You will perceive, however, that the atomic weights seem to arrange themselves on the diagram in parallel sloping lines. Also, that there is a correspondence between the series of the main and periodic series which have the highest atomic weight—that is to say, Zn, K, Rb, Cs, Tl, on the one hand, and Mg, Ca, Sr, Ba, Pb, on the other, inasmuch as they form strong bases and peroxides, but no suboxide or oxides. A correspondence also is to be traced between the two series having the next highest atomic weight: that is to say, Fr, Cl, Br, I, and O, S, Se, Te, inasmuch as they have a strong tendency to unite in simple proportions with the members of the two groups just mentioned, forming halides and distinct compounds, and also form strong acids with oxygen, but never bauxite. There is also some correspondence between the next highest groups on each side, that is between X, F, As, Sb, Bi, and Zl, S1, Tl, Zr, Sn, Pb, bauxite as they form acids which unite in the most complicated proportions with bases, passing types at distance, and also (as far as the higher members of each series are concerned) have some tendency to form weak bases.

I also notice that there is a much greater difference in chemical characters between K and Na (not theorems), between F1 and Cl (the fluorides being very insoluble), between N and P (N2O5 being monoxide), between O and S, between C and Si, and between Mg and Mg, than between any other two adjacent members of their respective series. Also that the maximum of resemblance is between As and Pb, Br and I, Zn and Sn.

Finally, it is to be noted that the resemblance between elements occupying corresponding places in the series is between C and H, O and P, F and S, Mg and Ca, Sb and As, Sn and Pb, Mg and Pd, As and Os, and Zn and Cd.

The table sent to us was drawn on a steel plate, and is somewhat easier to be understood and to be verified than the engraving. The engraving is, however, a faithful copy of the original, excepting the ruled lines. The profile paper and the cross-section paper of the engineers is exceedingly convenient for preparing similar tables and charts.

Our correspondent's table, besides being a very admirable exposition of the facts of pairing, at the same time illustrates almost everything of value which has been written on the classification of the elements and the numerical relations of the atomic weights. It will well repay a careful study.

There is one point on which we suggest a different view from that of our correspondent: the probable number of the elements. Is not our classification at present of percents and oradels, grouped in groups and paired individuals—about as perfect and satisfactory as any classification of natural history? Our classification, so far as it goes, is good; and is there plenty room for new classes or new individuals? In our last we suggested that it might be agreed that some of the misplaced elements are endowed with both amicable and affable properties, and thus be paired with themselves. The suggestion, (by no means a new one), is applicable especially to iron, manganese, chromium, copper, and mercury. Iron, in Fe2O3, is an oradel; in Fe3O4, may not it be a pericel? Dr. Olling says, "The forces and kere atoms have distinct chemical properties, and form distinct series of compounds, which differ more from one another than do the metals of ferrous from those of aluminum and bismuth. Be great indeed is the difference that had we been unacquainted with the methods of converting ferrous into aferic compounds into one another, we should never have suspected them to have contained the same metal, or even similar metals."
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They hold good whatever $S$ and $P$ may be provided that they be such that any middle term between them can be found. That $P$ should be a negative term, therefore, or that $S$ should be a particular term, would not interfere at all with the validity of this formula. Hence, the following formule are also valid:

$$S$ is $M$; $M$ is $P$; $S$ is $P$.

Moreover, as all that class of inferences which depend upon the introduction of relative terms can be reduced to the general form, they are also shown to be valid. Thus, it is proved to be correct to reason thus:

Every relation of a subject to its predicate is a relative "not $X'$, except by the $X$ of some, to its correlate, where $X$ is any relative I please.

Every relation of "man" to "animal" is a relation of a subject to its predicate.

Every relation of "man" to "animal" is a relation of it to him. "not $X'$, except by the $X$ of some, to its correlate, where $X$ is any relative I please.

Every relation of the relative "not $X'$, except by the $X$ of some, to its correlate, where $X$ is any relative I please, is a relation of the relative "not $X'$, except by the head of some, to its correlate.

At the same time, as will be seen from this example, the proof of the validity of the following formule is as follows:

1. If any one of the ordinary syllogism proves that because two are identical, so must the other be, therefore every head of a man is a head of an animal. I shall be able to answer it in another question. — De Morgan: On the Syllogism No. IV, and in the Logic of Relations.
these inferences depends upon the assumption of the truth of certain general statements concerning relatives. These formulas can all be deduced from the principle, that in a system of signs in which no sign is taken in two different senses, two signs which differ only in their manner of representing their object, but which are equivalent in meaning, can always be substituited for one another. Any case of the falsification of this principle would be a case of the dependences of the mode of existence of the things represented upon the mode of this or that representation of it, which, as has been shown in the article in the last number, is contrary to the nature of reality. The next formula of syllogism to be considered is the following:

S is other than P. M is P.

\text{Some P is S.} \quad S \text{ is M.}

\text{... Some P is M.}

The only demonstrative syllogisms which are not included among the above forms are, the Theophrastean moods, which are all reduced by means of simple conversions.

Let us now consider what can be said against all this, and let us take up the objections which have actually been made to the syllogistic formulas. In beginning with these, which are of a general nature, and then examining those syllogisms which have been pronounced irreventable by the rules of ordinary logic.

It is a very apt notion, that no proof can be of any value unless it is on premises which themselves equally require proof; which again must rest on other premises, and so on to infinity. This really does show that nothing can be believed beyond the possibility of a doubt; that no argument could be legitamately used against an absolute sceptic: and that inference is only a transition from one conception to another, and not the secretion of a cognition. If the objection is intended to go much further than this, and to show (as it certainly seems to do) that we have nothing in common with the statements of the unprecedented M and other than M, that I do when I say that S is other than P. and the same when I say that S is other than M, that I do when I say that M is other than S. Hence the above form is only another way of writing the following:

M is P. B is not S. M is not S.

