having matter as well as form. Take, for example, all M is P, all S is M, therefore all S is P. To see the validity of this we must take a particular syllogism with actual propositions, and in that instance we must see directly the proper conclusion, which is as specific and definite as the premisses themselves. We must further see on reflection how the general form of the conclusion depends on the general characteristics of the form of the premisses. The first step, namely seeing the conclusion in a particular case, is the condition of our being able to reason at all in the particular way in question; the second, namely the abstracting process, is the condition of our being able to make the general logical abstraction^a of the syllogism. It is also directly self-evident

[^a "logical" reconsider.' MS. note.]

to us that the form we are abstracting is universally valid, because we can see that nothing in it depends upon the matter peculiar to the instance. Its method therefore is the apprehension of the universal in the particular, and we see how both imagination and perception are necessary to that abstract investigation, *a priori* as it is, which determines the syllogistic rules. This procedure does not indeed prove any rules of inference; it is simply the immediate recognition of them.

§ 232. The syllogistic rules, being but abstractions from the actual procedure of the human reason, cannot be described as rules discovered by the logician and laid down for the guidance of our reason: they tell us what reason necessarily *is*, in a certain limited department, and we cannot prescribe rules for what cannot be otherwise. This is not realized by the syllogistic logicians when they draw up a list of fallacies to be avoided. As reason has rules, they seem to think that these rules may be broken and sometimes expressly say so, and then they imagine that this is confirmed by the fact of error. They are rules, though the phrase is misleading, but they cannot be broken; if they could, no logic could ever instruct a reason capable of such error. On inspection it will readily be seen that the so-called formal fallacies arise from a misrepresentation due to the logician himself of certain actual trains of argument; these he treats as though they were intended to be demonstrations, whereas they are but probable arguments, which no one supposes to have proved their conclusions. The precept, for instance, about the distribution of the middle in syllogistic argument is absolutely nugatory; no one can perform the intellectual feat of arguing with an undistributed middle and supposing that he has a necessary demonstration.

§ 233.^a The ordinary analysis of a proposition on which the syllogistic logic is based, all S is P, implies a type of proposition in which the predicate is attached to each individual comprehended in S, or each case of the universal Sness, independently and not as being in some relation to the other individuals. Take the statement that all triangles have any two of their sides together greater than the third; here we can say that

[^a This section is marked 'to be rewritten'. I have found no redraft and left it in its present very lame form.]

each triangle has any two sides together greater than the third because each has the given property quite independently of the existence of other triangles. But now take the statement that things which are equal to the same thing are equal to one another. Here we can get no single subject expressed at all which will do for our purpose. We cannot, for instance, make 'each thing' the subject and 'equal to one another' the predicate. Thus the ordinary form of the syllogism is adapted to the first case but not to the second. In this second case it normally requires some trouble as well as considerable periphrasis to force the statement into the proper verbal expression required for the syllogism. We might put a given argument into this form. Every group of things such that its members are equal to the same thing is a group of which the members are equal to one another. But AB is a group of which the members A and B are equal to the same thing. Therefore AB is a group of which the members (A and B) are equal to one another. This conclusion we then have to interpret into A is equal to B or A and B are equal to one another, the natural modes of expression. The necessity of this form of reduction comes from the fact that A and B do not appear in the statement as separate subjects of a given predicate, but only as related members of a group. The artificiality of the reduction is obvious and the reasoning is clearer and simpler in the ordinary non-syllogistic statement of the argument. We shall see presently how such artificial forms arise, and that the true form of reasoning in such a case is not syllogistic at all. But besides this there are certain processes which concern statements of this kind (which we may define as statements of which the grammatical subject is a group of particulars considered as related in a certain way to one another), which the syllogistic logic leaves altogether out of account. We have already had an instance where A and C are equal to the same thing is derived from the two statements $A = B$ and $C = B$. Now, on the one hand, this process explicitly appears in the syllogistic presentation of certain arguments in geometry and, on the other hand, there is no account given of it in the deductive or syllogistic logic; for obviously it cannot be a syllogism that will give such a result. This shows how little the syllogistic logic is based upon an analysis

of given arguments; for the very first proposition in Euclid's *Elements* contains an example of reasoning of this kind, with the difficulties of which, from the point of view of syllogistic logic, we have been dealing.

