

CAUSATION, PHYSICAL AND METAPHYSICAL

WE LIVE in a world where effect follows cause in an orderly and, it would seem, inevitable rhythm. It matters not where we tap the fount of scientific inspiration, we always find that the untiring search for the antecedents of any event is founded on the conviction that for that event there is some ascertainable cause. Even chance has yielded to the statistical method, so that its laws may be formulated. By dealing with larger and larger numbers we eliminate more and more the idiosyncrasies of the particular case. And thus we come to realise that what we call chance in the tossing of a coin is only our ignorance of the nature and immediate cause of these idiosyncrasies. Just in so far as our science or its application is imperfect, do we project upon the screen of nature, woven by our experience, the shadow of fortuity, blurring the details of processes which, to less imperfect mental vision, would stand out clearly as causally related. Thus it arises that, for those who have been led to this point of view, the doctrine of evolution, as applicable throughout the range of an experience which science indefinitely prolongs, gives expression to the daily strengthening belief that the state of matters at any given moment is the outcome of a state of matters in the preceding moment, and in like manner serves to determine the state of matters in the moment that follows.

It may be said, however, that what I have spoken of as chance was, with inferior knowledge perhaps but with greater reverence, regarded by our forefathers as a direct action of the Power that lies behind the fleeting phenomena of the material universe. All that modern science has done, it will be urged, is to bring into stronger

and stronger relief the fact that the nature of this Power is without variableness or shadow of turning. Science thus shows behind the multiplicity of phenomena the unity of the causal power. How far and in what sense this is true, it is the object of the present essay to discuss.

In my former essay on "The Realities of Experience"¹ I have endeavored to prepare the way for this discussion. It was there shown that both the physical and the psychological sciences deal with data afforded by experience; that the incontrovertible dictum on which they take their stand is *experientia est*, that the phenomena of the world, which through experience we construct, have a practical reality on which we may rely with implicit confidence; but that the sciences which take their stand on experience have no right to proceed a single step—to assert anything positive or negative—beyond that which is given in experience or securely founded thereon. I even ventured to say that in presence of the problems of causation, science is smitten with the dumbness of agnosticism; adding, however, that behind the realities of experience I, for one, believe in a causal reality which makes that experience possible and explicable.

Now, what in the name of reason is the meaning of these astounding contradictions? Almost in the same breath we are told that science has established the all-embracing sway of natural causation; and that science can tell us nothing whatever about this (or is it some other?) causation, in which we are none the less solemnly invited to believe! If the reader deem the matter worthy of his serious attention, he will not be unwilling to look into it somewhat carefully.

Glanvill in his *Scep̄sis Scientifica* says: "All knowledge of causes is deductive; for we know of none by simple intuition, but through the mediation of their effects. So that we cannot conclude anything to be the cause of another but from its continual[ly] accompanying it; for the causality itself is insensible." "What we call experience," said Hobbes, "is nothing else but remembrance of what

¹ *Monist*, October, 1897.

antecedents have been followed by what consequents." Such statements as these, which are quoted by Lewes, may have been the seeds which germinated in the mind of Hume and developed into his well-known theory of causation. In any case it is evident that he thought the matter out for himself with his customary vigor and independence. We may profitably make his treatment of the subject our starting point.

"When we look about us towards external objects, and consider the operation of causes," said Hume in that section of the *Enquiry* which treats of the Idea of Necessary Connexion, "we are never able in a single instance to discover any power or necessary connexion, any quality, which binds the effect to the cause, and renders the one an infallible consequence of the other. We only find, that the one does actually, in fact, follow the other. The impulse of one billiard-ball is attended with motion in the second. This is the whole that appears to the outward senses. The mind feels no sentiment or inward impression from this succession of objects. Consequently there is not, in any single, particular instance of cause and effect; anything which can suggest the idea of power or necessary connexion."

For a comprehension of Hume's conception stress must be laid, in this passage, on the words "in a single instance." When he says that we are never able *in a single instance* to discover any power or necessary connexion, these four words are not merely inserted to emphasise the *never*; they are to be taken literally. We are never able, from the study of a single and isolated case or example, to discover any power or necessary connexion. This appears more evidently in later passages.

