CHAPTER XIII

LOGICAL KNOWLEDGE

LOGIC concerns epistemology from two points of view. Epistemology must determine (1) what is the *function* which reasoning performs in the building up of knowledge, and (2) whether logical knowledge possesses the character of *necessary* truth. We will discuss first the question of function, and afterwards that of necessity.

This is not a treatise on logic, and it is neither possible nor necessary that we should discuss at length the internal affairs and problems of the science. Great advances have been made in modern times, especially by the exponents of mathematical logic. The syllogism can no longer claim to be the sole valid form of mediate inference. But it is generally admitted by modern formal logicians that the syllogism is *one* of the valid forms. And as it is still the best known, I shall take it for the purposes of our study as the type of deductive reasoning. It will be found, as we proceed, that what can be said of the syllogism regarding our two problems of (1) function, and (2) necessity, can be generalized so as to apply to all forms of deductive reasoning.

To discover the single ultimate law of reason which validates all forms of inference, whether syllogistic or not —if there exists such a law—is obviously not a task which can be undertaken here. It is the job of the pure logician. But it would appear at least that all forms of inference agree in that they are modes of ensuring *consistency*. In the last resort what logic does ensure is that the body of knowledge to which it is applied, whether mathematics, mechanics, morality, politics, or any other, shall be internally self-consistent. *If* you assert Euclid's axiom of parallels, then you must, in order to be self-consistent, admit that the three angles of a triangle are together equal to two right angles. Or *if* you adopt any other and rival

axiom, then you must admit whatever other propositions follow from it. If you admit that selfishness in general is wrong, then you must admit that any particular act of selfishness (of which you have yourself perhaps been convicted) is wrong. To admit the premisses of a valid deduction, whether it is syllogistic or not, and to deny the conclusion, is inconsistent. That is the lesson of every logic.

Hence the ultimate principle of logic may perhaps be called *the law of consistency*. How it should be formulated, or whether it is possible to formulate it in a single statement, are questions which we must leave to the logicians to answer. But it applies at any rate to all forms of inference. Suppose our argument is symbolized by

$$\begin{array}{l} P \\ Q \\ \text{Therefore } R. \end{array}$$

This may stand for the syllogism:

$$\begin{array}{ll} & \text{All } S \text{ is } M. \\ & \text{All } M \text{ is } P. \\ \text{Therefore} & \text{all } S \text{ is } P. \end{array}$$

Or it may stand for the argument:

$$\begin{array}{ll} & A > B \\ & B > C \\ \text{Therefore} & A > C \end{array}$$

(where $>$ stands for 'is bigger than') which is *not* a syllogism at all. Or it may stand for *any other kind* of valid deduction of a conclusion from two premisses. But whatever it stands for, its principle is consistency. If you assert the truth of P and Q, then you cannot consistently deny the truth of R. The same principle would clearly apply to any argument in which the number of premisses is not two, but one, or three, or any other number. It therefore applies to all deductive reasoning.

It is admitted that the form of the syllogism, though it ensures consistency, does not guarantee material *truth*. For if the premisses are false, the conclusion, though validly drawn, may also be false. Therefore, if the syllogism is to be of any use as an instrument of proof, all will

depend upon obtaining true premisses. How are we to obtain these?

The premisses may perhaps have been obtained as the conclusions of prior syllogisms. But in that case the problem is only pushed back a step. For how can we be assured of the truth of the premisses of the prior syllogism? If we go back to still earlier syllogisms it is obvious that we cannot stop at any point, and that we are led on to an infinite regress. And that means, of course, that we can never *prove* our conclusion. How, then, is the infinite regress to be avoided?

Now it is true, of course, that sometimes a premiss may be given to us by direct perception. But we can only perceive particular cases, never a general principle. The premiss which asserts that Socrates is a man (in the famous syllogism about the mortality of Socrates) is known to be true because it was perceived at the time by numerous persons. But from two particular premisses nothing follows. In every syllogism there must be at least one general principle. And general principles cannot be perceived. Hence we are still left with our question so far unanswered, namely, how we are to avoid the infinite regress, and where we are to obtain the general principles which have to serve as premisses?

As against the argument of the last paragraph it might be pointed out that it is possible to produce valid deductive reasonings which have no general principle stated in the premisses. These are never syllogisms, of course, but such reasoning as that since $A > B$, and $B > C$, therefore $A > C$. But I think it will be admitted by logicians that in all such cases a general principle is involved, though not explicitly stated, and that the validity of the argument depends upon this principle.

To the question how the infinite regress is to be avoided two answers are possible. Firstly, we may get back to 'axioms', truths which are known as truths by immediate intuition, and which therefore do not require to be proved by earlier syllogisms. Secondly, our premisses may have been supplied by inductive reasoning.

The first of these proposed solutions, however, is entirely vain. There are no such things as axioms in the sense desired. The logical laws of thought may perhaps be quoted as exceptions. But they are purely formal and give us no information regarding facts. The law of contradiction can tell us that an object cannot be both white and not-white, but it cannot tell us whether it is in fact white or not. Now we require for our premisses general principles regarding actual matters of fact, such as the mortality of man, the nature of gravitation, or the laws governing the distribution of flora and fauna. Therefore the laws of thought, even if we admit that they are self-evident and necessary, will not do as axioms on which the syllogism can fall back. And apart from the laws of thought no axioms have ever been produced which will stand critical examination. The onus of proof is obviously upon those who assert the existence of axioms. And if they have never been able to produce a single indisputable example of an axiom, if the supposed axiomatic character of their examples has always evaporated upon examination, we are entitled to conclude, till they can prove the contrary, that none exist. And that is the actual position of affairs.

The only supposed axioms which can claim to have been at any time generally accepted as axioms by all instructed persons are those of mathematics. But it is now known that all the axioms of mathematics are either (1) analytic propositions, or (2) propositions which are not self-evident and which can be disputed. The analytic axioms are certainly self-evident. But they do not yield any material truth. They only explain the meanings which their authors propose to attach to words. It will always be true, and it is a self-evident and necessary truth, that the whole is greater than the part. But this is because the part is by definition less than its whole. On the other hand, those axioms of geometry which are not analytic—such as the axiom of parallels—are also not self-evident. Hence the solution of the problem of the infinite regress by means of axioms fails.

The other suggested solution of the problem, namely,

that the truth of our premisses may be assured by inductive reasoning, takes us outside the sphere of deductive logic. I shall postpone dealing with it to a later section in the present chapter. For we may at once draw a valuable conclusion from the considerations already adduced, namely that, unless we have recourse to induction, *the syllogism by itself can never prove any truth.*

This conclusion can be generalized. It is true, not only of the syllogism, but of all deductive reasoning, including those non-syllogistic forms which modern logicians have discovered. For in all deduction the conclusion follows from premisses, and the question arises how the truth of these premisses is to be assured. Either we must rely on axioms or on induction. Therefore it follows that *deductive reasoning by itself, i.e. without the aid of induction, is never a sufficient instrument for proving the truth of any conclusion.*

It is well known that the syllogism, if it is regarded as a method of proof, is a *petitio principii*. Consider the following syllogism:

All Etonians wear top hats.
Smith is an Etonian.
Therefore, Smith wears a top hat.