§ 234. The syllogistic logic then has not solved its own problem completely. We shall now show that its problem is not the complete problem of demonstrative reasoning. We observe that in the syllogism the subject and predicate terms in the conclusion are related through their relation to one and the same term; and this relation is of the special kind called here predication. Now this is clearly a species of something more general, the relation of two terms to one another in virtue of their relation to a third term. The general problem, then, if conceived on the analogy of the problem of the syllogistic logicians, would be to find the general rules which can be laid down for determining the relation between two terms which follows from their relation to a third term. In the nature of the case the answer must be that there are no general rules. For obviously the rule of inference in the case of each relation must depend on the particular nature of the given relation itself. It must be got by our knowledge of the special subject-matter and cannot possibly depend upon any general forms of thinking or inference, as, for instance, on what is called formal thinking, which is supposed indeed (though, as we have seen, wrongly) to make abstraction of all such matter.

Take, for instance, the argument most B is C, most B is A, therefore some A is C. This argument depends upon our special knowledge or intuition in the department of quantity, that if we take of a given whole a quantity more than half and if we take in this same whole another quantity greater than half, there must be something common to the two parts. This is a matter of absolutely direct intuition, and no reason can be given for it other than itself. Clearly the rules of the syllogism would not give us the required conclusion. If we force the argument itself into the verbal form of the syllogism we shall find that we can only do so by a verbal transformation in which we make the argument itself its own major premiss. Thus: Two parts of the same whole which are each more than half of it must have a part in common, A and C are such parts of

a whole B, therefore some A is C. But the major premiss is nothing but putting into ordinary words what is meant by the symbolic expression If most B is C ($= BC$) and most B is A ($= BA$), some (B)A is (B)C, for B stands for any whole whatever, and (B)A and (B)C for any parts of it greater than a half. Again, the plane figure A is inside the plane figure B, the plane figure B inside the plane figure C, therefore A is inside C. This time the inference depends on our spatial apprehension. It is self-evident. The two premisses are quite sufficient by themselves, yet no syllogistic rule can get the required conclusion out of them.

§ 235. What now is the relation of the syllogism to this very general conception of inference? The answer makes clear the limitations of the syllogism. The syllogism does deal with a definite relation usually, though inaccurately, expressed as the relation of subject and predicate. This predicate is in the affirmative statement a kind of being which the subject has, either covering the whole of it or but a part of it, in which latter case the relation is called that of subject and attribute, and the same holds, *mutatis mutandis*, for the negative statement. It is our consideration of the special character of this relation that gives us the rules of the syllogism; in fact we recognize the rules of inference here as elsewhere because we have a direct intuition of the character of the special relation before us. We must, nevertheless, avoid the error of supposing that this relation is one which covers all other relations. It does not, for instance, cover the relation expressed by A is equal to B, where the relation of A and B is not that of predication. This relation of predication has perhaps been unconsciously confused with the general form of every relation because everything can stand in such a relation. But what does this latter exactly mean? The relation of father and son can, for instance, be put into the so-called predication relation, if we say, The father is father of the son. Yet the predication relation here obviously is not the relation of father and son, nor the genus of which the latter is the particular, for the son cannot be predicated of the father or the father of the son. These two terms do not stand in the relation of predication.

§ 236. All this mediate inference has a middle term, but it is

clearly not always that of the syllogism. Its definition is simply that it is a term to which the others are related, and as this relation is not always that of subject and predicate, so the middle term cannot always be the syllogistic middle term. We may easily verify the fact that in scientific investigations we are mainly concerned in seeking relations between given terms which are not in that relation here called predication. There is another consideration which will bring out the fact that the syllogism deals with a special relation and therefore with what is called matter in reasoning as opposed to form. We shall always find that the premisses are not the mere abstract form of the proposition. They are very abstract, it is true, but they are not all form; there is left in them just enough matter to make reasoning possible. In Figure I, for instance, there are two premisses, each of which may represent a universal affirmative. Now they could be mere form only if they represented the universal affirmative in its simplicity. But of that there is only one form (all S is P). Thus if we are really dealing with abstract form only, both premisses must have exactly the same form and identical symbols. Thus in the expressions all M is P and all S is M we have not abstracted all the matter. The term M is to be the same in both premisses; P and S are to be different in general and different from M. This, then, is matter which has not been abstracted. If it were abstracted, both premisses would be reduced to one and the same form. In fact all M is P and all S is M, as a general form, is the general form of two propositions which are different from one another. Thus the matter in them is that the subject-conception M in the one is different from the subject-conception S in the other, and the predicate-conception P in one from the predicate-conception M in the other, and finally that the subject-conception M of the one proposition is identical with the predicate-conception M in the other. This matter which has been left is precisely what makes the inference possible, for without it there would not have been two premisses but only one. We may illustrate this by an analogy from geometry. A theorem about two circles intersecting is universal, and it is right to say that it is universal because it treats of the relations of universals. But there is a sense in which it does not treat simply of the universal of the circle, for there is only