"When any natural object or event is presented, 'tis impossible for us, by any sagacity or penetration, to discover, or even conjecture, without experience, what event will result from it, or to carry our foresight beyond that object, which is immediately present to the memory or senses. Even after one instance or experiment, when we have observed a particular event to follow upon another, we are not entitled to form a general rule, or foretell what will happen in like cases; it being justly esteemed an unpardonable temerity to judge of the whole course of nature from one single experiment, however accurate or certain. But when one particular species of event has always, in all instances, been conjoined with another, we make no longer any scruple to foretell the one upon appearance of the other, and to employ that reasoning, which can alone assure us of any matter of fact or existence. We then call the one object, *Cause*; and the other *Effect*. We suppose that there is some connexion between them; some power in the one, by which it infallibly

produces the other, and operates with the greatest certainty and strongest necessity.

"It appears, then, that this idea of a necessary connexion amongst events arises from a number of similar instances, which occur, of the constant conjunction of these events; nor can that idea ever be suggested by any one of these instances, surveyed in all possible lights and positions. But there is nothing in a number of instances, different from every single instance, which is supposed to be exactly similar; except only, that after a repetition of similar instances, the mind is carried by habit, upon the appearance of the one event, to expect its usual attendant, and to believe, that it will exist. This connexion, therefore, which we *feel* in the mind, or customary transition of the imagination from one object to its usual attendant, is the sentiment or impression, from which we form the idea of power or necessary connexion. . . . The first time a man saw communication of motion by impulse, as by the shock of two billiard balls, he could not pronounce that the one event was *connected*; but only that it was *conjoined* with the other. After he has observed several instances of this nature, he then pronounces them to be *connected*. What alteration has happened to give rise to this new idea of *connexion*? Nothing but that he now feels these events to be connected in his imagination, and can readily foretell the existence of the one from the appearance of the other. . . . When many uniform instances appear, and the same object is always followed by the same event; we then begin to entertain the notion of cause or connexion."

The first question we may ask concerning the views which are thus so clearly and forcibly expressed is this: Does Hume disclose anything beyond observable or frequently observed succession? Obviously not. Let us take a matter of common experience. The flash and the report of a distant cannon are so connected in experience that the occurrence of the one suggests the other through association. In Hume's interpretation, first, the visible flash is the antecedent of the heard report; secondly, the flash is the antecedent of an expectation or anticipation of the report; and thirdly, custom is the antecedent condition of the settled and established anticipation. Here we are simply describing certain facts of experience in terms of antecedence and sequence. Of any "power" or "strongest necessity" Hume should be, and I take it actually was, the last to see in mere custom the smallest indication. To modify the words of Hobbes without altering his meaning we may say: "What we call custom is nothing else but remembering what antecedents have been followed by what consequents"; and we may

add in the phrase of Glanvill "for the causality itself is insensible."

A second question may be put thus: Is anything gained by shifting the field of discussion from the physical to the psychological aspect of one common experience? Otherwise stated: Is there any advantage in dealing with the sequence, seen-flash—expectation-of-the-report, instead of with the frankly objective sequence, flash—report. In some respects there would seem to be a distinct disadvantage. For though in the subjective scheme on which we interpret experience the flash and the report stand in the relation of antecedent and sequent, in the objective scheme on which we interpret experience they do not stand in this relation. For experience itself discloses the fact that if we lessen our distance from the cannon the interval between the antecedent flash and sequent report is proportionally lessened. The two converge in time as we approach the cannon. Carrying this convergence to its ideal limit in the objective sphere, the two coalesce, and antecedence vanishes, at the cannon's mouth. Hence, in the objective interpretation of experience by physical science, the flash is not the antecedent or cause of the report. They are the diverse effects of an antecedent common to both. Of course there is no lasting and abiding discrepancy between the psychological and the physical interpretation of experience, in a scheme of knowledge that is adequately organised and correlated. But the fact that such organisation and correlation is necessary, should warn us against any limitation of the discussion of causation to the subjective sphere of impressions and expectations. It need hardly be said that this does not imply any forgetfulness of the fact that there is a subjective aspect in all experience, and in every stage of its interpretation. This we may now take for granted; and we may say that experience, whether we regard it objectively or subjectively, affords certain observable sequences which in any consistent interpretation must be duly correlated. We thus come back to what may be regarded as Hume's primary contention which may be thus summarised. All that is disclosed in the objective treatment of experience may be expressed in terms of actually observed antecedence and

sequence. "The scenes of the universe are continually shifting, and one object follows another in uninterrupted succession ; but the power or force, which actuates the whole machine, is entirely concealed from us, and never discovers itself in any of the sensible qualities of body."