If we do not already know that Smith wears a top hat, then we cannot possibly know that all Etonians do so. Since Smith is a Etonian, it can only be true that all Etonians wear top hats, if it is true that Smith wears one. Therefore the major premiss 'All Etonians wear top hats' *assumes* the truth of the conclusion that Smith wears one. The syllogism, therefore, does not prove its conclusion at all. It assumes the truth of the conclusion in the major premiss. If it is regarded as a proof, it commits the fallacy of begging the question.

This does not mean that the syllogism is worthless as an instrument of thought. What it means is that the assumption that the function of the syllogism is to *prove* the truth of propositions is false. What the function of the syllogism is will be discussed in a moment. But it is clear at any rate that its function is not proof.

Exactly the same argument will apply to *any* deductive reasoning. No argument of the form

P, therefore Q,

can be valid unless the proposition P assumes the truth of the conclusion Q. Hence we reach, by a different route, the same result as we reached at the end of the last section, namely *that deductive reasoning by itself is not a sufficient instrument for proving any truth. Its function, in fact, is something other than proof.*

For generations the enigma of the infinite regress and the enigma of the *petitio principii* have baffled logicians. They have attempted to pick little holes. They have tried to show that the syllogism is not 'really' a *petitio*, or that axioms really do exist. These attempts have all failed. But the solution of both difficulties is perfectly simple. It stares one in the face. The difficulties have arisen because *logicians have erroneously assumed that deductive reasoning is a method of proof, and that the function of reasoning is to prove truths.*

By means of reasoning we understand, no doubt, the full implications of our beliefs. But we do not arrive at those beliefs by means of reasoning. We reach them by means of constructions and assumptions together with an application of these to observations of fact. The function of reasoning is solely to ensure that these beliefs are consistent with one another. The syllogism

P.
Q.
Therefore R.

does not prove the truth of R. What it proves is that *if* you hold the beliefs P and Q, you cannot deny the truth of the belief R. It shows that you cannot hold the beliefs $(P+Q)$ and not-R together. This will be true of all deductive reasoning. If we symbolize the premisses (whether one or more) by P and the conclusion by R, then the result of deductive reasoning is to show that if you hold P, you cannot deny R, i.e. that P and not-R is an inconsistent and therefore impossible combination of beliefs.

From this it is clear that reasoning never tells us what we *shall* believe, but always what we shall *not* believe. It forbids us to believe P and not-R together. We have, as a result of reasoning, no *positive* knowledge of any kind. We do not know whether P is true, or whether R is true. All we have is the negative knowledge that P+not-R is not true. Thus the necessity which logic imposes upon us—if we are going to believe in such a necessity—is purely negative and prohibitive. Its commands are never 'Thou shalt', but always merely 'Thou shalt not'.

Logic places alternatives before us, but never tells us which alternative we are to choose. You can believe not-R, but if so you cannot believe P. Or you can believe P, but if so you cannot believe not-R. You can believe either P or not-R, but not both. You have your choice between the alternatives (P+R) and (not-P+not-R). But no logic and no reasoning can ever tell you which of these two you ought to believe. This is really saying no more than that the function of deductive reasoning is to guarantee, not truth, but consistency—an old enough doctrine, to be sure.

The conclusion that the function of the syllogism is not proof solves both the problem of the *petitio principii* and the problem of the infinite regress. We need not trouble about the syllogism being a *petitio*, because that only invalidates it if we persist in regarding it as a *proof* of the conclusion. It does not invalidate it if we regard it as merely pointing out that we cannot consistently hold both to the assertion of the premisses and the denial of the conclusion.

As to the infinite regress (apart from premisses inductively supplied, the question of which we shall study in a moment) similar considerations apply. The infinite regress is an objection to the syllogism if it is viewed as a means of proof, but not if we assign to it the more modest function of merely ensuring consistency. For there is not the slightest objection to the process of combing through our beliefs and weeding out inconsistent combinations going on for ever. We find by this means that the

combination of *P* and not-*R* is inconsistent. Going back, we find that the combination of *O* and not-*P* is inconsistent; then that the combination of *N* and not-*O* is inconsistent. We may comb through the entire field of knowledge in this way. The process will naturally go on for ever, and indeed ought to do so. Thus the infinite regress is a fatal objection to the view of the syllogism as an instrument of proof, but accords admirably with the view of it as an instrument for eliminating inconsistencies.

But if deductive reasoning proves nothing, if it does not yield us any positive beliefs, where are we to get these beliefs? The logician will probably reply to this question that we are to get them by means of inductive reasoning. Formal logic, he will say, only guarantees consistency, but induction gives material truth. It is not necessary for the syllogism to go back either to axioms or to an infinite regress. It can go back to premisses the truth of which has been proved by induction. Thus we may prove the mortality of Smith by deducing it from the proposition that 'all men are mortal'. This latter proposition is known to be true, not because it has been proved by any prior syllogism, much less because it is supposed to be self-evident, but because it is proved true by induction.

This leads direct, however, to what Dr. Broad has called 'the skeleton in the cupboard of inductive logic' and the 'scandal of philosophy'.[1] For all induction involves the fallacious argument from the particular to the general, the illicit jump from 'some' to 'all'. *Some* samples of water (extremely few) have been observed in the laboratory or elsewhere to freeze at 0° Centigrade and to boil at 100° at sea-level. We conclude inductively that *all* water, including those samples which never have been and never will be observed, freeze at 0° and boil at 100°. Of the animals and vegetables in the world an almost infinitesimal fraction has been examined, and these have been found to consist of cells. It is concluded inductively that *all* organic matter is composed of cells. It is assumed not only that

[1] *The Philosophy of Francis Bacon*, pp. 66 and 67.

these inductive conclusions will be found true in all cases in the present and the past, but that they will be true in the future too. Not only is it believed, on the strength of a few particular cases of observations on water, that water in the unexplored parts of the earth at the present boils at 100°. It is also believed that the law will hold true to-morrow and a hundred years hence. We assume that the future will resemble the past, and that the same laws and uniformities will operate in the future as operate now.

It is obvious that it is illicit thus to argue from particular to general. It involves basing upon experience conclusions which experience does not justify. For undoubtedly when we thus argue, for example, about water, our conclusion is supposed to be based upon experience. But how can experience justify any conclusion which goes *beyond* experience? However many times we observe that particular *S*'s are *P*'s, how can this possibly prove that the next *S* we meet will be a *P*, or that all the unobserved *S*'s in the world now, or to be in the world in the future, will be *P*'s?

