CHAPTER XIV

Causation

Section 1. For the theory of Induction, the specially important aspect of the Uniformity of Nature is Causation.

For (1) the Principles of Contradiction and Excluded Middle are implied in all logical operations, and need no further explication.

(2) That one thing is a mark of another or constantly related to it, must be established by Induction; and the surest of all marks is a Cause. So that the application of the axiom of the Syllogism in particular cases requires, when most valid, a previous appeal to Causation.

(3) The uniformity of Space and of Time is involved in Causation, so far as we conceive Causation as essentially matter in motion–for motion is only known as a traversing of space in time; and so far as forces vary in any way according to the distance between bodies; so that if space and time were not uniform, causation would be irregular. Not that time and space are agents, but they are conditions of every agent's operation.

(4) The persistence of Matter and Energy, being nothing else than Causation in the general movement of the world, is applied under the name of that principle in explaining any particular limited phenomenon, such as a soap-bubble, or a thunderstorm, or the tide.

(5) As to co-existences, the Geometrical do not belong to Logic: those involved in the existence of plants, animals, and inorganic bodies, must, as far as possible, be traced to causes; and so, of course, must the relative positions of objects in space at any time: and what Co-existences remain do not admit of methodical inductive treatment; they will be briefly discussed in chap. xix.

Causation, then, is that mode or aspect of the Uniformity of Nature which especially concerns us in Induction; and we must make it as definite as possible. It is nothing occult, but merely a convenient

name for phenomena in a particular relation to other phenomena, called their effect. Similarly, if the word 'force' is sometimes used for convenience in analysing causation, it means nothing more than something in time and space, itself moving, or tending to move, or hindering or accelerating other things. If any one does not find these words convenient for the purpose, he can use others.

Section 2. A Cause, according to Mill, is "the invariable unconditional antecedent" of a given phenomenon. To enlarge upon this:

(1) A Cause is relative to a given phenomenon, called the Effect. Logic has no method for investigating the cause of the universe as a whole, but only of a part or epoch of it: we select from the infinite continuum of Nature any portion that is neither too large nor too small for a trained mind to comprehend. The magnitude of the phenomenon may be a matter of convenience. If the cause of disease in general be too wide a problem, can fevers be dealt with; or, if that be too much, is typhus within the reach of inquiry? In short, how much can we deal with accurately?

(2) The given phenomenon is always an event; that is to say, not a new thing (nothing is wholly new), but a change in something, or in the relative position of things. We may ask the cause of the phases of the moon, of the freezing of water, of the kindling of a match, of a deposit of chalk, of the differentiation of species. To inquire the cause of France being a republic, or Russia an autocracy, implies that these countries were once otherwise governed, or had no government: to inquire the cause of the earth being shaped like an orange, implies that the matter of the earth had once another shape.

(3) The Cause is antecedent to the Effect, which accordingly is often called its consequent. This is often misunderstood and sometimes disputed. It has been said that the meaning of 'cause' implies an 'effect,' so that until an effect occurs there can be no cause. But this is a blunder; for whilst the word 'cause' implies 'effect,' it also implies the relative futurity of the effect; and effect implies the relative priority of the cause. The connotation of the words, therefore, agrees well enough with Mill's doctrine. In fact,

the danger is that any pair of contrasted words may suggest too strongly that the phenomena denoted are separate in Nature; whereas every natural process is continuous. If water, dripping from the roof wears away a stone, it fell on the roof as rain; the rain came from a condensing cloud; the cloud was driven by the wind from the sea, whence it exhaled; and so on. There is no known beginning to this, and no break in it. We may take any one of these changes, call it an effect, and ask for its cause; or call it a cause, and ask for its effect. There is not in Nature one set of things called causes and another called effects; but every change is both cause (or a condition) of the future and effect of the past; and whether we consider an event as the one or the other, depends upon the direction of our curiosity or interest.

Still, taking the event as effect, its cause is the antecedent process; or, taking it as a cause, its effect is the consequent process. This follows from the conception of causation as essentially motion; for that motion takes time is (from the way our perceptive powers grow) an ultimate intuition. But, for the same reason, there is no interval of time between cause and effect; since all the time is filled up with motion.

Nor must it be supposed that the whole cause is antecedent to the effect as a whole: for we often take the phenomenon on such a scale that minutes, days, years, ages, may elapse before we consider the cause as exhausted (e.g., an earthquake, a battle, an expansion of credit, natural selection operating on a given variety); and all that time the effect has been accumulating. But we may further consider such a cause as made up of moments or minute factors, and the effect as made up of corresponding moments; and then the cause, taken in its moments, is antecedent throughout to the effect, taken in its corresponding moments.