And so we may pass on to our third question. Is this way of regarding causation accepted by modern science? But in order to lead up to an answer to this question we must consider briefly in what respects the conceptions of science differ from the raw material of sensory experience.

It is clear that the conceptions of science are mental products. They form part of an ideal scheme, often highly abstract and generalised, by which we interpret the phenomena of our sensory experience. The law of gravitation is an abstract and general formula applicable to any one of the thousands of particular cases of gravitative attraction which may at any time, and in any part of the universe, be presented to our observation. The law that the tide-producing influence of any celestial body varies directly as its mass and inversely as the cube of its distance from the Earth, is a formula which results from a consideration of the differential effects of gravitative attraction on a body which is in part rigid and in part mobile. That such abstract formulæ and general schemes for the interpretation of a multiplicity of particular cases, are what we may term "constructs" of the human mind, needs no further illustration. But it is obvious that our treatment of experience in the foregoing essay precludes our saying that, save in their abstract and general nature, the constructs of science differ in any essential aspect from the constructs of sensory experience. For the latter no less than the former are mental products ; and they are constructs in so far as the immediate data of sense are supplemented by the associated products of past experience revived in memory. A subtle and characteristic scent leads me to construct violets ; a sound in the street leads me to construct tram-car ; the sight of distant specks of grey on the swelling chalk downs leads me to construct sheep ; and so on in a thousand familiar cases. This whole range of our sensory experience is a mental product ; and every object

therein is a construct, or, as Dr. Johnstone Stoney terms it, a *syntheton*, of which sense supplies the nucleus and memory fills in the rest.

Shall we then discover a distinction in the fact that the constructs of sense have an objective reality which is lacking to the more abstract and general constructs of science? That depends on how we define the term objective, and on what we understand by reality. Subject and object are, in our interpretation, products of the analysis of experience. Both are implicit in every definite item of human experience; both may be rendered explicit in thought as distinguishable but inseparable. Now if we limit the term "objective" to one aspect of this *sensory* experience then it will follow that, by definition, the constructs of sense have an "objective" reality which is lacking to the constructs of science. But such a limitation is arbitrary and leads rather to confusion than to clearness of ideas. We commonly speak of objects of thought, objects of desire, objects of reverence, and so forth. It is more consistent and more helpful to regard all experience, sensory and super-sensory alike, as susceptible of analysis into an objective aspect and a subjective aspect. In which case the conceptions which form the constructs of science constitute, from the appropriate standpoint of analysis, an objective scheme which we, so to speak, project on to the screen of the phenomenal universe.

As to the reality of the constructs of science, that is their inalienable right as products of the widened experience of rational beings. *Experientia est*. To say that they *are* products implies that they are real products in the sense I endeavored to make clear in my former essay. But if the word "real" be used, as it often is, as the equivalent of "valid," then we may say that the constructs of science are valid just in so far as they fulfil their purpose of enabling us to interpret the particular phenomena to which they are applicable. The ideal scheme of science must fit the facts whenever and by whomsoever it may be applied as a canon of interpretation. If the scheme fits, under all possible circumstances within the sphere of its appropriate application, it is as real and

valid as anything within the range of human experience can possibly be,

It is therefore not in any lack of reality or of objective import that the constructs of science differ from the constructs of sensory experience. It is their abstract and general character which alone distinguishes them. We may add, however, that there is another feature about them which Dr. Karl Pearson well expresses by saying that they have been carried in thought to their ideal limits. Take the law of gravitation for example. It is sometimes asked, by what right we assume from a limited number of observations—very numerous perhaps but still limited—that the law is universal; and, further, by what right we assume from measurements limited in accuracy—very accurate, no doubt, but still falling short of that which is absolute—that in no particular case is there any variation, even by so much as a hair's breadth, from the formula which Newton expressed in mathematical terms. The answer is that we carry our law to an ideal limit unattainable by sense and by practical measurement. We assume that it is absolutely and universally true because in no case has it been shown to be actually and observably false. We sweep our ideal curve through the recorded data of physical measurement and regard the minute deviations of the actual from the ideal as due to errors of observation. We trust to a reality of thought which we believe to be truer and wider than the realities of sense.