Unless there is some other logical principle on which we can fall back here, it is clear that this argument from particular to universal, which all induction involves, is totally fallacious. So logicians have tried to find or invent some other logical principle on which induction can fall back. This principle has been called the principle of 'the uniformity of nature'. The precise definition which ought to be given to this phrase is not very clear. But it may be said in a general way to mean that there is complete regularity in nature, and that the behaviour of nature may be analysed into 'uniformities' or laws. It is clear that 'the uniformity of nature' is merely a collective name for all the particular uniformities or laws the validity of which is in question. Hence it stands itself in exactly the same need of justification as do the particular uniformities which are subsumed under it. To hold that because some *S* is *P* therefore all *S*'s will be *P*'s, is an unjustified assumption. But the uniformity of nature is merely the assumption that all these minor assumptions are true. How is it possible to justify the proposition that all water behaves uniformly

by means of the supposed principle that all nature behaves uniformly? How can we justify an assumption merely by making a bigger assumption which includes it?

Thus we are brought back once more to the question what logical grounds we can possibly have for believing that nature, *outside* the limits of our observations, obeys the same laws which we have found to operate in observed cases. How can an observed fact, or any multitude of observed facts, ever prove an unobserved fact? Is there the slightest logical ground for believing that the universe will obey the same laws to-morrow as it obeys to-day? Is there the slightest logical ground for believing that the sun will rise to-morrow? Have we a right even to the view that the same laws of nature as those to which we are accustomed hold good in portions of the earth which are still unexplored?

Since the time of Hume logicians and philosophers have tortured their brains over this problem. It is assumed that there must be some valid way of *proving* the uniformity of nature. All inductive reasoning depends upon this principle as its ultimate premiss, just as geometry depends upon its axioms. There is not the least reason to assert—although philosophers have been found to assert—that it is a 'necessary truth', or that it is self-evident. But if not, it follows that this ultimate principle of induction itself stands in need of proof. Now it cannot be proved *deductively*, because there is no higher or more general principle under which it can be brought and from which it can be deduced. It is itself the most general of all generalizations. It cannot be proved *inductively* because it is itself the principle which all induction assumes as valid. Therefore it cannot be proved at all.

In spite of this, logicians continue to believe that there must be *some* solution, that it must be possible in some way to *prove* the uniformity of nature, or to show that it is logically valid. But although generations of logicians have racked their brains over it, no one has ever suggested a rational solution, and the problem remains the 'scandal of philosophy'.

The history of this problem thus bears a suspicious resemblance to that of another which we have already had occasion to mention, the problem of the axiom of parallels. Generations of mathematicians racked their brains trying to prove Euclid's axiom. There must be a solution of the problem, they thought, if only they could find it. But as no valid proof ever presented itself, mathematicians in the end came to the conclusion (which Beltrami afterwards proved mathematically!) that there *is* no proof of the axiom of parallels, or in other words that it is a pure assumption.

The whole history of the logical problem which we have been considering surely points to the likelihood of a similar ending. The obvious reason why logicians have laboured fruitlessly to find a logically valid basis for the principle of uniformity is simply that it has not got any logically valid basis, or in other words that it is a pure assumption. How long it will take logicians to come to this conclusion, it is difficult to predict. Perhaps another fifty years. They are at present still hunting for a proof of uniformity just as the mathematicians kept on hunting for a proof of the axiom of parallels. Human hopes in these matters die hard, and logicians are no more logical than other people.

For our part we shall adopt the view which is plainly dictated by reason. The belief in the uniformity of nature is a pure assumption for which no valid reasons whatever can be given. There is nothing in this conclusion which need surprise any one who has followed the argument of this book. We have seen that from its earliest stages knowledge constantly uses assumptions which are incapable of proof, and that it could never have advanced a single step from its starting-point if it had not done so. The whole fabric of human knowledge is built upon an elaborate foundation of assumptions, some of which we have studied in the earlier chapters of this book.

It will naturally be asked whether the principle of the uniformity of nature, being now recognized as an unprovable assumption, is for that reason to be classed as a

mental construction similar to those which we have studied in earlier pages. It has in common with all constructions the fundamental character that it is assumed without proof. But there are important differences. In order to see these, we will break up the uniformity of nature into particular uniformities. It is, after all, only a general name which covers all particular uniformities, so that instead of considering the general principle we may consider instead some particular cases. Take first the proposition 'Water freezes under normal conditions at 0° Centigrade'. We have observed this to happen in a few cases. We assume that it happens, and will continue to happen, in all unobserved cases. That an unobserved sample x freezes at 0° means: 'If we had perceived the freezing of x, and had applied a thermometer, we should have perceived the mercury in the thermometer standing at 0°'. It is of course an impossibility that we should have perceived what is by hypothesis an unobserved case, and the hypothetical proposition with the impossible antecedent no doubt points to the presence of an existential construction. But it seems clear that the element of construction here belongs, not to the particular assumption about freezing, but to the underlying conception of 'existence'. What is constructed is the fact that the unobserved water exists at all. When once this unobserved existence is constructed, the further ascription to it, rightly or wrongly, of this or that particular quality, whether it be freezing at 0° or being colourless or white or any other, is not a new construction, though it may be an assumption.

Now consider a belief which results from applying the principle of uniformity to the future. 'The sun will rise to-morrow.' This is a pure assumption, of the truth of which there is and can be no proof. But the rising of the sun to-morrow, when it happens, will be a *fact* and will be actually perceived. Hence my belief that the sun will rise to-morrow cannot be regarded as a construction. It stands in clear contrast, for example, to the construction of 'the table when no one is perceiving it'. This table is a pure invention or fiction. It never factually exists at all. Its

existence can never be perceived or verified. For that any one should ever perceive a table when it is not being perceived is a flat self-contradiction. But the rising of the sun to-morrow is not a pure invention which no one will ever perceive. It will, on the contrary, be perceived when it happens. The existence which is assumed is, or at least will be, *factual* in character, and it therefore cannot be regarded as a construction.

We could, of course, define the meaning which we propose to attach to the word construction in such a way as to include assumptions such as that of the uniformity of nature. But it seems better to exclude them. The word construction clearly implies something that is *made* by us, something that is invented, created, or fabricated. This meaning applies very well to the unperceived table and to all the constructions which we have so far examined. But it does not apply to the principle of uniformity, which is not a fiction, but is an assumption regarding *facts*. Hence it will be better to call it simply an assumption, and not a construction.

In another way, too, the principle of uniformity differs from any construction. This is in regard to its *justification*. A construction is always such that it can neither be proved nor disproved, nor in any way tested or verified in experience, so that we are at liberty to assume it or not assume it as we please. If we do assume it, we do so, not because the facts prove it, but because it is more convenient or simple to do so than not to do so. For example, no one can prove or verify that there exists an unperceived table. It makes no difference at all to the facts whether we believe in one or not. It does, however, make a difference to our convenience of thinking in the manner shown in Chapter VI. We therefore adopt the assumption. The justification of a construction is always convenience, simplicity, economy, or consistency.