Hardly a fair criticism
— "identity of matter" is
not itself "matter".

one such universal, and we can't have the universal circle cutting the universal circle. That about which the theorem is demonstrated is the universal of two particular intersecting circles, or the universal of which the particulars are groups of two circles intersecting one another, and this depends indeed ultimately upon the universal of the circle.

§ 237. It is no doubt supposed by some to be decisive for the claims of the syllogism to be the general form of demonstrative reasoning that all demonstrative arguments can be reduced to the syllogistic form. This is taken as a fact readily verifiable though without an attempt to show that it must always be so. If we inquire why it really is that this apparent reduction should be possible, we shall discover the nature of the fallacy. If we take the syllogistic argument all M is P, all S is M, therefore all S is P, we can represent this as the application of a general principle to a particular case; we apply, that is, the general principle that all M is P to the particular case of the M's which are S. Now every particular inference which concerns a given kind of relation can of course be represented as the application of a general principle to a particular case, that is, as the application to the particular inference of the rule of inference which belongs to the given relation. Thus we can bring the argument verbally into the form of a syllogism. This obviously involves making the rule of the inference the major premiss in this syllogism, and the particular application of the rule of inference, the conclusion, will be represented as inferred from the rule of inference itself, as if the latter were a premiss. This in fact we shall find to be exactly what is done in the so-called reduction of what are really non-syllogistic arguments to the syllogistic form. Moreover, if the inference is put in a certain form which is really general, though employing special symbols, the reduction will take the form of which we have already had examples, viz. the inference to the general form, disguised in symbols, from itself stated without symbols. And it is clearly a fallacy to represent the rule according to which an inference is to be drawn from premisses as one of the premisses themselves. We should anticipate that this must somehow produce an infinite regress, and that this is so can easily be shown. But now observe that there *are* general forms of argument to which the proposed

reduction cannot be applied because the major premiss (in the reduction), which is the rule of inference, is nothing but the general form of the inference or argument itself. Thus the argument B is greater than C, A is greater than B, therefore A is greater than C, would be reduced to the syllogistic form by taking as major premiss the following statement, when of three magnitudes the first is greater than the second and the second greater than the third, the first is greater than the third, and as minor, A, B, and C stand in this relation to one another. But the expression, if B is greater than C, and A is greater than B, A is greater than C, is perfectly general, because taken to be true whatever A, B, and C may be, and it is because it is general that it can have this symbolic form. Thus it is the exact equivalent of the supposed major premiss from which it is pretended to be deduced. It may here be remarked that the theory of the so-called *dictum de omni et nullo* being an axiom of the syllogism or a canon of syllogistic reasoning is only an amusing instance of this same fallacy. This dictum is nothing but the syllogistic figure of which it is supposed to be the axiom written down in ordinary words instead of being partly written in symbols. To return to our supposed reduction. If we like to give the symbols a more particular meaning, so that A_1 represents not A in general but a particular A, we shall get by the proposed reduction an infinite regress. Thus let the argument be: $A_1 = B_1$, $B_1 = C_1$, therefore $A_1 = C_1$. The rule which has to be put as major premiss is, things which are equal to the same thing are equal to one another. Under this we subsume A_1 and C_1 are things equal to the same thing, and so draw the conclusion that they are equal to one another. This is syllogism I. Now syllogism I, which is of the form MP, SM, SP, in its turn exemplifies another rule of inference which is the so-called *dictum de omni et nullo*. This must now appear as a major premiss. The resulting syllogism may be put variously; the following short form will serve. Every inference which obeys the dictum is correct; the inference of syllogism I obeys the dictum; therefore it is correct. This is a new syllogism (II) which again has for rule of inference the same dictum; hence a new syllogism (III) and so on *in saecula saeculorum*.