Thus we use the conceptual constructs of science, carried in this way to their ideal limits and rendered absolute for thought, to explain the phenomena presented to our observation in the field of sense. But here we must pause again for a moment and render clear the meaning which attaches to the word "explanation." What, it may be asked, is the law of gravitative attraction, but a highly general and abstract *description* of certain facts and phenomena stripped of merely incidental errors of observation? Given certain antecedent conditions, certain consequent events follow. That is all. There is no explanation, not even an attempt at explanation, which shall afford an answer to the question why they should thus follow. Your law, it will be said, presents us with the *how* of gravi-

tative attraction in convenient schematic form. It tells us nothing of the *why*. If a boy asks why a stone falls to the earth, you do not reply: Because of the law of gravitation. Or if you do, he will, if a tolerably sharp lad, make answer: But I understood you to say that the law is an ideal construct to enable us to interpret the facts, whereas now you seem to tell me that it somehow constrains the stone to move toward the earth!

The truth is that the word "explanation" is used in two senses; in what we may term the scientific sense and in the metaphysical sense. When we refer a given fact of observation to the general law under which it falls, we are said to give a scientific explanation of the fact. Thus we explain the magnifying power of a pocket lens by bringing the particular phenomena under the general laws of refraction. We explain the easting of the trade winds in terms of the differential velocity, under rotation, of the tropical and equatorial zones. We explain the formation of hoar frost by showing that, when the dew-point is below the freezing point, water-vapor condenses in the form of crystalline needles of ice. In a word, the explanation, in this sense of the term, exhibits the relations of particular phenomena to the abstract constructs of science. Hence the fall of a stone to the earth is explained by referring it to the law of gravitation. But in none of the cases above adduced, which may be taken as sufficiently typical examples, is there any explanation in the metaphysical sense. In no case are they referred to an ultimate underlying Cause. The constructs of sensory experience are accepted as data; the constructs of science are built upon them in conceptional synthesis; the ideal scheme is repeatedly applied to phenomena for purposes of interpretation; observed facts are again and again referred to the ideal scheme for scientific explanation. But why the facts and the sensory data are what they are and as they are, is a question for metaphysics, not for science. If an answer to this question can be given, it will be an explanation in the metaphysical sense.

The observable sequences of natural phenomena as given in practical experience may here be distinguished from the inevitable sequiturs of logical thought. Of the former we can only say (apart

from some metaphysical explanation) that they are ; of the latter we may say that they *must be*. That the three angles of any plane triangle must be equal to two right angles, or that the square described on the hypotenuse of any right-angled triangle must be equal to the sum of the squares on the other two sides, are inevitable sequiturs for all who accept the postulates, and understand the ideal scheme, of geometry. These statements not only are true, but they must be true *within that ideal scheme*. That an unsupported stone falls to the earth with a given acceleration, as a natural phenomenon is simply an observable fact ; as a natural phenomenon there is (apart from metaphysics) no “must be” in the case. The idea of necessity only arises when we incorporate the facts in an ideal scheme of physics. Assuming the universality of the law of gravitation we may then say that, apart from disturbing influences, the stone must fall to the earth. But it is clear that the necessary and inevitable sequitur lies in the scheme of logical thought ; and not in the observable sequences on which that scheme is founded. From the point of view we thus reach it may be said that any necessity we may ascribe to the observable sequences of natural phenomena is an importation from the products of our logical thought.