But what justifies the assumption of the uniformity of nature is the *event*. My assumption, which I make to-day, that the sun will rise to-morrow, cannot be proved now. There is *now* no logical basis for it at all. And it is,

therefore, quite right to insist that it is an unprovable assumption. But it will be *justified* in the particular case, though not of course as a general principle, when to-morrow the sun actually rises. Subsequent justification, of course, is not in any sense proof. For proof consists in logical grounds which are *prior* to the proposition proved. Thus a construction makes no difference to the facts, and is not justified by them, but by convenience. And because it makes no difference to the facts, it is a matter of choice whether we assume it or not. The opposite assumption would always be just as *true*. It would be just as true to think that no table exists when no one is perceiving it as to think that it does exist. It would be just as true to believe in many private worlds as in one public world. But these conditions do not hold of the assumption of the uniformity of nature. It *does* make a difference to the facts, and it is not a mere matter of convenience, whether I assume that the sun will rise to-morrow or whether I assume that it will not. The whole question is one of fact, and not of convenience. Suppose I state that the sun will not rise to-morrow. Then, when to-morrow comes and the sun rises, my statement will be shown false. And it is not equally true to say either that the sun will rise or that it will not rise. One of the two statements will turn out to be false. That the justification of my assumption lies in the facts, and not in convenience, is what places this assumption in a different category from all constructions.

That the principle of the uniformity of nature is an assumption is at present accepted, so far as I know, only by some of the pragmatists. But they usually make the fatal mistake of calling it a *methodological* assumption.[1] This is a mistake because it is not an assumption regarding method, but regarding facts. This is merely repeating what has been said in the last paragraph. But it may be made clearer by a comparison. Suppose I guess, without any reasons at all, that the horse *X* will win the Derby. This would be a pure assumption, since there are no logical grounds for it. But it would be sheer confusion of thought

[1] Cf. Schiller, *Logic for Use*, pp. 162–3.

to call it a methodological assumption. It has nothing to do with any question of method. And exactly the same is true of the principle of the uniformity of nature, or of any of its applications such as that the sun will rise to-morrow.

Methodological assumptions are always assumptions regarding which we have a *choice*. We can choose one method or another. We can make one assumption or its opposite. The results of our choice will be greater or less convenience of working. And that is all. But we have no choice as regards the uniformity of nature. We have a choice, of course, in the sense that, since there are no logical grounds for believing that the sun will rise to-morrow, we can, if we like, believe that it will not. But when to-morrow comes the belief will (I hope) turn out to be false. This is not the kind of choice which exists in the case of methodological assumptions. In their case I may choose which I like because both will be right. Only one will be more convenient than the other. But the choice as regards the uniformity of nature is a choice between two beliefs one of which will turn out to be true, the other false.

One of the most extraordinary delusions of the philosophic mind consists in supposing that, if we frankly admit that the principle of the uniformity of nature is an unprovable assumption, we are thereby committing ourselves to 'scepticism'. It is this bogy of scepticism which is chiefly responsible for making logicians and philosophers cling desperately to the belief that they will some day discover a way of showing that the uniformity of nature can be proved or shown to be in some way logically valid. But scepticism, if it means anything, means the belief that we have no knowledge, or that the human mind is incapable of knowledge, or that our knowledge is not truth. Now all that our view of the uniformity of nature as an assumption commits us to is an admission that, when I say 'The sun will rise to-morrow', I cannot have any logically binding grounds for the statement, or in other words that I cannot *prove* that it is true. But the statement

may be in fact true although I cannot prove it. And if it is true, then it contains true knowledge. We may in general have true knowledge without being able to give any logical reason for it. An assumption may contain true knowledge. It does so if the assumption turns out to be correct. The fact that we cannot, at the time we make the assumption, prove that it is going to turn out true, has absolutely nothing to do with the matter. It in no way makes our knowledge false, or misleading, or in any way unsatisfactory. 'The sun will rise to-morrow' is true, and therefore knowledge, if to-morrow the sun does rise. So long as the world continues in its old grooves, so long as the present uniformities of nature persist, we have and shall have true knowledge, and there is, therefore, no ground for scepticism. If ever the world deserts these grooves and uniformities (as it may to-morrow for all I know), then—since we shall all presumably perish immediately—it will not matter to any one whether there is any ground for scepticism or not. We may, therefore, safely reject the view that to admit that the uniformity of nature is an unprovable assumption involves us in scepticism.

It follows from what has been said that inductive reasoning, like deductive reasoning, *proves nothing*. The syllogism about mortality does not prove the mortality of Smith. It shows that you cannot believe *both* that all men are mortal and that Smith is not mortal. It proves that Smith is mortal, *if* we first know that all men are mortal. But how do we know this? We cannot prove it by induction unless we admit the universal truth of the principle of the uniformity of nature. But that principle is a pure assumption. So that in the end all reasoning, deductive and inductive, goes back to an unprovable assumption. And this is another way of saying that *no reasoning, inductive or deductive, ever proves anything, and that no proposition can ever be proved.*

It does not follow from this that logic is a fraud, or that reasoning is a fallacy. What follows is that we have all along expected reason to do something which is not

within its function. We have all along been mistaken in supposing that the function of reason is to prove the truth of propositions.

Two questions at once arise. (1) If reason never proves anything, how do we know the truth of truths, and where do we get them from? (2) If proof is not the function of reason, what is?

The answer to the first question is that we arrive at truths, or at least at those truths which are general principles as distinguished from particular facts, by inductive reasoning in much the way usually described in the logic books. We believe that all men are mortal because (1) all men have so far died, and because (2) we also believe in the principles of causation and of the uniformity of nature. It would be inconsistent to accept these two positions and yet to deny that all men are mortal. Therefore we accept that proposition. That is the way in which we *arrive at* that truth. But the process of *arriving at* a belief is not a valid *proof* of it, and does not, or ought not, to profess to be such. We attain to truth by a suitable manipulation of assumptions, constructions, and observed facts (givens). The methods of doing this are described (or misdescribed) in books on inductive logic. But there is no such thing anywhere in the universe as *proof*. The delusion that there is such a thing has very likely arisen, as Doctor Schiller has urged,[1] by reason of the fact that the Greeks, among whom logic as a science originated, were disputatious controversialists who desired above all things an instrument for compelling their opponents to admit the truth of their assertions. The syllogism was supposed—erroneously as we now know—to supply this need. Proof was compulsion applied to your opponent. The mistake of supposing that reasoning proves propositions has persisted all down the ages.

How, then, do we distinguish between a true belief and a false one? If we cannot prove that a proposition is true, how do we ever know that it is true? We need not make this inquiry as regards propositions which only state what

[1] *Logic for Use*, pp. 269–70.

is immediately perceived, such as 'This is red'. Our question refers, of course, to general propositions which go beyond the given, and which make assertions about what is not observed. And the answer appears to be that we cannot ever be certain of the truth of a proposition until observation verifies it. 'The sun will rise to-morrow' is doubtless true. And it is accepted because it satisfies the conditions of inductive logic. But we cannot actually be certain of it until to-morrow. It must also be remembered that although in strict theory logic proves nothing, yet for practical purposes it is not unnaturally credited with the power of proof. For a logical argument does prove its conclusion *if* the premisses are true. When, therefore, we find a conclusion which follows from another proposition which is universally accepted as true; or when the conclusion is a deduction from a whole body of knowledge; then we either have to accept the conclusion or throw overboard accepted truths or perhaps a whole science of painfully elaborated knowledge. Usually in such cases the alternative of rejecting the premisses is a practical impossibility, and never even comes before our minds. In such cases reasoning is not unnaturally regarded as proving conclusions. When we are asked, therefore, how we know that any proposition is true, the answer is that we know it through the ordinary methods laid down in logic, but that this knowledge, so far as it goes beyond the given, never amounts to certainty.