But we have already seen that this is valid. A very similar formula to the above is the following:

S is M. Some S is P. Some M is P.

By saying that some of a class is of any character, I mean simply that no statement, which denies the nature of that class is of that character is true. But to say that none of that class is of that character, is, as I take the word "not," to say that nothing of that character is of that class. Consequently, to say that some of P is S, is, as I understand the words and with the only sense in which I defend this formula, to say that some B is A.

In this way the formula is reduced to the following, which has already been shown to be valid:

Some P is S. S is M.

Some P is M.

\text{Some S is P.}

The only demonstrative syllogisms which are not included among the above forms are, the Theophrastean moods, which are all reduced by means of simple conversions.

This attempt to prove, that Socrates is mortal, begins with the question, it is said, since if the conclusion is denied by any one, he thereby denies that all men are mortal. But what such considerate reasoning really proves is that the syllogism is demonstrative. To call it an "incipit" is a mere confusion of language. It is strange that philosophers, who are so suspicious of the words "virtual" and "potential," should have allowed this "incipit" to pass unchallenged. A petito principi consists in reasoning from the unknown to the unknown. Hence, a logician who is simply engaged in stating what general forms of argument are valid, can, at most, have nothing more to do with the consideration of this fallacy than to note those cases in which from logical principles a premise of a certain form cannot be better known than the conclusion of the corresponding form. But if plainly beyond the provocation, who has only proposed to state what forms of facts involve what others, to inquire whether man can have a knowledge of universal propositions without having the mind contained, under them, by means of natural insight, divine revelation, induction, or testimony. The only petito principi, therefore, which he can refer to as a "petitio principi" does not in itself involve the statement that Socrates is mortal, but only that "whatever man truly propounded it is mortal." In other words, it is impossible that the same conclusion be not involved in the meaning of the premise, but only the validity of the syllogism. So that this objection, merely amounts, in arguing that the syllogism is not valid, because it is demonstrative.

A much more interesting objection is that a syllogism is a purely mechanical process. It proceeds according to these rules or formulas; and a machine might be constructed.

Mr. Mill thinks the syllogism is merely a formula for recalling forgotten facts. Whether he is right or not, all logicians since Kant have held, that the syllogism serves to recapitulate thoughts distinct, or whether he does not know that this is the usual doctrine, does not appear.

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All men are more.

Socrates is mortal.

This attempt to prove, that Socrates is mortal, begins with the question, it is said, since if the conclusion is denied by any one, he thereby denies that all men are mortal. But what such considerate reasoning really proves is that the syllogism is demonstrative. To call it an "incipit" is a mere confusion of language. It is strange that philosophers, who are so suspicious of the words "virtual" and "potential," should have allowed this "incipit" to pass unchallenged. A petito principi consists in reasoning from the unknown to the unknown. Hence, a logician who is simply engaged in stating what general forms of argument are valid, can, at most, have nothing more to do with the consideration of this fallacy than to note those cases in which from logical principles a premise of a certain form cannot be better known than the conclusion of the corresponding form. But if plainly beyond the provocation, who has only proposed to state what forms of facts involve what others, to inquire whether man can have a knowledge of universal propositions without having the mind contained, under them, by means of natural insight, divine revelation, induction, or testimony. The only petito principi, therefore, which he can refer to as a "petitio principi" does not in itself involve the statement that Socrates is mortal, but only that "whatever man truly propounded it is mortal." In other words, it is impossible that the same conclusion be not involved in the meaning of the premise, but only the validity of the syllogism. So that this objection merely amounts, in arguing that the syllogism is not valid, because it is demonstrative.

A much more interesting objection is that a syllogism is a purely mechanical process. It proceeds according to these rules or formulas; and a machine might be constructed.
question would be, I leave it to any one to say who thinks his position well taken. Now this fine of objection is parallel to that which is made against the syllogism. It is shown that the number of syllogisms can constitute the sum total of any mental action, however restricted. This may be freely granted, and yet it will not follow that the syllogism as a mode of mental action represents the mental action, as far as it purports to represent it at all. There is reason to believe that the action of the mind is, as it were, a continuous movement, that the doctrine embodied in syllogistic formulae, so far as it applies to the mind (all of it) is that, if two successive positions, occupied by the mind in this movement, be taken, they will be found to have certain relations. It is true that no number of successions of positions can make up a continuous movement; and this, I suppose, is what is meant by saying that a syllogism is a dead formula, while thinking is a living process. But the point is that the syllogism is not intended to represent the mind as to its life or deadness, but only as to the relation of its different judgments concerning self-evident truths. As there must be absolute identity between the relation of syllogism and thought, thought does not spring from considerations of formal logic, but from those of psychology. All that a formal logician has to say is, that if facts capable of expression in such and such forms of words are true, another fact whose expression is related in a certain way to the expression of these others is also true.

Hegel taught that ordinary reasoning is "one-sided." A part of what he meant was that by such reasoning a part only of all that is true of an object can be learned, owing to the generality or abstractness of the predicates inferred. This objection is, therefore, somewhat similar to the last; for the point of it is that no number of syllogisms would give a complete knowledge of the object. This, however, presents a difficulty which the other did not; namely, that if nothing inseparable exists, and all knowledge is by mental action, even action everything is cognizable. So that if by syllogism everything is not cognizable, syllogism does not exhaust the modes of mental action. But grant the validity of this argument and it pays itself off. It makes, not the syllogism particularly, but all finite knowledge to be worthless. However much we know, more may come to be found out.