So far we have been endeavoring to make clear the nature of explanation and the relation which an ideal scheme with its logical sequiturs bears to natural phenomena with their observed sequences. We are now in a position to return to the third question we asked concerning Hume's doctrine of causation : Is his main contention accepted by modern science ? That contention we summarised as follows : All that is disclosed in the objective treatment of experience may be expressed in terms of actually observed antecedence and sequence. If we ask what is the cause of the attraction, by the earth, of an unsupported stone, we shall perhaps be told “the force of gravity.” And if we require more exact information, expressed in general terms, it will be said that every substance in the universe attracts every other substance with a force jointly proportional to the mass of the attracting and of the attracted body, and varying inversely as the square of the distance. How does

this force, as the cause of attraction, square with Hume's conclusion? Is there an observed antecedent "force" and then an observed sequent "attraction"? Surely not. From the physical point of view it is all one whether we say the force of gravitative attraction or the attraction of gravitative force. For physics the attraction and the force are identical. We may cut out all reference to force in the above statement of Newton's law without detracting from its scientific value, and say that every substance in the universe attracts every other substance *in a degree* jointly proportional to the masses and inversely as the square of their distance. That is a statement of observed and observable phenomena. And many physicists are content to restrict the term "force" to an expression, in mathematical formula, of the measure of intensity. For them physical causation may be expressed in terms which are essentially those of antecedence and sequence. Others, however, while they adopt this usage, give also another and distinct definition of force, as the cause of motion. It is not for an outsider to decide between contending giants. But to an outsider it seems perfectly clear that if force be regarded as the cause of motion, the word "cause" is used in a sense quite different from that which is founded on the conception of antecedence and sequence.

Let us frankly accept this conclusion. And let us speak of physical or scientific causation which refers events to their antecedents, generalising the results of observation in an ideal scheme of physical science; and let us speak of metaphysical causation which seeks to get behind or beneath phenomena and to give the *raison d'être* of their being, generalising its conclusions in an ideal scheme of metaphysical interpretation. And, with this distinction in view, let us proceed to consider physical causation a little more closely that we may see how far and with what amendments modern science accepts Hume's doctrine. Three points may be noticed.

1. Hobbes, in a passage which is quoted by Jevons, brought out an important feature when he said: "A cause is the sum or aggregate of all such accidents, both in the agents and the patients, as concur in the producing of the effect propounded; all which existing together, it cannot be understood but that the effect existed

with them; or that it can possibly exist if any one of them be absent." Mill accepted and endorsed this view. "The real cause," he said, "is the whole of the antecedents; and we have, philosophically speaking, no right to give the name of cause to any one of them exclusively of the others." True and important, "philosophically speaking," as is this identification of the cause with the totality of the antecedent conditions, it is none the less true that "scientifically speaking" it is the aim of physics to isolate the factors of phenomena and to disentangle the threads which are woven into the totality of antecedent conditions. It is this disentanglement which serves, in part at least, to distinguish the ideal scheme of physics from the complex web of natural phenomena which with ever-increasing success it enables us to interpret. At the same time it should be noted that this method of scientific procedure does not at all invalidate Hobbes's contention. For though physics adopts the method of analysis with a view to isolating the factors of causation, it still remains true that, when its results are applied to a complex phenomenon such as Hobbes had in view, no interpretation can be satisfactory unless all the co-operating antecedents are represented synthetically in due quantitative proportion. Accepting, therefore, the validity of Hobbes's contention that the cause is the totality of the conditions, we may add, as a rider, that science analyses this complex into its factors and utilises the results of its analysis in synthetic interpretation.

2. Hume's doctrine on the effects of custom and habit led him, no doubt, as Reid pointed out, to exaggerate the importance of the repetition of experience. When the conception of uniformity has been reached, a single accurate and precise determination of the essential antecedent conditions is sufficient. The value of repetition is, first, to eliminate errors of observation, and secondly (where others repeat the observations of the original investigator), to ensure the social validity of the conclusion, and to make allowance, if necessary, for the personal equation. Hume's error, if such it be regarded, arose from the fact that he had a double purpose in view; first, to show how the conception of uniformity arises, and secondly, to interpret causation in terms of observable sequence.