(4) The Cause is the invariable antecedent of the effect; that is to say, whenever a given cause occurs it always has the same effect: in this, in fact, consists the Uniformity of Causation. Accordingly, not every antecedent of an event is its Cause: to assume that it is so, is the familiar fallacy of arguing ‘post hoc ergo propter hoc.’ Every event has an infinite number of antecedents that have no ascertainable connection with it: if a picture falls from the wall in

this room, there may have occurred, just previously, an earthquake in New Zealand, an explosion in a Japanese arsenal, a religious riot in India, a political assassination in Russia and a vote of censure in the House of Commons, besides millions of other less noticeable events, between none of which and the falling of the picture can any direct causation be detected; though, no doubt, they are all necessary occurrences in the general world-process, and remotely connected. The cause, however, was that a door slammed violently in the room above and shook the wall, and that the picture was heavy and the cord old and rotten. Even if two events invariably occur one after the other, as day follows night, or as the report follows the flash of a gun, they may not be cause and effect, though it is highly probable that they are closely connected by causation; and in each of these two examples the events are co-effects of a common cause, and may be regarded as elements of its total effect. Still, whilst it is not true that every antecedent, or that every invariable antecedent, of an event is its cause, the cause is conceived of as some change in certain conditions, or some state and process of things, such that should it exactly recur the same event would invariably follow. If we consider the antecedent state and process of things very widely or very minutely, it never does exactly recur; nor does the consequent. But the purpose of induction is to get as near the truth as possible within the limits set by our faculties of observation and calculation. Complex causal instances that are most unlikely to recur as a whole, may be analysed into the laws of their constituent conditions.

(5) The Cause is the Unconditional Antecedent. A cause is never simple, but may be analysed into several conditions; and 'Condition' means any necessary factor of a Cause: any thing or agent that exerts, absorbs, transforms, or deflects energy; or any relation of time or space in which agents stand to one another. A positive condition is one that cannot be omitted without frustrating the effect; a negative condition is one that cannot be introduced without frustrating the effect. In the falling of the picture, e.g., the positive conditions were the picture (as being heavy), the slamming of the door, and the weakness of the cord: a negative condition was that the picture should have no support but the cord. When Mill, then, defines the Cause of any event as its "unconditional" antecedent, he means that it is that group of

conditions (state and process of things) which, without any further condition, is followed by the event in question: it is the least antecedent that suffices, positive conditions being present and negative absent.

Whatever item of the antecedent can be left out, then, without affecting the event, is no part of the cause. Earthquakes have happened in New Zealand and votes of censure in the House of Commons without a picture's falling in this room: they were not unconditional antecedents; something else was needed to bring down a picture. Unconditionality also distinguishes a true cause from an invariable antecedent that is only a co-effect: for when day follows night something else happens; the Earth rotates upon her axis: a flash of gunpowder is not an unconditional antecedent of a report; the powder must be ignited in a closed chamber.

By common experience, and more precisely by experiment, it is found possible to select from among the antecedents of an event a certain number upon which, so far as can be perceived, it is dependent, and to neglect the rest: to purge the cause of all irrelevant antecedents is the great art of inductive method. Remote or minute conditions may indeed modify the event in ways so refined as to escape our notice. Subject to the limitations of our human faculties, however, we are able in many cases to secure an unconditional antecedent upon which a certain event invariably follows. Everybody takes this for granted: if the gas will not burn, or a gun will not go off, we wonder 'what can be wrong with it,' that is, what positive condition is wanting, or what negative one is present. No one now supposes that gunnery depends upon those "remotest of all causes," the stars, or upon the sun being in Sagittarius rather than in Aquarius, or that one shoots straightest with a silver bullet, or after saying the alphabet backwards.

(6) That the Cause of any event is an Immediate Antecedent follows from its being an unconditional one. For if there are three events, A B C, causally connected, it is plain that A is not the unconditional antecedent of C, but requires the further condition of first giving rise to B. But that is not all; for the B that gives rise to C is never merely the effect of A; it involves something further. Take such a simple case as the motion of the earth round the sun

(neglecting all other conditions, the other planets, etc.); and let the earth's motion at three successive moments be A B C: A is not the whole cause of B in velocity and direction; we must add relation to the sun, say x. But then, again, the cause of C will not be merely Bx, for the relation to the sun will have altered; so that we must represent it as Bx'. The series, therefore, is Ax Bx' C. What is called a "remote cause" is, therefore, doubly conditional; first, because it supposes an intervening cause; and secondly, because it only in part determines the conditions that constitute this intervening cause.

The immediacy of a cause being implied in its unconditionalness, is an important clue to it; but as far as the detection of causes depends upon sense-perception, our powers (however aided by instruments) are unequal to the subtlety of Nature. Between the event and what seems to us the immediate antecedent many things (molecular or etherial changes) may happen in Chemistry or Physics. The progress of science would be impossible were not observation supplemented by hypothesis and calculation. And where phenomena are treated upon a large scale, as in the biological and social sciences, immediacy, as a mark of causation, must be liberally interpreted. So far, then, as to the qualitative character of Causation.

(7) But to complete our account of it, we must briefly consider its quantitative character. As to the Matter contained, and as to the Energy embodied, Cause and Effect are conceived to be equal. As to matter, indeed, they may be more properly called identical; since the effect is nothing but the cause redistributed. When oxygen combines with hydrogen to form water, or with mercury to form red precipitate, the weight of the compound is exactly equal to the weight of the elements combined in it; when a shell explodes and knocks down a wall, the materials of the shell and wall are scattered about. As to energy, we see that in the heavenly bodies, which meet with no sensible impediment, it remains the same from age to age: with things 'below the moon' we have to allow for the more or less rapid conversion of the visible motion of a mass into other forms of energy, such as sound and heat. But the right understanding of this point involves physical considerations of some difficulty, as to which the reader must refer to appropriate

books, such as Balfour Stewart's on The Conservation of Energy.