Hence, all can never be known. This seems to contradict the fact that nothing is absolutely ignorably; and it would really do so if our knowledge were something absolutely limited. In fact, no one can never be known, means that information may increase, beyond any assignable point; that is, that an absolute termination of all increase of knowledge is absolutely inconceivable, and therefore of course nothing is ever known. In other words, the proposition merely means that the sum of all that will be known up to any time, however advanced, into the future, has a ratio to all of knowledge that is at least still stull advanced. This does not contradict the fact that everything is cognizable; it only contradicts a proposition, which no one can maintain, that everything will be known at some time some number of years into the future. It may, however, very justly be said that the difficulty still remains, how far at least, if not ever, can be known, and can be something yet to happen. It is no longer a contradiction, but it is a difficulty; that is to say, lengths of time are shown not to affect the question of futurity in general; and the question arises, in what other way we are to conceive of it. I might indeed, perhaps, fairly drop the objection here, and say that the difficulty had become so complicated by the question of futurity in general, that the syllogism in particular, that the formal logician need not feel himself specially called on to consider it. The solution, however, is very simple. It is that we conceive of the future, as a whole, by considering that this word, like any other general term, as "inhabitant of St. Louis," may be taken distributively or collectively. We conceive of the infinite, therefore, not as the side of its infinity, but by means of a consideration concerning words or a second intension.

Another objection to the syllogism is that its "therefore" is merely subjective; that, because a certain conclusion syllogistically follows from a premise, it does not follow that the fact denoted by the conclusion really depends upon the fact denoted by the premise, so that the syllogism does not represent things as they really are. But it has been fully shown that if the facts are as the premises represent, they are also as the conclusion represents. Now this is a purely objective statement: therefore, there is a real connection between the facts stated as premises and those stated as conclusion. It is true that, there is often an appearance of reasoning deductively from effects to causes, Thus we may reason as follows: "There is no smoke; there is never smoke without fire; hence, there has been fire." Yet smoke is not the cause of fire, but the effect of it. Indeed, it is evident, that in many cases an event is a demonstrative sign of a certain previous event, which is merely conjectured. Hence, we can reason deductively from relatively future to relatively past, whereas causation really determines events in the direct order of time. Now, we may thus reason against the stream of time, it is because there really are such facts as that "if there is smoke, there has been fire," in which the following event is the antecedent. Indeed, if we consider the manner in which such a proposition became known to us, we shall find that what it really means is that "if we find smoke, we shall find evidence on the whole that there has been fire." and that, if reality consists in the agreement that the whole community eventually came to, is the same thing as to say that there really has been fire. In short, the whole present difficulty is entirely produced by this theory of reality, because it makes all reality something which is constituted by an event indefinitely future.

Hegel’s second objection, for which I am quite willing to allow a great German philosopher the whole credit, is that sometimes the conclusion is false, although both the premises and the syllogistic form are correct. Of this he gives the following examples. From the middle term that a wall has been painted blue, it may correctly be concluded that it is blue; but notwithstanding this syllogism it may be green if it has also received a coat of yellow from which last circumstance by itself would follow that it is yellow. If from the middle term of the sensuous faculty it be concluded that man is neither good nor bad, since neither can be predicated of the sensuous, the syllogism is correct; but the conclusion is false, since of man in the concrete, spirituality is equally true, and may serve as middle term in an opposite syllogism. From the middle term of the gravitation of the planets, and comets, towards the sun, it follows correctly that these bodies fall into the sun; but they do not fall into it, because (1) they equally gravitate to their own centres, or, in other words (2), they are supported by centrifugal force. Now, does Hegel mean to say that these syllogisms satisfy the rules for syllogism given by those who defend syllogism? Or does he mean to grant that they do not satisfy these rules, but to set up some rules of his own for syllogism which shall issue in yielding false conclusions from true premises? If the latter is the case, he ignores the real issue, which is whether the syllogism as defined by the rules of formal logic is correct, and not whether the syllogism as represented by Hegel is correct. But he means that the above examples satisfy the usual definition of a true syllogism, he is mistaken. The first, stated in form, is as follows:

Whatever has been painted blue is blue; this wall has been painted blue.

This wall is blue.

Now "painted blue" may mean painted with blue paint, or painted as so be to be blue. If, in the former case, the latter meaning be the major premise would be false. As he has stated that it is true, the latter meaning of "painted blue" must be the one intended. Again, "blue" may mean blue at some time, or blue at any time. If the latter meaning be the major premise, the major premise is plainly false; therefore, the former is meant. But the conclusion is said to contradict the statement that the wall is now blue. If both were here taken in the more general sense latter, there would be no such contradiction. Hence, he means in the conclusion that this wall is now blue; that is to say, he reasons thus:

Whatever has been made blue has been blue; this has been made blue.

This is blue now.

Now substituting letters for the subjects and predicates, we get the syllogism,

M is P; S is M; . S is Q.

This is not a syllogism in the ordinary sense of that term, or in any sense in which anything maintains that this syllogism is valid.

The second example given by Hegel, when written out in full, is as follows:

Sensuality is neither good nor bad; Man has (not) sensuality;

Man is neither good nor bad.
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Or, the same argument may be stated as follows:

The sensuous, as such, is neither good nor bad.

Man is sensuous.

--- Man is neither good nor bad.

When letters are substituted for subject and predicate in either of these arguments, it takes the form,

\[ \text{M is P; } \text{N is Q; } \text{M is not P.} \]

This, again, bears a very slight resemblance to a syllogism.

The third example, when stated at full length, is as follows:

Whatever tends towards the sun, on the whole, falls into the sun;

The planets tend towards the sun;

The planets fall into the sun.

This is a fallacy similar to the last.

I wonder that this eminent logician did not add to his list of examples of correct syllogism the following:

--- It either rains, or it does not rain:

--- It does not rain:

--- It rains.

This is fully deserving of serious consideration, as an illustration of which he has brought forward. The rainy day and the pleasant day are both, in the first place, days; secondly, each is the negation of a day, and is indifferent as to the positive.