The foregoing is an indirect refutation, of the nature of *reductio ad absurdum*. A direct refutation may, however, be given as follows. In the above procedure the rule of inference is made a premiss and a particular inference is represented as deduced from it. But, as we have seen, that is an inversion of the true order of thought. The validity of the general rule of inference can only be apprehended in a particular inference. If we could not see the truth directly in the particular inference, we should never get the general rule at all. Thus it is impossible to deduce the particular inference from the general rule, and the so-called reduction is merely verbal with no corresponding process of thought.

It is of interest here to remark that there is a natural and justifiable way of speaking which promotes that confusion of thought which has suggested these verbal reductions to syllogistic form. Take, for example, $B_1 = C_1$, $A_1 = B_1$, therefore $A_1 = C_1$. If we are asked why $A_1 = C_1$, we may answer, because A_1 and C_1 are both equal to B_1 , or because A_1 and C_1 are equal to the same thing. Now if a statement preceded by the word *because* is given as the reason for another, we tend to assume that if the reason is a true one the said statement must be a premiss from which the other is deduced. And this is in effect the doctrine of Aristotle. Yet we have seen that that is quite impossible in the particular examples we have examined. It is not true that the word *because*, however valid the reason it introduces, must introduce a premiss. What then does it precisely mean? In the given case we see that $A_1 = C_1$ in virtue of the fact that both are equal to the particular thing B_1 . That is the first step in our thought. But we reflect further that the equality of A_1 and C_1 , as apprehended, does not depend on anything else in them except that they both are equal to B_1 , nor on anything in B_1 except that it is the one thing to which both are equal. Thus we see that the inference may be generalized and that we can say that things which are equal to the same thing are equal to one another. This therefore, as being the only essential, we truly call *the* reason, and it is rightly preceded by the word *because*. Yet, as our analysis has shown, we can only get this generalization by an act in which we recognize it in the particular instance, an act which cannot

possibly be preceded by the generalization as a premiss. We recognize then that the true reason of a fact which we apprehend is not necessarily a premiss from which we deduce the apprehension of it, and we arrive at the very converse of Aristotle's view that in the proof the fact must be deduced from its cause (*αἰτιον*) as premiss.¹

This is the result of one of those principles which we have maintained to be a necessary preliminary of any account of inference, the distinction, namely, between what a given premiss means and our apprehension of it. To sum up, such arguments as $B = C$, $A = B$, therefore $A = C$, or, most A is C , most A is B , therefore some B is C , or any other reasoning which proceeds by relating two terms to one and the same term, are, in this general symbolic form, on the same footing with respect to logical analysis as the syllogistic forms, such as M is P , S is M , therefore S is P , themselves. The analysis is as ultimate in the one case as in the other, and if the first kind requires further analysis, in the sense that the rule of inference is to be explicitly stated, so also does the second; the truth being that in either case it is nugatory, for it turns out to be a mere restatement of the argument itself. In fact in every one of the inferences in question, the rule of inference is explicitly stated, requires therefore no further statement, the rule being precisely this statement.

§ 238. We have now to inquire what is the relation of the conclusion to either premiss of an inference taken by itself. We will consider generally the inference in which the terms, say, A and B are related to one another through their relation to the same thing M . A convenient symbolism is Br_1M , Ar_2M , $\therefore Ar_3B$, where the precise nature of r_3 depends on a knowledge of the relation r (the general form of the relation has the same main symbol r because the relations must obviously be of the same kind). The question how the conclusion is related to each premiss occurs in the ordinary logic in a special form which concerns the syllogism only, since it is the syllogism only which

¹ Aristotle never distinguishes the objective reason of a fact from the order of apprehension in our thought; he speaks as though the apprehension of the reason could precede the apprehension of the application to a particular case.