The second question we had to answer concerned the function of reasoning. If proof is not its function, what is? The function of inductive reasoning is to arrive at, i.e. to *discover* truths, but not to *prove* them. The function of deductive reasoning is simply to ensure consistency among the beliefs which we thus arrive at.

Properly speaking, however, induction is not a form of *reasoning* at all. It is, or is supposed to be, a set of rules for observing, experimenting, and making *de*ductions from what is observed. It is a method of discovery, but it is not a form of reasoning distinct from deductive reasoning.

For immediately we attempt to throw our inductions into the form of reasonings we find that they at once exhibit themselves as deductive. Mill's famous 'methods' simply applied the general principles of causation to particular cases in order to discover which phenomenon is the cause of which. They are plainly deductive. Mill first defines a cause as the invariable and unconditional antecedent of a phenomenon. His methods then tell us how to manipulate our data in such a manner as to show that in the particular case before us *A* is the invariable and unconditional antecedent of *B*. From this it is plainly a *de*duction that *A* is the cause of *B*. Moreover, as has often been remarked, all induction is really a syllogism with the uniformity of nature as a major premiss. The whole of the *reasoning* involved in induction is deductive. The rest of what goes by the name of inductive logic consists in the analysis of scientific (and other) methods, not of reasoning, but of observing and experimenting. It is not logic, but methodology. It consists of rules for selecting or discovering the relevant data from which we can *deduce* our conclusions. We are told, for example, that the great rule is to *vary the circumstances one at a time and observe the results*.[1] But this obviously is not a rule of *reasoning*. It has nothing to do with reasoning. It is a rule which purports to tell us what are the relevant things to observe before we begin to reason. Immediately we begin to reason from the data so obtained our reasoning is necessarily deductive.

To argue from general principles to particular cases, from 'All *S* is *P*' to 'Some *S* is *P*' or to 'This *S* is *P*', is considered valid reasoning, and it is deductive. To argue from 'Some *S* is *P*' to 'All *S* is *P*' is the method of induction and it is not valid, or in other words it is not a piece of reasoning at all. We may throw it into the form of reasoning by saying: 'Nature acts uniformly, so that if we are sure that the same set of circumstances recurs, the same propositions will be true of it each time it recurs. Therefore, since we have found in all observed cases that when

[1] See *A Modern Introduction to Logic*, by Miss L. S. Stebbing, p. 339.

the set of circumstances *S* occurs we also get the circumstance *P*, it follows that this will also be true of unobserved cases, so we may conclude that *all S* is *P*.' This is certainly reasoning, but the reasoning is simply a syllogism.

It follows that *all reasoning is deductive*. All reasoning proceeds from the general to the particular. The idea that there is another kind of reasoning, called inductive, which proceeds from the particular to the general, is the veriest superstition. From this superstition have proceeded all the empty and futile argumentations about how it can be valid to reason from the particular to the general. No one would have asked the absurd question how induction can be valid if he had not proceeded on the false assumption that induction is a kind of reasoning.

Since all reasoning is deductive; and since the function of deduction is, not proof, but to ensure consistency among our beliefs; it follows that to ensure consistency is the function of all reasoning.

We now see how it was that Descartes so lamentably failed in building up the system of our beliefs by reasoning, i.e. by deductions from the foundation of experienced certainty. Nothing can be built up in that way. Reason is powerless to advance us one step from the starting-point of our knowledge. Knowledge advances, not by reasoning, but by means of constructions, assumptions, and observations of the given. It is by these means that we arrive at truths.

Nevertheless the function of reason is of vast importance. Its commands are negative. But these commands are absolute law. It never says 'Thou shalt believe the proposition *P*'. It is powerless to do that. But it says 'Thou shalt not believe both the propositions *P* and *Q*, since they are inconsistent with one another'. It gives us the choice between *P* and *Q*. It does not indicate which we are to choose. But it forbids us to accept both.

We have already seen reason at work in the earlier stages of human knowledge, and if we look back we shall see that the description just given of its working is correct.

For example, the second construction of Chapter VI laid it down that there are not many private worlds, but one public world, and that the table which I am now seeing is identical with the table which is seen by some one standing beside me. From this follows the third construction, which lays it down that the table which I perceive continues to exist when I am not looking at it, provided that some other mind is still aware of it. Thus the third construction is a deduction from the second. But this does not mean that the third is *proved* by means of the second. It is not proved at all. The reasoning merely lays it down that we cannot at the same time accept the second and reject the third. If we do not wish to accept the third we must go back on our tracks and give up the second. If we wish to retain the second, then we have to admit the third. Reason gave us this choice. It could not instruct us which alternative to choose. The choice in the case of these constructions was determined by convenience.

Human knowledge is like a mosaic. Our various beliefs are the pieces which have to be fitted into one another. Reason does not supply the pieces, but it is the set of rules which tells us how to fit them together and to reject those which do not fit.

When, as has now happened with the human race, a vast body of knowledge has been built up and accepted, reason may often appear practically to prove a new proposition by showing that we must either accept it or give up the whole, or at least a very large part, of the accepted system of knowledge. We still theoretically have the choice between the two alternatives which reason always gives us. But the alternative of giving up a whole systematic body of knowledge may be practically unthinkable. So we accept the new proposition and consider that it has been conclusively 'proved'. It is as a result of cases of this sort that the delusion has been fostered that reason can prove truths, and that to do so is its function.

The function of reasoning having now been made clear, we must pass on to the second big division of the subject

of this chapter, the question, namely, of the alleged *necessity* of reason.

We have found that 'necessary truth' does not reside either in mathematical or in categorial knowledge, except in so far as these kinds of knowledge are necessitated by logic. Certain of the axioms of geometry may be necessary, but only because they are analytical propositions whose truth is guaranteed by the logical law of contradiction. The same remark is true of those categories of which necessity can in any sense be predicated. Consequently the claim that necessary truth exists has not been substantiated by our examination of mathematics and of the categories. Such necessity as they possess is not in their own right, but is derivative. It is derived from logic. Consequently, if any necessary truth exists, we must now seek for it in the sphere of logical knowledge.

Necessity, having been pushed back out of mathematics and categorial knowledge, into logic, cannot now be pushed back any farther. It turns at bay here, and we have to meet it and settle final accounts with it. We have to decide what we are to think of necessity. We have either to admit it or explain it away. The necessity of logic, if it is a reality, is something absolute and ultimate for the reason that it cannot be pushed back any farther, but remains here 'in itself'.

The necessity of logic can be seen both in the fundamental logical laws, such as the law of contradiction, and in any valid inferences on any subject. That S cannot be both P and not-P appears necessary. That if Smith is a man, he cannot be a tiger may be expressed in the syllogism

No men are tigers.
Smith is a man.
Therefore Smith is not a tiger.