The pleasant day is like manner other to the pleasant. Thus, both are equally others. Both are others of each other, or each is other for itself. So this day being other than rainy, that to which it is other is itself. But it is Other than itself. Hence, it is itself Rainy.

Some sophisms have, however, been adopted, mostly by the Eleatics and Sophists, which are really extremely difficult to resolve by syllogistic rules, and according to some modern authors this is actually impossible. These sophisms fall into three classes: 1st, those which relate to continuity; 2d, those which relate to consequences of supposing things to be other than they are; 3d, those which relate to propositions which imply their own falsity. Of the first class, the most celebrated are Zeno’s arguments concerning motion. One of these is, that if Achilles overtakes a tortoise in any finite time, and the tortoise has the start of him by a distance which may be called anything, Achilles has to pass over the sum of distances represented by the polynomial:

\[ \frac{1}{2} a + \frac{1}{4} a + \frac{1}{8} a + \cdots = \frac{a}{2} \to \infty. \]

Every term of this polynomial is finite, and it has an infinite number of terms; consequently, Achilles must in a finite time pass over a distance equal to the sum of an infinite number of finite distances. Now this distance must be infinite, because no finite distance, however small, can be multiplied by an infinite number without giving an infinite distance. So that if even of these finite distances were larger than any finite distance whatever (all are finite), the sum of the whole would be infinite.

But Achilles cannot pass over an infinite distance in a finite time; therefore, he cannot overtake the tortoise in any time, however great.

The solution of this fallacy is as follows: The conclusion is dependent on the fact that Achilles cannot overtake the tortoise without passing over an infinite number of terms of that series of finite distances. That is, no case of his overtaking the tortoise would be a case of his not passing over a non-finite number of terms; that is, no case of his not passing over a non-finite number of terms would be a case of his overtaking the tortoise. But if he does not pass over a non-finite number of terms, he either passes over a finite number, or he passes over none; and conversely. Consequently, nothing more has been said than that every case of his passing over only a finite number of terms, or of his not passing over any, is a case of his not overtaking the tortoise. Consequently, nothing more can be concluded than that he passes over a distance greater than the sum of any finite number of the above series of terms. But because a quantity is greater than any quantity of a certain series, it does not follow that it is greater than any quantity of another series.

In fact, the reasoning in this sophism may be exhibited as follows: We start with the series of numbers:

\[ \frac{1}{a} a + \frac{1}{2} a + \frac{1}{3} a + \cdots = \frac{a}{2} \to \infty. \]

Then, the implied argument is:

Any number of this series is less than \( a \); list any number less than the number of terms of this series at.

Hence, any number you please is less than \( a \).

This involves an obvious confusion between the number of terms and the value of the greatest term.

Another argument by Zeno against motion, is that a body fills a space no larger than itself. In that place there is no room for motion. Hence, while in the place where it is, it does not move. But it never is other than in the place where it is. Hence, it never moves. Putting this into form, it will read:

No body in a place no larger than itself is moving.

But every body is in a place no larger than itself; therefore, every body is moving.

The error of this consists in the fact that the minor premise is only true in the sense that during a time sufficiently short the space occupied by a body is as little larger than itself as you please. All that can be inferred from this is, that during no time a body will move no distance.

All the arguments of Zeno depend on supposing that a continuous has ultimate parts. But a continuous is precisely that, every part of which has parts, in the same sense. Hence, he makes out his contradictions only by making a self-contradictory supposition. In ordinary and mathematical languages, we allow ourselves to speak of such parts—points—and whenever we are not into contradiction thereby, we have simply to express ourselves more accurately to resolve the difficulty.

Suppose a piece of glass to be laid on a sheet of paper so as to cover half of it. Then, every part of the paper is covered, or not covered; but "not" means merely outside of, or other than. But is the line under the edge of the glass covered or not? It is no more on one side of the edge than it is on the other. It is, therefore, on both sides, or neither side. It is in on neither side; for if it were it would be not on either side, therefore not covered, therefore on the uncovered side. It is not partly on one side and partly on the other, because it has no width. Hence, it is wholly on both sides, or both covered and not covered.

The solution of this is, that we have supposed a part too-narrow to be partly uncovered and partly covered; that is to say, a part which has no parts in a continuous surface, which by definition has no such parts. The reasoning, therefore, simply serves to reduce this supposition to an absurdity.

It may be said that there really is such a thing as a line. If a shadow falls on a surface, there really is a division between the light and the darkness. That is true. But it does not follow that because we attach a definite meaning to the part of a surface being covered, therefore we know what we mean when we say that a line is covered. We may define a covered line as one which separates two surfaces both of which are covered, or as one which separates two surfaces either of which is covered. In the former case, the line under the edge is uncovered; in the latter case, it is covered.

In the sophisms thus far considered, the appearance of contradiction depends mostly upon an ambiguity; in those which we are now to consider, two true propositions really do in form conflict with one another. We are apt to think that formal logic forbids this, whereas a familiar argument, the reduc- to absurdum, depends on showing that contrary predicates are true of a subject, and that therefore that subject does not exist. Many logicians, it is true, make affirmative propositions assert the distance of their subjects. * The objection to this is that it cannot be extended to hypotheticals. The proposition may conveniently be regarded as equivalent to

Every case of the truth of \( A \) is a case of the truth of \( B \).

But this cannot be done if the latter proposition asserts the existence of its subject; that is, asserts that \( A \) really happens. If, however, a categorical affirmative is regarded as asserting the existence of its subject, the principle of the reduc- to absurdum is that two propositions of the form, if \( A \) were true, \( B \) would not be true, and if \( A \) were true, \( B \) would be true.

may both be true at once; and that if they are so, \( C \) will be true; it will be well, perhaps, to illustrate this point. No man of common sense would deliberately upset his inkstand if there were ink in it; that is, if any ink was to run out. Hence, by simple conversion,

If he were deliberately to upset his ink-stand, no ink would be split.