is considered there. In the syllogism the form of argument is such that a special difficulty has been felt about the relation of the conclusion to one of the premisses, the major. It has been objected that the major premiss, all M is P , must include the conclusion all S is P as a part of what it states, inasmuch as S is part of M . Thus instead of proving that S is P , we seem simply to assume a wider statement, which includes it, and this statement is the major premiss. This is what is meant by saying that the syllogism is a *petitio principii*. Let us, however, consider the more general form, which includes the syllogism. If the act of thought which gives us Br_1M is not such as to show us the side of M in which A stands in the relation r to it, then this act of thought Br_1M certainly cannot yield the relation r_3 between A and B . It requires to be supplemented by the other premiss, Ar_2M , which shows us that aspect of M to which A is related, before a conclusion is possible. The same is true if we ask whether the conclusion is contained in the premiss Ar_2M . Thus the argument requires both premisses, which proves that the conclusion cannot be said to be contained in one alone. Once more we observe the importance of distinguishing between what a premiss means objectively and our apprehension of this.

§ 239. Although the above reasoning includes the syllogism, we may consider the latter separately. Let the major premiss be all M is B . This premiss may be got in one of two ways. There are cases where the group M is exhausted; here the predicate B may be attached to each member separately, giving the general statement all M is B . Consider now a member A of the group M . The act of thought by which B was attached to M in general was by hypothesis one whereby B was attached directly to A . Thus the condition of inference is not realized and there is no true syllogism. The supposed conclusion A is B is an *explicit* part of the judgement or opinion all M is B . But, in the first place, no one in such a case would seriously give A is B as the conclusion. These exhaustible groups are of little importance. The universals studied by the sciences have infinite possibilities in the way of individuals, and even when, in the case of exhaustible groups, we have attached the predicate B to each member, we do not get the scientific judgement that

we require till we have found the common reason present in each member which causes its Bness: only then has *all* ceased to be an all of enumeration.

In a second group of cases all M is B may be arrived at on the ground that the universal nature of M necessitates B, and that in two ways. We may be able to see immediately that the nature of M, as such, independent of particular manifestations of it, necessitates B; that a three-sided rectilinear closed figure, for instance, must have three angles; or, again, this necessary connexion of M and B in their universal nature may be inferred as the consequence of some other fact.

But, secondly, all M is B may be based on a so-called inductive argument. For our present purpose this is in exactly the same position as the previous case, which may be called either the *a priori* intuition or the proof that Mness as such necessitates Bness. For though this statement is based upon particular instances of M, these instances are only of value because a comparison of them has led us to believe that B does not depend on their special and individual character, but upon the M which they have in common. In either case then the statement all M is B represents a connexion, known in the one case, believed probable in the other, between the universals Mness and Bness. Now this act of thought is clearly not an attachment of Bness separately to each individual; for, in the case of what may be called *a priori* connexion, no individual is considered as individual at all, while in inductive connexion the value of our induction depends upon our being able to apply Bness to cases which we have *not* considered, and this we do because we suppose the connexion to depend solely on the universal character of M however manifested. Thus, in the case of *a priori* intuition, the thought of M not containing all the species of M, we may require the minor premiss to inform us that there is such a species of it as A. In the second case the thought of Mness has not included every one of its realizations, and we may make abstraction of the particularity even of those we have observed. The connexion is between universals just as much as if we had never argued from any particulars. Thus when we apply a universal judgement or opinion got inductively to instances we have not observed, there is as before a true syllogism; we require in fact

a minor premiss to inform us that M is realized in the new instance.

§ 240. The conclusion is often said to be drawn from the premisses by an act of inference. This would seem to imply something more than the possession of the premisses, some operation in fact performed upon them. The operation may be described as, first, the combination of the premisses, and, secondly, the getting the conclusion from the premisses. What is in the first place clear is that there is an immediate connexion between the fact represented by the conclusion and the fact represented by the premisses taken together. There is, then, no reason why the premisses necessitate the conclusion, for they are themselves the reason. To put it otherwise, we can interpose no link between the conclusion and the premisses. Thus, what is rightly called from one point of view a mediate inference (as when I proceed from B is C and A is B to A is C) is nevertheless essentially immediate as regards the connexion of the conclusion with the complex of the premisses; and, in this sense, all mediate inference is as immediate as that kind of inference to which the name immediate is usually confined. It is obvious that we must always have immediate necessitation. Suppose that A and C are connected mediately through some link B. This, we might say, necessitates that A is connected with B and B with C, and so, if all connexion were by links, we must interpose something again between A and B, and so on *ad infinitum*. We can state then the true character of the necessitation of which inference is the apprehension, as follows: 'one element of reality, whether simple or complex, immediately and of itself necessitates the existence of another element, the elements being different.' It is this ultimate fact which makes what is called a *synthetic* universal judgement possible, and we may add that we may call those universal synthetic judgements, which are not acquired by a train of inference in the ordinary sense but are self-evident, inferences on this account, because they simply mean the immediate necessitation by one thing of something different from itself. So far therefore they share the nature of inference; whether they are really inferences we may consider later.