The conclusion *necessarily* follows from the premisses. And it is the same necessity as that which appears in the law of contradiction. For the syllogism is merely the application of the laws of thought. To admit its premisses and deny its conclusion is inconsistent, i.e. breaks the law of contradiction. And it is the necessity of that law which

compels us, if we have admitted the premisses of the syllogism, to admit the conclusion. It is the same if we consider any deductive argument which cannot be reduced to the syllogism. The truth that if $A > B$, and $B > C$, then $A > C$, possesses exactly the same necessity as does the syllogism, and for the same reason, namely that to admit the premisses and deny the conclusion would be inconsistent.

This, then, is the case for the necessity of logic. It appears as self-evident.

We must now inquire whether this necessity can be, or has been, reasonably disputed. Those who would deny it or explain it away appear to fall into three groups according as they assert one or other of the following opinions:

(1) That the laws of logic are not laws of *thought* at all, but that they are laws of *things*, and that they do not therefore differ epistemologically from other empirically known laws. Their apparent necessity must then be explained away as a delusion due to their extreme familiarity and to the fact that we know of no instances which contradict them. This seems to be the view adopted by some realists.

(2) That the laws of thought may be *subjectively* necessary, i.e. they may be necessary ways of our thinking, but that it does not follow that they are necessarily true of things outside us.

(3) That the laws of logic are similar to the rules of a game. They are conventions which we choose to adopt because they serve our purposes. We might, however, have adopted other conventions, if we had wished, and therefore there is no necessity in those which we have adopted. This opinion is supported by pragmatists.

We will briefly discuss these three types of opinion.

(1) Those realists who adopt this view assert that the so-called laws of thought are not in fact laws of thought at all, but that they are laws of things. And we come to know their truth in the same way as we come to know other laws of things, that is to say, through experience. The law of contradiction is just as much an empirically

learned law as Kepler's laws of the planetary motions. We find in experience that nothing is ever both white and not-white at the same time and place, and that nothing is ever both beef and not-beef, and so on. We generalize these experiences into the law that nothing is ever both X and not-X, and formulate it as the law of contradiction. And similarly with the other so-called laws of thought.

This view is compelled, of course, to deny the existence of any true necessity in logic. For necessity cannot be found in experience. Experience gives us the 'is' of things, but cannot give any 'must'. Hume showed this once for all, and no instructed person can now dispute it. If we adopt the realist explanation of the laws of thought, then we must give up belief in their necessity. We must regard them as merely facts, not necessities. We may say that it is as a matter of fact true that my meat is not both beef and not-beef. But we cannot say that it is impossible that it should be both beef and not-beef. For if the laws of logic, instead of being necessary truths, are merely empirical generalizations, they may become false to-morrow.

This opinion cannot explain the necessity, but has to explain it away. It has to be represented as a delusion which is bred in us by the fact that we have always seen the laws of logic obeyed and never disobeyed. When we invariably see a thing happen in a certain way, we come to think that it *must* happen in that way. Necessity of thought is really the product of lack of imagination and of that kind of stupidity which, according to Mr. Bernard Shaw, makes Englishmen think that their tribal customs are the laws of God and man.

This is a weak position. It draws what little plausibility it has from cases in which beliefs have been supposed to be necessary truths and have afterwards turned out to be either false or at least open to alternatives and so not necessary. Euclid's axiom of parallels is, of course, the stock example. Other examples are usually not so clear. Some philosophers have believed that the law of causation or the principle of the uniformity of nature is a necessary truth, whereas that is not now the general view. Possibly

some people long ago may have thought 'the earth is flat' to be a necessary truth—though so far as I know there is no evidence that any one ever did think so.

But it does not follow, because human beings have made mistakes about *what* particular truths are necessary, that the whole conception of necessity is a delusion.

Nor does the attempted psychological explanation of the feeling of necessity seem at all convincing. If it were true that our feeling of the necessity of the law of contradiction is merely the result of the fact that we do not happen to have come across a case in which events did not follow that law, then we should expect that the feeling of necessity would attach to any empirical law of long standing which we have never seen disobeyed. Men must have believed, long before they ever thought about the axioms of Euclid, that all human beings die. Yet the mere fact that belief in human mortality has always existed, and has admitted of no exceptions, has never caused us to regard it as a necessary truth. It certainly seems to me that if the suggested explanation of the feeling of necessity were the true explanation we should expect that feeling to have attached to *all* ancient and uncontradicted beliefs, or at least to far more than those to which it has actually attached. Or at least the supporters of the view which we are discussing should produce as evidence of the correctness of their view a *large number* of undoubted instances in which propositions, other than the laws of thought, have come to be regarded as necessary simply because they were familiar and uncontradicted by experience. The actual evidence adduced is wretchedly meagre. The axioms of Euclid. But the necessity of those axioms which are analytic is derived from logic, and cannot therefore be given as an example of the necessity of propositions *other than* the laws of thought. To adduce this evidence is simply to adduce the laws of thought themselves. And as to the axiom of parallels, if it was mistakenly regarded as necessary, this was probably owing to the accident that it was found in the company of the other axioms which were necessary because they were analytic. The mistake of

treating it as a necessary truth is thus quite simply and naturally explained without resorting to the unconvincing and artificial explanation which we are discussing. And what other evidence is there? The law of causation? This was treated as necessary by Kant, because he thought that its being so regarded would alone save knowledge from scepticism, and not for the reasons supposed by the realists. This is about all the evidence there is. And it is plainly insufficient to bear the weight put upon it.

But the best reason for rejecting the realist opinion is that it renders all discussion on any subject futile. It in fact abolishes reason altogether. All argument, all discussion—including that on which the realist contention itself is based—assumes, not merely the truth, but the necessity of the laws of logic. Any reasoned argument assumes that, if certain propositions are granted, certain other propositions follow, and that if you admit the first propositions you *must* admit those which follow, and that you have no choice. To regard the necessity of logic as a delusion is thus to regard all reasoning and discussion as delusion, and in fact to render all thinking futile.

Moreover it may reasonably be doubted whether even those who profess this opinion really believe—as they assert—that to-morrow a thing might be both what it is and what it is not. It may reasonably be asserted that no one really can maintain such a proposition, since it is simply meaningless. It appears to be an impossibility to believe in what is recognized by the believer himself as a sheer self-contradiction.

Connected with the opinion which we are discussing, however, is a question which has caused a good deal of perplexity. How are we to distinguish, it is asked, between logical necessity and the mere psychological *feeling* (which may be false) that a proposition is necessary. Many propositions, now known to be false or at least not necessary, were once considered self-evident and necessary truths. The feeling of self-evidence or necessity is, after all, nothing more than a psychological fact. What guarantee have we that this mere feeling is not misleading us now

in regard to the laws of logic as it has in the past in regard to other propositions?