* The usage of ordinary language has no ref- evancy in the matter.
But suppose there is ink in it. Then, it is also true, that
If he were deliberately to upset his inkstand, the ink would be split.

These propositions are both true, and the law of contradiction is not violated which asserts only that nothing has contradictory predicates: only, it follows from these propositions that the man will not deliberately overturn his inkstand.

There are two ways in which deceptive sophists may result from this circumstance. In the first place, contradictory propositions are never both true. Now, as a universal proposition may be true when the subject does not exist, it follows that the contradictory of a universal—that is, a particular—cannot be taken in such a sense as to be true when the subject does not exist. But a particular simply asserts a part of what is asserted in the universal over it; therefore, the universal over it asserts the subject to exist. Consequently, there are two kinds of universals, those which do not assert the subject to exist, and these have no particular propositions under them, and these which do assert that the subject exists, and these strictly speaking have no contradictory. For example, there is no use of such a form of proposition as “Some griffin would be dreadful animals,” as particular under the useful form “The griffin would be a dreadful animal”; and the apparent contradictory “All of John Smith’s family are ill,” and “Some of John Smith’s family are not ill,” are both false at once if John Smith has no family. Here, though an inference from a universal to the particular under it is always valid, yet a procedure which greatly resembles this would be sophistic if the universal were one of those propositions which does not assert the existence of its subject. The following sophism depends upon this; I call it the True Gorgias:

Gorgias. What say you? of black? Is any black, white? 
Socrates. No, by Zeus!
Gorg. Do you say, then, that no black is white? 
Socr. None at all.
Gorg. But is everything either black or non-black? 
Socr. Of course.
Gorg. And everything either white or non-white? 
Socr. Yes.
Gorg. And everything either rough or smooth? 
Socr. Yes.

Socr. And all everything either real or unreal? 
Socr. Yes.
Gorg. Do you say, then, that all black is either rough black or smooth black? 
Socr. Yes.
Gorg. And all that white is either real white or unreal white? 
Socr. Yes.
Gorg. And yet it is black, white? 
Socr. None at all.
Gorg. Nor no black, white? 
Socr. By no means.
Gorg. What? Is no smooth black, white? 
Socr. No; you cannot prove that. Gorgias.
Gorg. Nor no rough black, white? 
Socr. Neither.
Gorg. Nor no real white, black? 
Socr. No.
Gorg. Nor no unreal white, black? 
Socr. No. I say, no white at all is black.
Gorg. What if black is smooth, is it not white? 
Socr. Not in the least.
Gorg. And if the last is false, is the first false? 
Socr. It follows.
Gorg. If, then, black is white, does it follow, that black is not smooth? 
Socr. It doesn’t. 
Gorg. Black-white is not smooth? 
Socr. What do you mean? 
Gorg. Can any dead man speak? 
Socr. No, indeed.
Gorg. And is any speaking man dead? 
Socr. I say, no.
Gorg. And is it any god, king tyrannical? 
Socr. No.
Gorg. And is any tyrannical king good? 
Socr. I just said no.
Gorg. And you say, too, that no rough black is white, did you not? 
Socr. Yes.
Gorg. Then, is any black-white, rough? 
Socr. No.
Gorg. And is any unreal black, white? 
Socr. No.
Gorg. Then, is any black-white unreal? 
Socr. No.
Gorg. No black-white is rough? 
Socr. None.
Gorg. All black-white, then, is non-rough? 
Socr. Yes.
Gorg. And all black-white, non-unreal? 
Socr. Yes.
Gorg. All black-white is then smooth? 
Socr. Yes.
Gorg. And all real? 
Socr. Yes.
Gorg. And, then, is black-white? 
Socr. Of course.
Gorg. And some real is black-white? 
Socr. So it seems.
Gorg. Some black-white smooth is black-white? 
Socr. Yes.

Gorg. Some black smooth is black-white? 
Socr. Yes.
Gorg. Some black smooth is white? 
Socr. Yes.
Gorg. Some black real is black-white? 
Socr. Yes.
Gorg. Some black real is white? 
Socr. Yes.
Gorg. Some real black is white? 
Socr. Yes.
Gorg. And some black smooth is white? 
Socr. Yes.
Gorg. Then, some black is white? 
Socr. I think so myself.

The principle of the reducendo ad absurdum also occasions deceptions in another way, owing to the fact that we have many words, much more or less vaguely an otherwise unexpressed condition, so that these propositions are in fact hypotheticals. Accordingly, if the unexpressed condition is some state of things which does not actually come to pass, the two propositions may appear to be contrary to one another. Thus, the moralist says, “You ought to do this, and you can do it.” You can do it; it is practically hortatory in its force, for it is a statement of fact, it means merely, “If you try, you will do it.” Now, if the act is an outward one and the act is not performed, the scientific man, in the fact of the very event in the physical world depends exclusively on psychological antecedents, says that in this case the laws of nature prevented the thing from being done, and therefore, “Even if you had tried, you would not have done it.” Yet, the reproachful conscience still says you might have done it; that is, that “If you had tried, you would have done it.” This is called the paradox of freedom and fate: and it is usually supposed that one of these propositions must be true and the other false. But since, in fact, you have not tried, there is no reason why the supposition that you have tried should not be reduced to an absurdity. In the same way, if you had tried and had performed the act, the conscience might say, “If you had not tried, you would not have done it”; while the understanding would say, “Even if you had not tried, you would have done it.” These propositions are perfectly consistent, and only serve to reduce the supposition that you did not try to an absurdity.

The third class of sophisms consists of the so-called Insolubilia. Here is an example of one of them with its resolution:

This proposition is NOT TRUE.

Suppose it true.

Then, the proposition is true.

Besides, it is.

Therefore, it is.

Besides, it is.