Let us now consider the subjective side. Since the objective facts corresponding to the premisses necessitate the fact expressed by the conclusion, with nothing intervening, it might seem that

when we have both the premisses we must have the conclusion, and that there can be no place for an act of inference to draw the conclusion out of the premisses, given the premisses themselves. This does not agree with the familiar usage of language when we speak of *drawing* the conclusion from the premisses, and yet ordinary speech is, in an important sense, justified. The possession of the conclusion is certainly not merely having the premisses in their original form. The act of thought which gives us such a premiss as Mr_1B may not show us that side of M of which we apprehend Mr_2A (and similarly for the act of thought which gives Mr_2A). Merely, then, to have these premisses in their original form would no more conduce to the inference than if we had them alternately. We must have something more. It would usually be said that we have to combine the premisses or put them together. This is no help; these terms are mere metaphors; we have seen their insufficiency already in their application to processes of thought, when discussing the combination, or putting together, of ideas. We must look into the nature of the process itself to explain them. What is right, however, is the recognition that *some* act of unification is required. Aristotle recognized the necessity of the unification of the premisses; indeed it could hardly escape notice when logical reflection had begun at all; but he did not happen to realize the necessity of elucidating it, and this causes at least an appearance of contradiction between the *Prior Analytics* and the *Nicomachean Ethics*.¹ In the *Analytics*² he quite clearly held that a man may have both premisses and yet not put them together, and so not have the conclusion. There is something in this, but it is not quite correct, and it requires careful examination, which it did not get from Aristotle, and it is this which produced the apparent contradiction.

Suppose the order of apprehension is Ar_1M , Mr_2B . Since the

¹ In the *Nicomachean Ethics*, Book VII, ch. 3, 1147^a 24 et seq., he assumes, throughout his discussion of the practical syllogism, that if you have two premisses you must have the conclusion. For his argument in the *Ethics*, the point of view of the *Analytics* would have suited admirably. I am forbidden to take sweets, this is a sweet thing; the necessary conclusion is not drawn because it is in the interest of 'appetite' to refuse to combine the premisses.

² *Prior Analytics*, ii. 21, especially, οὐδὲν δὲ καλῶς εἰδῶτα καὶ ὅτι τὸ A ὅλας τῶν B ὑπάρχει καὶ πάντων τοῦτο τῶν Γ , οἰσθῆναι μὴ ὑπάρχειν τὸ A τῶν Γ . . . οὐ γὰρ ἐπιστάται ὅτι τὸ A τῶν Γ , μὴ συνθεῶν τὸ καθ' ἑκάτερον. 67^a 33.

second act of thought does not include Ar_1M , that is, M in its relation to A , we may not in the second act of thought, which corresponds to Mr_2B , be thinking of M as in the relation r_1 to A at all, and, if that be so, no inference can result. We therefore have to remember that M , which is r_2B , was apprehended as it is in Ar_1M . But this is not the apprehension that corresponds to the first premiss; it is the memory that it was apprehended, which memory, however, is itself a way, though another way, of apprehending the original fact (Ar_1M). Now this act of memory need not necessarily supervene on the two premisses. It may be present at once with the second. The judgement therefore Mr_2B is modified in the sense that we now judge that M which appears in the second premiss as r_2B is that which stands in the relation r_1M to A in the first premiss; that is, we have the complex judgement Ar_1Mr_2B . The next step is that we see, because of our knowledge of the relation r , that Ar_1Mr_2B immediately necessitates Ar_3B . Now Ar_1Mr_2B may be considered as a modification of Mr_2B by the substitution for M as there apprehended, viz. as apprehended in the second premiss, of M as apprehended in this present premiss Ar_1Mr_2B . Similarly, if we start from Mr_2B , we arrive by a similar substitution at the same Ar_1Mr_2B . Clearly then this substitution is what makes the reasoning possible. But how is such modification of the premiss justifiable? Ar_1M was true of M as presented in the act of apprehension which gave us that premiss. How can we justify the substitution for M in that premiss of something different from M as there presented? And yet, if it is not different, what could be the use of the substitution? It would not be justified if M were confined in the first judgement to the particular nature of M referred to in that judgement. But it is both understood that M has an indefinite margin of unknown possibilities, and it is also understood that what is known in the first judgement is such that it cannot be affected, in the sense of being contradicted, by any further knowledge of the undetermined possibilities of M . The judgement Ar_1M then cannot have its truth impaired by any further information we may get about M as, for instance, Mr_2B , and this is the justification of the substitution.