Now in the first place it is not so easy to produce examples of these *other* propositions to which the argument appeals. We have already noted this fact. The axioms of Euclid and the law of causation. Perhaps a few others might be raked out of the rag-bag of the history of philosophy. But in most cases the only mistake has been to suppose that the necessity which the proposition exhibits is in itself, instead of being derivative from logic. This is the case with the analytic axioms of Euclid. And in other cases it is easy to show how the mistake arose and where the mind has gone wrong. These mistakes have been gradually eliminated. We no longer believe that there is a special mathematical necessity, a special categorial necessity, and so on. We see that these apparent necessities are only the shadows cast by the necessity of logic. We assert that there is no necessity anywhere in thought except that of the laws of logic. It is reasonable to suppose that we have reached bed-rock in the matter in logic, and that this necessity is genuine. But even if this is not admitted, the various eliminations from the list of supposed necessary truths give us hope that, if we are mistaken in thinking that logic is necessary, the mistake will be discovered, as the others have been. But this has not been done yet. And we are entitled to continue to assert the necessity of logic until some one proves the contrary, until some one shows that the laws of logic are false, or at least admit of alternatives, *and tells us what the alternatives are*. And for my part I shall be quite content with this position, for I fancy that we shall be allowed to rest in our beliefs for ever!

If any one persists in disbelieving in the necessity of the laws of thought on the ground that they might some day be proved false, he certainly cannot be dislodged from that position by any logic. For if he does not admit the necessity of logic, it is clear that no logical argument can convince him, and that it is useless to argue with him. But this should surely be, to those of us who are sane, a

sufficient refutation of his opinion, since it is plain that such an opinion reduces all thinking to a futility.

(2) With some hesitation I attribute the opinion that the laws of thought may be subjective necessities which bind our thinking but do not necessarily apply to things outside us to Miss L. S. Stebbing. The hesitation is due to the fact that the meaning of the following passage is not entirely clear to me (which is doubtless my fault and not that of the distinguished authoress).

> It might be thought that the principles of logic provide an instance of propositions that are necessarily true. . . . But this would be a mistake. . . . The necessity of logical principles is nothing but the necessity of constructing systems. The construction of such systems may be the expression of the thinking of rational beings. But this would not *establish* the necessity. We do not intend to dispute this necessity but to deny that any significance can be attributed to the notion of absolutely necessary principles.[1]

I may be wrong in my interpretation of these sentences. But it appears to me that there are two thoughts intended to be expressed here, viz. (1) that logic is necessary *if* we are going to construct deductive systems, not otherwise; and (2) that its necessity for thought does not establish its necessity for things.

The first of these propositions may certainly be admitted. We are only under the compulsion of logic if we are going to construct systems. But to think at all is to link up experiences into systems or partial systems. So that what the proposition amounts to is that we can avoid the necessity of reason *by not thinking at all.* This is undoubtedly true. It is likewise true that we can avoid the necessity of reason by the simple expedient of being dead. But this does not touch the doctrine of necessity as understood in any rational sense.

The second of the two thoughts which we extracted from the passage quoted asserts that the necessity of logical thinking does not prove that the same necessity applies to things objectively. This, however, rests upon a confusion.

[1] *A Modern Introduction to Logic*, p. 176.

It supposes that we have first (1) a necessary thought, and then (2) that it has to 'apply to' things, and that the doctrine of logical necessity invalidly assumes that it does so. The error here consists in the false abstraction or separation of the two stages. It is false to suppose that there is *first of all* a necessary thought existing in a vacuum, all by itself, apart from things; and that it is then 'applied' to things. This sort of misunderstanding arises from the wooden and unintelligent use of metaphors, or from taking metaphors literally. It is supposed that a thought is like a metal cast or mould which applies, i.e. fits on to, the material that is put into it. It is forgotten that any thought, and therefore a logical law such as the law of contradiction, is from the first a *thought of things*. This thought of things is not twofold and divisible into the thought and the thing, but inseparably one. If the thing is eliminated, the thought too disappears. Thus it is impossible in any manner to think the law of contradiction *without thinking of it as applying to things*. You can only express it in the form 'A thing cannot be both white and not-white, hot and not-hot, &c.' It is true that logicians substitute their *S*, *M*, and *P* for 'thing', 'white', 'hot', and so on. But *S*, *M*, and *P* are merely symbols which stand for things. They indicate that it does not matter *what* things are thought of under the law, that any things will do equally well. But they do not indicate that the law can be thought without things at all. Thus the fact that the law of contradiction is formal does not mean that the thought of it can be framed in the mind without thinking of the things to which it applies. That would be a logical and a psychological impossibility. To think the law at all is to think it as applying to things, not any particular things, but things in general. To suppose that the law can first exist or be thought by itself as a pure thought without reference to things, and that it is afterwards externally applied to things, is simply to be misled by materialistic metaphors. It is therefore meaningless to suggest that a thought might be necessary as a thought, i.e. for us subjectively, but not apply to things. A necessity of thought *is* a necessity of things. And if you

admit a necessity of thought, you admit that it necessarily applies to the things of which it is the thought.

(3) The third opinion which we are to discuss is that usually put forward by pragmatist writers. For them, all knowledge derives its validity from its success as an instrument of action. Logic too will be judged in this way. Its rules will have no absolute sanction. They will be no more than the rules of the game, to be altered at will if they do not lead to success, if they do not 'work'.

This view of logic has recently been expressed with great clearness and vigour by Mr. C. I. Lewis in his book *Mind and the World-Order*. Mr. Lewis's views are not merely his own, but are representative of a large volume of opinion. And I shall therefore make no apology for quoting and criticizing them at some length.

'The laws of logic,' says Mr. Lewis, 'are purely formal: they forbid nothing but what concerns the use of terms and the corresponding modes of classification and analysis. The law of contradiction tells us that nothing can be both white and not white, but it does not and cannot tell us whether black is not white or soft or square is not white. . . . Similarly the law of excluded middle formulates our decision that whatever is not designated by a certain term shall be designated by its negative. It declares our purpose to make, for every name, a complete dichotomy of experience, instead—as we might choose—of classifying on the basis of a tripartite division into opposites and a middle ground between the two. . . . Further laws of logic are of like significance. They are principles of procedure, the parliamentary rules of intelligent thought and action. Such laws are independent of the given because they impose no limitations whatever upon it. They are legislative because they are addressed to ourselves—because definition, classification, and inference represent no operation in the world of things, but only our categorical attitudes of mind.

'Furthermore, the ultimate criteria of the laws of logic are pragmatic. Indeed, how could they be anything else? The truth of logic is not material truth but a truth about the modes of self-consistency.'[1]

On this I would make the following criticisms:

[1] *Mind and the World-Order*, pp. 246–7.