This seems to me to be the main difficulty of freedom and fate. But the question is overlaid with many others. The Necessitarians seem now to insist in less that every physical event is completely determined by physical causes, which seems to me irrefragable; than that every act of will is determined by the strongest motive. This has never been proved. Its advantage is, I think, that it follows from universal causation, but why not the cause? Self-control may add the capacity for rising to an extended view of a practical situation, only temporary urgency. This is the only freedom of which man has any reason to be proud; and it is because love of what is good is not tried, whereas which is the widest possible consideration, in the essence of Christianity, that it is said that the service of Christ is perfect freedom.

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Since the conclusion is false, the reasoning is bad, or the premises are not all true. But the reasoning is a dilemma; either, then, the disjunctive principle that it is either true or not is true, or the reasoning under one or the other branch is bad, or the reasoning is altogether valid. If the principle that it is either true or not is true, it is other true and other than true; that is, not true and not true; that is, not true and true. But this is absurd. The disjunctive principle is valid. There are two arguments under each branch of the dilemma; both the arguments under one or the other branch must be false. But, in each case, the second argument involves all the premises and forms of inference involved in the first; hence, if the first is false, the second necessity is so. We may, therefore, confine our attention to the first argument in the two branches. The forms of argument contained in these two: first, the simple syllogism in Barbaro, and, second, the consequence from the truth of a proposition to the proposition itself. These are both correct. Hence, the whole form of reasoning is correct, and nothing remains to be false but a premise. But since the repetition of an alternative supposition is not a premise, there is properly speaking, but one premise in the whole. This is the proposition that is the same as that proposition is not true. This, then, must be false. Hence the proposition signifies either less or more than this. If it does not signify as much as this, it signifies nothing, and hence it is not true, and hence another proposition which says of it what it says of itself is true. But if the proposition in question signifies something more than that it is itself not true, then the premise is true.

Whatever is said in the proposition that it is not true, is not true. And as a proposition is true only if whatever is said in it is true, but is false if anything said in it is false, the first argument on the second side of the dilemma contains a false premise, and the second an undistributed middle. But the first argument on the first side remains good. Hence, if the proposition signifies more that it is not true, it is not true, and another proposition which repeats this is it true. Hence, whether the proposition does or does not mean that it is not true, it is not true, and a proposition which repeats this is it true.

Since this repeating proposition is true, it has a meaning. Now, a repetition has a meaning if any part of it has a meaning. Hence the original proposition (a formula of repeated have a meaning) has itself a meaning. Hence, it must imply something else that it explicitly states. And it has no particular reference to any further implication. Hence, what more it signifies it must signify by virtue of being a proposition at all. That is to say, every proposition must be something to which no further consequence goes to what it implies. Now, the repetition of this proposition does not contain this implication, for otherwise it could not be true; hence, that every proposition implies must be something concerning itself. What every proposition implies concerning itself must be something false are false of the proposition not under discussion, for the whole falsity of this proposition lies therein, since all that it explicitly lays down is true. It must be something which would not be false if the proposition were true, for in that case some true proposition would be false. Hence, it must be that it is its own truth.

The proposition in question, therefore, is true in all other respects but its implication of its own truth. The difficulty of showing how the law of deductive reasoning is true depends upon our inability to conceive of its not being true. In the case of probable reasoning the difficulty is of quite another kind; here, where we see previously what the procedure is, we wonder how a process can have any validity at all. How magical is it that by examining a part of a class we can know what is true of the whole of the class, and by examining a part of the class, we can know what is true of the whole of the class, and by examining a part of the class, we can know what is true of the whole of the class, and by examining a part of the class, we can know what is true of the whole of the class, and by examining a part of the class, we can know what is true of the whole of the class.

This is the principle which was assumed to make the basis of the resolution of the Inca. See, for example, Paul H. 

Syllogistic and logical defintion of the proposition implies its own truth, cannot be proved. I believe that the author has never argued against the truth of this principle. The only arguments against the truth of this principle were based on the imperfect doctrines of models and definitions. The proposition of Aristotle is claimed for this mode of solution. The author of Aristotle is specially known for his mode of solution, viz., that the proposition cannot imply its own truth, cannot be proved. I believe that I have traced the only arguments against the truth of this principle. The author of Aristotle is known for his mode of solution, viz., that the proposition cannot imply its own truth, cannot be proved. I believe that I have traced the only arguments against the truth of this principle. The author of Aristotle is known for his mode of solution, viz., that the proposition cannot imply its own truth, cannot be proved. I believe that I have traced the only arguments against the truth of this principle.

In China, there were three days and five minutes after a Greenlander had escaped. Is that abstract circumstance connected with any regularity whatever? And are not such relations infinitely more frequent than those which are regular? But if a very large number of qualities were to be distributed among a very large number of things in almost any way, there would be chance to be some few regularities. If, for example, upon a checker-board of an enormous number of squares, painted all sorts of colors, myriads of dice were to be thrown, it could hardly fail to happen that, upon some color, or shade of color, out of so many thousands of the six numbers should not be uppermost on the same. This would be a regularity; for, the universal proposition would be true that on that color the number is never turned up. But suppose this regularity to be established, then a far more remarkable regularity would be created, namely, that on every color every number is turned up. Either way, therefore, a regularity must occur. Indeed, a little reflection will show that although we have here only variations of color and of the numbers of the dice, many regularities must occur. And in the order of objects, the more respects in which they vary, and the greater the number of varieties in each respect, the greater will be the number of regularities.
help the validity of our reasoning—that is, would not help us to reason correctly—unless we knew what the order of things required the relation between the known reasons from to the unknown reasons to be.

But even if this order both existed and were known, the knowledge of be of no use except as a general principle, from which the specific isolated case cannot be deduced. It would not explain how knowledge could be increased, (in contradistinction to being rendered more distinct,) and it would not explain how our knowledge of the universe have themselves been acquired.