3. Much has been written concerning the time-element in causation; and it has been urged that, since the cause shades insensibly into the effect, so that it may even be said that the effect is already precontained in the conditions, the time-element must be excluded, and with it, therefore, must go the whole conception of antecedence and sequence. Not a little confusion has, however, arisen from a failure to distinguish physical from metaphysical causation. In the latter, as we shall see, the time-element is absent; but in physical causation it is essential. But though it is essential, it is, after the method of science, carried in thought to its ideal limit. For an adequate conception of physical causation, as interpreted synthetically by modern science, two essential ideas have to be borne in mind. First, the continuity of progress wherein there is a constant shading and passage from antecedent into sequent; and secondly, the ideal nature of the boundary between the one and the other. For the purposes of our thought we draw this ideal plane, at any moment we wish to select, through the onward-flowing stream of events. The totality of conditions on the one side of this dividing plane we term the cause, the totality on the other side of the plane we call the effect. But the dividing plane has no existence save for our thought; and its time-breadth, reduced to its ideal limit, is for that thought infinitesimal. It is like the philosophical concept of the present,—the mere dividing line between the past and future. When we narrow down our consideration of physical causation to its ideal limits, we place ourselves on this dividing line and see cause pass into effect as the stream of phenomena crosses the boundary.

Such, I take it, is the conception of physical causation we reach when we reduce the notion of sequence to its ideal limits. It is the doctrine of Hume translated from the region of practical observation into the region of conceptual thought founded thereon. And in this sense we may say that modern science accepts the doctrine in its essential features. Why the sequence is of that nature which we find it to be in the data of sensory experience, physical science as such, does not, I conceive, attempt to explain. Here

are the facts as practically given ; that is an end of the matter so far as physical science is concerned.

Some physicists are, however, as we have already noticed, unable to accept this limitation. They define force as a cause in a sense wholly different from that in which this term is used as the equivalent of antecedent. But they do so as metaphysicians not as physicists. They supplement that kind of explanation which we term physical by the totally different kind of explanation which should in strictness be regarded as metaphysical. Force as a cause of motion is not its antecedent but its *raison d'être*.

The origin and justification of such procedure would seem to be somewhat as follows : First as to origin. Certain objective sequences are given, as matter of fact, in sensory experience. The terms of any sequence, so given, are, as Hume contends, conjoined but not connected. By analysis, generalisation, and synthesis we frame an ideal scheme of physical science, founded on the data of experience. Within this scheme the terms are not merely conjoined, but are logically connected for rational thought. We then project into the mere sequences, given in sensory experience, connexions analogous to those which obtain within the ideal scheme of physical science. We make the connexions part of our completed construct. So much for origin ; now for justification. The ideal scheme of physical science is admittedly rational and connected. But when this scheme (which is the product of rational thought) is applied to the data of sensory experience (which are independent of our rational thought and over which reason has no control) it is found to fit the given sequences. Hence, just in so far as the connexions of the ideal scheme coincide with the sequences of sensory experience, may we assume that these sequences have an underlying connexion which metaphysics endeavors to formulate. In brief therefore the justification runs thus. The constructs of physical science supply us with an ideal scheme which is connected, rational, and explicable. But this scheme seems to fit the constructs of sensory experience. Hence they too are assumed to be connected, rational, and explicable.

It may be said that, since the ideal scheme of physical science

is founded on the data of sensory experience, its connexions are derived from, and not imported into, the sequences of natural phenomena. But it is clear that, unless we are to deny in our conclusion what is granted in our premises, this is no argument against some metaphysical connexion. It merely asserts that the connexion is already there awaiting our discovery. A more plausible criticism is that since the sensory data form part of the experience of a rational being they must, as such, be logically connected. But the sensory data are not the product of our rational thought. And if they were, what ground would there be for the contention that they are merely observable sequences without underlying connexion? It is this contention which the metaphysician deems inadequate and desires to supplement by his doctrine of causation.