The last consideration provides us with an adequate criticism of the view that truth lies ^a in the complete agreement and

[^a The reference is to Mr. Joachim's *The Nature of Truth*. Cf. §§ 117, 545.]

mutual support of all items of experience, and therefore that the truth of anything which seems to be known is liable to be modified by future experience. The very nature of all inference is seen to contradict this doctrine. That this is so may be seen, in its simplest form, in any syllogism; and, shortly, the contradiction of this theory is a presupposition of any mediate inference whatsoever, however simple.

The foregoing is very simply vindicated in the case of the syllogism. Suppose we start with the minor premiss, all A is M, and the act of thought by which we apprehend that premiss does not by hypothesis contain the apprehension that Mness involves Bness, or that all M is B. Suppose next that we apprehend this latter, the major premiss. We now substitute in the minor the information which we have about M in the major, so that A is M gives way to A is MB. This provides us with the so-called conclusion. We may say that the original premiss A is M does not remain in consciousness in its original form, and this is due to the substitution for M, as known in the original form of this premiss, of M as known in the major premiss. We have therefore substituted for something in the original statement a new form of M. The question then is how to justify the substitution. For if we only substitute something which, though verbally different, is quite identical with the original M as originally apprehended, it is futile. It must therefore be something different to be of any use. How then can it be justified? The reply is that, in the original proposition, our notice of M was certainly not confined to what we happened to be apprehending in it. We were aware that there was an indefinite margin of reality in M which we were not apprehending; and when we say that A is M, having a certain definitive apprehension of M before us, our thought implies that A has this definite character of M together with any other definite quality in the unknown margin of the reality of M. We obviously presuppose then, in this very simple syllogistic argument, that the truth that A is M cannot possibly be in any sense impaired by anything which we may subsequently learn about M, so that this simple presupposition of syllogistic argument absolutely contradicts the metaphysical theory of which we have spoken.

§ 241. It is part of the traditional theory of the syllogism that

Figures II and III can be reduced to Figure I. This goes back to Aristotle, who, in the *Prior Analytics*,¹ shows the validity of conclusions in these figures by such a reduction. But, as we have seen, we must not abstract a judgement from the judging of it. The conclusion therefore of a syllogism must not be regarded as a separate judgement, a result forming a judgement by itself apart from the premisses. The full judgement of the conclusion contains the judgements of the premisses and consequently must vary if those judgements vary. It is interesting to notice that this truth is in one passage² virtually recognized by Aristotle, who there insists that the definition of a property which he supposes to be arrived at by Figure I must contain the cause of the property. This cause is the middle term of the syllogism and therefore, as he rightly observes, the definition is nothing but the syllogism itself written down in other words. Now this is, in effect, to recognize that the conclusion is properly speaking the whole syllogism.³ The result is that we cannot say that one argument is reduced to another so long as the premisses are different. There will only be an appearance of reduction, in so far as the conclusions have the same verbal form. But the thought corresponding to the verbal form is really different, and it is easy to show, for instance, that the mood Darapti, in Figure III, which contains two universal affirmatives, cannot be reduced to Darii,^a in Figure I.

¹ *An. Pr.* i. 7.

² *Anal. Post.* ii. 8.

³ § 220.

[^a 'Darapti to Darii'. Wilson nowhere explains what he means by this. Presumably he means that the minor premiss is converted to Y and not to I, cf. § 216.]