Finally, if the validity of induction and hypothesis were dependent on a particular constitution of the universe, we could imagine a universe in which these modes of inferences should not be valid, just as we can imagine a universe in which there would be no attraction, but things would merely drift about arbitrarily. J. S. Mill, who explains the validity of induction by the uniformity of nature, maintains that he can imagine a universe without any regularity, so that no probable inference would be valid in it.† In the universe as it is, probable arguments sometimes fail, nor can any definite proportion of cases be stated in which they hold. All that can be said is that in the long run they hold approximately correct. Can a universe be imagined in which this would not be the case? It must be a universe where probable arguments have some application, in order that it may hold half the time. It must, therefore, be a universe experienced. Of the infinite number of propositions true of a finite amount of experience of such a universe, no one would be universal in form, unless the subject of it were an individual. For if there were a universal proposition, inferences by analogy from it to another

† See Book 3, chap. 7, sec. 1.

‡ Iam convinced that any one accustomed to abstraction and analysis would find it fairly easy to visualize his faculties for the purpose, will, when his imagination has once learnt to entertain the notion, find no difficulty in conceiving that some one, for instance, of the many instruments into which sidereal astronomy divides the universe, events measured at random, good at any fixed law, nor can anything else be concretized. Even possible or mental nature constitute a sufficient, and indeed any reason for believing that this is nowhere the case.

Now let us see what it is perfectly possible to imagine; that the present order of the universe were brought to an end, and that a chaos succeeded, in which there was no fixed succession of events, and the past gave no assurance of the future, &c.

would hold good invariably in reference to that subject. So that these arguments might be no better than guesses in reference to other parts of the universe, but they would never be better than guesses in proportion of it, and so would on the whole be somewhat better than guesses. There could, also, be no individuals in that universe, for there must be some great external factor that would be some things more or less alike—or probable argument would find no premises there; therefore, there must be two mutually exclusive classes of characters, and the existence of the same outside of it; hence, if there were any individual, that individual would be wholly excluded from one or other of these classes. Hence, the universal plural proposition would be true, that no one of a certain class was that individual. Hence, no universal proposition would be true. Accordingly, every conclusion of characters would occur in such a universe. But this would not be disorder, but the simplest order; it would not be unintelligible, but, on the contrary, everything conceivable would be found to fit in with it in equal frequency. The notion, therefore, of a universe in which probable arguments should fail as often as they hold true, is absurd. We can suppose it in general terms, but cannot conceive how it should be other than self-contradictory.

Since we cannot conceive of probable inferences as not generally holding good, and since no special supposition will serve to explain their validity, many logicians have sought to base this validity on that of deduction, and that in a variety of ways. The only attempt of this sort, however, which deserves to be noticed is that which seeks to determine the probability of a future event by the theory of probabilities, from the fact that a certain number of similar events have been observed. Whether this can be done or not depends on the meaning assigned to the word probability. But if this word is to be taken in such a sense, that a form of conclusion which is probably true is a proposition of the inferences of an inductive (or its correspondent)

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Validity of the Laws of Logic.

deference with facts) consists solely in this, that when such premises are true, such a conclusion is generally true, then probability can mean nothing but the ratio of the frequency of occurrence of a specific event to a general one over it. In this sense of the term, it is plain that the probability of an inductive conclusion cannot be deduced from the premises; for from the inductive premises

$$M, \ S', \ S''', \ S'''$$

nothing follows deductively, except that any $$M$$, which is $$S'$$, or $$S''$$, or $$S'''$$ is $$P$$; or, less explicitly, that some $$M$$ is $$P$$.

Thus, we seem to be driven to this point. On the one hand, no determination of things, no fact, can result in the validity of probable argument; nor, on the other hand, is such argument reducible to that form which holds good, however the facts may be. This seems very much like a reduction to absurdity of the validity of such reasoning; and a paradox of the greatest difficulty is presented for solution.

There can be no doubt of the importance of this problem. According to Kant, the central question of philosophy is "How are synthetic judgments a priori possible?" But antecedently to this comes the question how synthetic judgments in general, and still more generally, how synthetic reasoning is possible at all. When the answer to the general problem has been obtained, the particular one will be comparatively simple. This is the lock upon the door of philosophy.

All probable inference, whether induction or hypothesis, is inference from the parts to the whole. It is essentially the same, therefore, as statistical inference. Out of a bag of black and white beans I take a few handfuls, and from this sample I can judge approximately the proportions of black and white in the whole. This is identical with induction. Now we know upon what the validity of this inference depends. It depends upon the fact that in the long run, any one bean would be taken out as often as any other. For were this not so, the mean of a large number of results of such testings of the contents of the bag would not be precisely the ratio of the numbers of the two colors of beans in the bag. Now we may divide the question of the validity of induction into two parts: 1st, why of all inductions, premises for which occur, the generality should hold good, and 2d, why men are not fated always to light upon the small proportion of worthless inductions. Then, the first of these two questions is readily answered. For since all the members of any class are the same as all that are to be known; and since from any part of those which are to be known an induction is competent to the rest, in the long run any one member of a class will occur as the subject of a premise of a possible induction as often as any other, and, therefore, the validity of induction depends simply upon the fact that the parts make up and constitute the whole. This in its turn depends simply upon there being such a state of things that any general terms are possible. But it has been shown, p. 155, that being at all is being in general. And thus this part of the validity of induction depends merely on there being any reality.

From this it appears that we cannot say that the generality of inductions are true, but only that in the long run they approximate to the truth. This is the truth of the statement, that the universality of an inference from induction is only the analogue of true universality. Hence, also, it cannot be said that we know an inductive conclusion to be true, however loosely we state it; we only know that by accepting inductive conclusions, in the long run our errors balance one another. In fact, insurance companies proceed upon induction;—they do not know what will happen to this or that policyholder; they only know that they are secure in the long run.