(1) We have already seen that in spite of logic being purely formal—a fact which we must admit—it is not true that its laws are not laws of things, but only of words or thought. Form, after all, must be the form of something, of some matter. And the fallacy of Mr. Lewis's reasoning consists in supposing that the form is indifferent to the matter. The truth is the very opposite. To legislate for the form is to legislate for the matter. Whatever affects the form of anything affects the matter. The laws of logic are forms whose matter can be nothing but the things in the real world. They are no doubt forms of thought, but that thought is *about* things. For example, it is quite untrue to say that the laws of thought 'are independent of the given because they impose no limitations whatever upon it'. They do impose limitations upon it. Thus the law of contradiction prevents this paper from being both black and white at the same time. It is true that it does not use the terms 'paper', 'black', and 'white'. It generalizes. It lays it down that a thing cannot have at the same time incompatible qualities. That it does not tell us *what* qualities are incompatible has nothing to do with the matter. The law of the land lays it down that I shall not kill. It does not inform me what particular classes of actions on my part will result in killing. Unless I know from experience that to point a loaded pistol at a man's head and pull the trigger will result in his death, the law will not prevent me from doing so. But it would be absurd to say that the law imposes no limitations upon me. Similarly unless I know from experience that black is not white, that the two colours are incompatible, the law of contradiction will not prevent me from thinking that the paper may be both black and white. But as soon as experience has given me that knowledge I see, not merely that I cannot *think* that it is both black and white at the same time, but that the paper itself cannot *be* both black and white. The law thus legislates for the paper, and in general, for things in the world. It must surely be admitted that, quite apart from what I think, things in the world cannot possess contradictory characters. This is

most certainly a limitation imposed by the laws of logic on objective realities.

Mr. Lewis's views imply an utter and irreconcilable dualism. Thought has to be conceived as floating about in a vacuum, as empty of all content, sundered from even the thinnest wisp of reality by an impassable chasm. It seems a simple reflection that if logic governs only words, and has nothing to do with things, which need not obey it, then the thought which the words express must be a completely idle play of the mind working independently of and out of touch with reality.

Logic may be compared with mathematics, which is likewise entirely formal. In spite of its completely formal character, mathematics, as we saw, does apply to things, and has no meaning without them. We had to resist the mathematician's desire to fly off into the blue, to leave the earth behind, to set up a mathematical paradise of his own, and thereafter to ignore the common things on the earth and to pretend that he knows nothing about them. And just as there are not two universes, one earthly and the other mathematical; so there are not two universes, one material and the other logical. If mathematics has any meaning at all, that meaning arises from the fact that it applies to *things*. The same with logic. Mathematics and logic either both apply to things, or they apply to nothing and are wholly meaningless and worthless.

(2) Mr. Lewis tells us that the laws of logic 'forbid nothing but what concerns the use of terms'. Terms, however, stand for things. And the only reason why we cannot use terms inconsistently (which is what the laws of logic enjoin) is because the nature of the real world forbids us to do so. We are not allowed to think that the things for which words stand are both what they are and what they are not, because the world is so constructed that things never are what they are and also what they are not. If I define a horse as an animal with four legs (and other equine qualities), then I cannot use the word horse for an animal with five legs, because in the actual world it is and always must be true that an animal with five legs is not an

animal with four legs. Consistency of language and thought is only necessary *because* the real world is governed by the laws of logic.

(3) Mr. Lewis calls these laws '*our* decisions'. The law of excluded middle is '*our* decision that whatever is not designated by a certain term shall be designated by its negative. It declares *our* purpose to make for every name a complete dichotomy of experience, instead—*as we might choose*—of classifying on the basis of a tripartite division into opposites and a middle ground between them.' (The italics are mine.) This passage is completely fallacious. It implies that instead of the laws of logic which we have adopted we might at will have chosen some other set. So that the set we have chosen are not really necessary. This is simply untrue, and it would be surprising that any competent philosopher should put forward such a farrago of confused ideas, if one did not know by sad experience of what muddle and confusion philosophers are capable. We can, of course, arrange the material of our experience as we please, in dichotomies, trichotomies, or any other kind of division. *But whatever kind of arrangement we choose for the classification or division of experience, all the laws of logic still remain the same and still remain valid.* The colours which happen to confront my eye at this moment may be divided into white and not-white. They may also be divided into white, grey, and black. But whichever way I classify them, the laws still hold that they (and everything else in the world) must be either white or not-white, either grey or not-grey, either black or not-black; that they cannot be both white and not-white, &c. The laws of contradiction, identity, and excluded middle are not in the slightest degree affected by the various methods of classification we may adopt, and methods of classification are totally irrelevant to the problem we are discussing.

Nor is there any sense in which we can *choose* what logical laws we shall use. Nothing can be both white and not-white. You may say this is trivial, or otherwise cast abuse at it. But you *cannot* deny it. And you cannot

choose an alternative law. It is sheer confusion of thought to suggest that a tripartite division, such as white–grey–black, implies or follows a logical law alternative to the law of excluded middle. The tripartite division is not an alternative to that law since material arranged in such a division continues to obey that law. The only alternative to the proposition that everything must be either white or not-white would be the proposition that some things may be neither white nor not-white. That proposition would be simply false, and we *cannot* choose it. The necessity of the law of excluded middle is real, cannot be pooh-poohed out of existence as 'a matter of words', and cannot be made a matter of choice between alternatives, for there are no possible alternatives.

(4) Mr. Lewis compares the laws of thought to 'parliamentary rules'. This carries on the same fallacy as that which has just been exposed. Rules of debate can be altered at will and are to a large extent matters of convention. Logical laws cannot be altered at will. They are necessary and binding. Nor are they in any sense matters of convention.

(5) The conclusion of the whole matter is that you cannot, however you twist or turn, explain away the necessity of logic. No doubt it is formal. No doubt it is a matter of 'mere consistency'. Our thoughts may be consistently false. Logic, as we saw, does not guarantee truth, but only consistency. It is in itself nothing but the law of consistency. But is it not an absurdity to suppose that, because of this, one has got rid of the necessity of logic, or in some way whittled it down? It is still there. It is not the necessity of believing this or that material proposition. *What* we believe is not dictated by logic. To think that it is so is the old delusion of thinking that the function of reasoning is to 'prove' truths. But the necessity of logic is simply the necessity of being consistent. Why should I be consistent? I *must* be, because logic *compels* it. This compulsion is necessity. And this necessity cannot be got round or explained away.

If a man of science is endeavouring to construct a

theory—be it a theory of light, of electricity, of palaeontology, or what not—logic lays it down that he cannot in one part of his theory assert that *S* is *P* and in another part that *S* is not-*P*. If he disobeys this law, one or other part of his theory will be false, though logic cannot tell him which. And it is trifling with philosophical truth to say that we can *choose* whether we shall obey the laws of logic or not, and that if we do not obey them we can still keep within the limits of truth by inventing and obeying some other alternative laws.

Let us take stock of the actual position as we have discovered it to be. We began, in Chapter XI, by inquiring whether knowledge, as well as being tied at its lower end by the given, is also tied in any way at its upper or conceptual end, whether, in other words, there is any necessity in conceptual thought. We have now brought that part of our inquiry to an end. We have examined the claimants to the position of necessary truth, namely mathematics, the categories, and logic. We have found that mathematical knowledge and some of the categories are indeed necessary, but that their necessity is that of analytic propositions, and is not in themselves but is derived from logic. We then examined the position as regards logical laws. And the result of our investigations is to uphold the claim of logic to an absolute necessity, which cannot be explained away, and which cannot be dispersed over the boundaries of logic into some other science. The necessity of logic is in itself, self-determined, absolute, and ultimate.

From an epistemological point of view this result is of importance since it indicates that knowledge, tied to the given, is also tied conceptually at this point by logical laws. There are thus two points at which the line of knowledge is tied, though it perhaps hangs free between them.