Here it will be necessary to make a fresh start and approach the problem by a somewhat different path. It will be remembered that, in my former essay, the question: How is it that we have sensory experience? was passed by as one involving a metaphysical answer. Speaking of the milestones on the Dover road I said: "And if it be contended that something, at any rate, does exist, independently, which generates, or is the occasion of, the several experiences of those who journey along the Dover road, I am certainly not prepared to deny the statement; but it belongs to the domain of metaphysics, not to that of practical knowledge." The real question here is: What causes experience? And this question cannot be answered in terms of physical antecedence but only in terms of metaphysical causation. The practical man in the street, who does not realise that he is a metaphysician *malgré lui*, may be inclined to doubt this. But it cannot be seriously questioned by any one who considers the nature of the inquiry. Physical causation deals with antecedence and sequence as given in experience. But that which we now wish to ascertain is what calls experience into being. The separation of a stone from the earth is the antecedent condition of its fall; but if we ask, what makes it fall, we are constrained to have recourse to the metaphysical conception of gravitative force. Even if we could say with any certainty that the physical antecedent is some kind of ethereal stress, we should still

have to ask, what makes the ether "stressy." Push any physical or scientific inquiry deep enough, and you get the general reply, "That's the way things are constituted." And man the metaphysician will still want to know what is the cause of this constitution.

Of course I am fully aware that many philosophical agnostics contend that the modest and honest attitude in face of such inquiries is a confession of ignorance. "We don't know and there's an end on't." But it is, rightly or wrongly, characteristic of the metaphysician that he cannot rest content with this reply at this stage of the inquiry. He must endeavor to get a little deeper down and frame a wider construct, even if he then, in his turn, must make confession of ignorance of its nature independently of our rational thought.

Let us see then how metaphysics sets to work and what kind of suggestion it has to offer. It proceeds on the method of science and frames an ideal scheme. And it tests the validity of the scheme by applying it to the phenomenal universe, as interpreted by physical science, to see how it fits. If the ideal scheme, fashioned by human reason, when superimposed upon the sensory data, over which reason has no control, is found to coincide, metaphysics regards this as the only possible, but at the same time the rationally sufficient, guarantee of its validity. Sensory experience discloses a sequence of phenomena. If we ask why this sequent follows that antecedent, experience and physical science can give no answer. They can only say: Such are the facts as given. Metaphysical assumptions give an ideal scheme as a framework, supplying the threads on which the passing beads are strung.

A fundamental assumption of metaphysics is the continuity of that existence which is capable of acting as cause. Of this existence the data of sense-impressions are regarded as the effects. The effects may come and go, with the opportunities of experience; but the existence by which they are caused persists. As people pass to and fro along the Dover road, the mile-stones pop in and out of experience; but the existence which causes these fleeting effects remains and abides. The discontinuity of sensory experience is supplemented by the continuity of metaphysical existence. John

Stuart Mill, who is not generally regarded as a champion of metaphysics, would describe the mile-stones as "permanent possibilities of sensations." But whence did he derive the permanence? Not from experience: for experience, which relies solely on its own data, has no right to go beyond them, or to make any assertion, positive or negative, as to what exists in the absence of experience, when no one is travelling along the Dover road. There seems to be little difference between a permanent possibility of sensation and a continuous existence capable of acting as cause. But the former is pseudo-experiential and the latter is frankly metaphysical. The ideal scheme of metaphysical existence is however to be regarded, like the ideal scheme of physical science, as a construct of the human mind, valid just in so far as it fits the facts. Though here again the accord of a rational scheme with the observable data of experience may be regarded as presumptive evidence of the rational character of these data.

It may be said that the continuity and rationality of causal existence are after all nothing more nor less than our old friends the uniformity of nature and the universality of physical causation masquerading in metaphysical disguise. To which the metaphysician's reply is that, just in so far as the nature, of which uniformity is predicated, is a *connected* whole, and not merely a given series of observed, remembered, or anticipated experiences, are metaphysical assumptions inevitable, whether the man who makes or accepts them realizes their true character or not. Furthermore, for the thoroughgoing experientialist, the so-called uniformity of nature is nothing more nor less than the uniformity of experience. He who believes in a material universe which exists independently of our experience, and teaches that this material universe is the cause of our sensory impressions and the like, is committed to a metaphysical proposition which the experience on which he relies can never be in a position to demonstrate. And so we seem to be fully justified in asserting that just in so far as the uniformity of nature is held to be a cause of (and not merely a convenient expression for) the uniformity of experience it is a metaphysical and not a physical conception.