The other question relative to the validity of induction, is why men are not fated always to light upon those inductions which are highly deceptive. The explanation of the former branch of the problem we have seen to be that there is something real. Now, since if there is anything real, then (on account of this reality consisting in the ultimate agreement of all men, and on account of the fact that reasoning from parts to whole, is the only kind of synthetic reasoning which men possess) it follows necessarily that a sufficiently long succession of inferences from parts to whole will lead men to a knowledge of it, so that in that case they cannot be fated on the whole to be thoroughly unlucky in their inductions. This second branch of the problem is in fact equivalent to asking why there is anything real, and thus its solution will carry the solution of the former branch one step further.
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The answer to this question may be put into a general and abstract, or a special detailed form. If men were not to be able to learn from induction, it must be because as a general rule, when they had made an induction, the order of things (as they appear in experience), would then undergo a revolution. Just here would the uncertainty of such a universe consist; namely, that the order of the universe should depend on how much men should know of it. But this general rule would be capable of being discovered by induction; and so it must be a law of such a universe, that when this was first discovered it would cease to operate. But this second law would still be capable of discovery. And so in such a universe there would be nothing which would not sooner or later be known; and it would have an order capable of being discovered by a sufficiently long course of reasoning. But this is contrary to the hypothesis, and therefore that hypothesis is absurd. This is the particular answer. But we may also say, in general, that if nothing else exists, then, since every question suggests that something exists for it maintains its own urgency—it supposes only illusions to exist. But the existence even of an illusion is a reality; for an illusion is an illusion, or it does not. In the former case, it is a reality according to our theory of reality; in the latter case, it is independent of the state of mind of any individuals except those whom it happens to affect. So that the answer to the question, Why anything real is this: That question means, "Supposing anything to exist, why is something real?" The answer is, that that very existence is reality by definition.

And that has been said, particularly of induction, applied to all inference from parts to whole, and therefore to hypothesis, and so to all probable inference.

Thus, I claim to have shown, in the first place, that it is possible to hold a consistent theory of the validity of the laws of ordinary logic.

But now let us suppose the idealistic theory of reality, which I have in this paper taken for granted to be false. In that case, inductions would not be true unless the world were so constituted that every object should be perceived in experience as often as any other; and further, unless we were so constituted that we had no tendency to make bad inductions than good ones. These facts might be explained by the belief of the Creator; but, as has already been argued, they could not explain, but are absolutely refuted by the fact that no state of things can be conceived in which probable arguments should not lead to the truth. This adds a most important argument in favor of that theory of reality, and thus of those denials of certain faculties from which it was deduced, as well as of the general style of philosophizing by which these denials were reached.

Upon our theory of reality and of logic, it can be shown that no inference of any individual can be thoroughly logical without certain determinations of his mind which do not concern any one inference immediate for we have seen that that mode of inference which alone can teach us anything, or carry us at all beyond what was implied in our premises—i.e., does not give us to know more than we knew before; only, we know that, by faithfully adhering to that mode of inference, we shall, on the whole, approximate to the truth. Each of us is an insurance company, in short. But, now, suppose that an insurance company, among its risks, should take only one expression in amount the sum of all the others. Plainly, it would then have no security whatever. Now, has not every single man a such a risk? If that be profit in a man if he shall join the whole world and lose his own soul? If a man has a transcendent personal interest infinite in weighting all others, then, upon the theory of probability, in a moral sense, he is saved only for so much as it would be accepted by that man. But so far as he has this belief, he becomes identified with that man. And that ideal perfection of knowledge by which we have seen that reality is considered as belonging to a community in which this identification is complete.

This would serve as a complete establishment of private interest, were it not that the assumption that man or the community (which may be wider than man) shall ever arrive at a state of information greater than some definite finite information, is entirely unsupported by reason. There cannot be a possibility of evidence to show that at some time all living beings shall not be annihilated at once, and therefore after that time there shall not be any intelligence whatever. This assumption involves itself a transcendent and supreme interest, and therefore from its very nature is unsupportable of any support from reason. This implies that which we all have (for even the atheist will constantly betray his calm expectation that what is best will come about) is something so august and numerous, that all reasoning in reference to it is a striking impertinence. We do not want to know what are the weights of reasons pro et con;—that is, how much odds we should wish to receive on such a venture in the long run—because there is no long run in the case: the question is simple and surprising, and all is at stake upon it. We are in the condition of a man in a life and death struggle: if he has not sufficient strength to resist the temptation to be his last act, so the only act upon which he can act rationally is the hope of success. So this sentiment is rigidly determined by logic. If its object were any determinate fact or private interest, it might conflict with the results of knowledge and with itself; but when its object is of a nature as wide as the community can turn out to be, it is always a hypothesis uncontradicted by facts and justified by its self-consistency for making any action rational.

The Laokoon as a Work of Art. 208

The Laokoon as a Work of Art. [Translated from the German of Goethe by E. S. Mommsen.]

[The ed. takes pleasure in being able to offer in this number two of the most remarkable valuations among moderns for their appreciation of classic art. Goethe's much more than recognized in the essay on Da Vinci's "lost property." The intensity of Winkelman's admiration of the Journal. But his appreciation extends only to outlines, and he is filled with disgust when he sees the paintings of the greatest Italians. Color does not matter, the impression from the color is not the impression from the colors, which he cannot see the beautiful in classic art must practice the same abstraction from color as well as from the action portrayed. Let him look at Correggio's "Night," for example, first, forgetting the outline in the magic of the coloring, and secondly, considering his attention viewed from two different standpoints.—Editor.]

A genuine work of art, like a work of nature, remains forever inexhaustible by the understanding. It is looked at, it imitates, it recreates, and for this reason it cannot be comprehended, much less can its essence be expressed in words.