If we thus assume, as a fundamental postulate of metaphysics, an existence which is the cause of the sequences our sense-impressions present, we cannot regard it as, in its essential nature, like these impressions; for, to quote Glanvill once more, "the causality itself is insensible." It is unnecessary here to repeat the arguments of Berkeley and his modern disciples, by which it is, to my mind, conclusively shown that this existence, as cause, cannot be reasonably supposed to resemble the sense-products which are its effects in human experience. Those who understand the physiology of sensation and realise that what we call a visual impression is the concomitant of certain molecular vibrations in the grey matter of the brain, and that the brain particles are separated from the retinal-image (to say nothing of all that lies beyond) by a tract of nerve-fibres conveying physiological impulses of whose nature we know little—those, I say, who realise all this, can hardly expect to convince us that the product in conscientiousness resembles in any conceivable way the cause which calls it into being. Philosophical materialism is, however, already so completely dead that it is superfluous to belabor its defunct corpse.

At the present stage of our inquiry it is, indeed, impossible to make any suggestion as to the metaphysical nature of that existence which we assume to play the rôle of cause. Carrying the conception to its ideal limits we may indeed predicate universality—on the lines of the scientific conception of universal gravitation. Thus regarded as universal, time-reference and space-reference would seem to become meaningless. The universalised present tense is alone admissible. When we speak of universal gravitation, we do not say that it was or will be; we use this comprehensive "is." We mean that substances always attract each other under the appropriate conditions. Time-reference is only applicable to the particular instances of such attraction as they fall under consideration. So is it with the existence which acts as cause: *It is*. The expression First Cause, if used with time-reference, is wholly misleading. It is probably a legacy of the confusion of thought between physical and metaphysical causation. The cause, as antecedent, is itself caused by a previous antecedent, this by an-

other, and so on in an indefinite retrogressive series, at the very beginning of which the First Cause was conceived as the very originating antecedent. On which follows the pertinent question, Why stop here? Presumably you do so simply because you do not know the antecedent of your First Cause. Why should I not stop just one stage short of your completed series and begin with what you term the second cause? The mistake, of course, is to confuse the conception of antecedent (which belongs to physical causation) with the metaphysical *raison d'être* implied on conception of a so-called First Cause. For metaphysics cause and effect are the two aspects, experiential and existential, of the same reality. They are simultaneous not successive; one on the hither side, the other on the further side, of the phenomenal veil. And the question—what is the cause of the cause?—is sheer nonsense, since it implies a misconception of the meaning of the term as used in a metaphysical as contrasted with a scientific scheme.

The absence of all space-reference, as applicable to metaphysical existence, involves further the exclusion of any conception of the cause as external. Externality, like time-sequence, is an idea based on sensible experience and has no place in the metaphysical construct. The existence as cause is conceived not as external to the phenomena and producing them from without, but as co-extensive with the universe of experience and as everywhere immanent. Here again we are but carrying a conception to its ideal limits. We have seen that physical causation, carried to its ideal limits, places the antecedent and sequent on either side of a boundary line which is conceived as in itself timeless and spaceless. Herein lies the metaphysical connexion between the conjoined phenomena. But such an ideal boundary may be drawn anywhere and at any time in the flow of natural events. Hence the conception may be universalised and conceived as everywhere and always within the connected phenomena, whenever and wherever they occur.

Thus we reach the metaphysical conception of a unifying existence, omnipresent in space and time, and immanent, founded on the conviction that experience is rational and explicable—a convic-

tion without which the search for knowledge is a vain and illusory dream-quest.

It only remains to point out, or to repeat, that the metaphysical scheme is a construct of the human mind. If it leads us to believe that behind the realities of experience there is a causal reality which makes that experience possible and explicable, we must remember that metaphysical existence is a reality *for rational thought*. And if, in Kantian phrase, we speak of this existence as *noumenal*, as contrasted with the phenomenal data of sensory experience, we must define "noumenal" as that which exists for thought but not for sense, and has for thought a reality analogous to that which is the indefeasible right of sensory experience. Science presents us with an ideal scheme formulated in terms of antecedence and sequence; metaphysics with an ideal scheme by which this antecedence and sequence may be rationally explained. If we admit, with Hume, that natural phenomena are merely conjoined, we may none the less claim that a causal nexus is a fundamental postulate of rational thought.

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