The comprehension of the quantitative aspect of causation is greatly aided by Bain's analysis of any cause into a 'Moving or an Inciting Power' and a 'Collocation' of circumstances. When a demagogue by making a speech stirs up a mob to a riot, the speech is the moving or inciting power; the mob already in a state of smouldering passion, and a street convenient to be wrecked, are the collocation. When a small quantity of strychnine kills a man, the strychnine is the inciting power; the nature of his nervo-muscular system, apt to be thrown into spasms by that drug, and all the organs of his body dependent on that system, are the collocation. Now any one who thinks only of the speech, or the drug, in these cases, may express astonishment at the disproportion of cause and effect: "What great events from trivial causes spring!"

But, remembering that the whole cause of the riot included the excited mob, every one sees that its muscular power is enough to wreck a street; and remembering that breathing depends upon the normal action of the intercostal muscles, it is plain that if this action is stopped by strychnine, a man must die. Again, a slight rise of temperature may be a sufficient inciting power to occasion extensive chemical changes in a collocation of elements otherwise stable; a spark is enough to explode a powder magazine. Hence, when sufficient energy to account for any effect cannot be found in the inciting power, or manifestly active condition, we must look for it in the collocation which is often supposed to be passive.

And that reminds us of another common misapprehension, namely, that in Nature some things are passive and others active: the distinction between 'agent' and 'patient.' This is a merely relative distinction: in Nature all things are active. To the eye some things seem at rest and others in motion; but we know that nothing is really at rest, that everything palpitates with molecular change, and whirls with the planet through space. Everything that is acted upon reacts according to its own nature: the quietest-looking object (say, a moss-covered stone), if we try to push or lift it, pushes or pulls us back, assuring us that 'action and reaction are equal and opposite.' 'Inertia' does not mean want of vigour, but may be metaphorically described as the inexpugnable resolve of everything to have its

own way.

The equality of cause and effect defines and interprets the unconditionality of causation. The cause, we have seen, is that group of conditions which, without any further condition, is followed by a given event. But how is such a group to be conceived? Unquantified, it admits only of a general description: quantified, it must mean a group of conditions equal to the effect in mass and energy, the essence of the physical world. Apparently, a necessary conception of the human mind: for if a cause seem greater than its effect, we ask what has become of the surplus matter and energy; or if an effect seem greater than its cause, we ask whence the surplus matter and energy has arisen. So convinced of this truth is every experimenter, that if his results present any deviation from it, he always assumes that it is he who has made some mistake or oversight, never that there is indeterminism or discontinuity in Nature.

The transformation of matter and energy, then, is the essence of causation: because it is continuous, causation is immediate; and because in the same circumstances the transformation always follows the same course, a cause has invariably the same effect. If a fire be lit morning after morning in the same grate, with coal, wood, and paper of the same quality and similarly arranged, there will be each day the same flaming of paper, crackling of wood and glowing of coal, followed in about the same time by the same reduction of the whole mass partly to ashes and partly to gases and smoke that have gone up the chimney. The flaming, crackling and glowing are, physically, modes of energy; and the change of materials into gas and ashes is a chemical and physical redistribution: and, if some one be present, he will be aware of all this; and then, besides the physical changes, there will be sensations of light, sound and heat; and these again will be always the same in the same circumstances.

The Cause of any event, then, when exactly ascertainable, has five marks: it is (quantitatively) equal to the effect, and (qualitatively) the immediate, unconditional, invariable antecedent of the effect.

Section 3. This scientific conception of causation has been

developed and rendered definite by the investigations of those physical sciences that can avail themselves of exact experiments and mathematical calculation; and it is there, in Chemistry and Physics, that it is most at home. The conception can indeed be carried into the Biological and Social Sciences, even in its quantitative form, by making the proper allowances. For the limbs of animals are levers, and act upon mechanical principles; and digestion and the aeration of the blood by breathing are partly chemical processes. There is a quantitative relation between the food a man eats and the amount of work he can do. The numbers of any species of plant or animal depend upon the food supply. The value of a country's imports is equal to the value of its exports and of the services it renders to foreigners. But, generally, the less experiment and exact calculation are practicable in any branch of inquiry, the less rigorously can the conception of causation be applied there, the more will its application depend upon the qualitative marks, and the more need there will be to use it judiciously. In every inquiry the greatest possible precision must be aimed at; but it is unreasonable to expect in any case more precise proof than the subject admits of in the existing state of culture.

Wherever mental action is involved, there is a special difficulty in applying the physical notion of causation. For if a Cause be conceived of as matter in motion, a thought, or feeling, or volition can be neither cause nor effect. And since mental action is involved in all social affairs, and in the life of all men and animals, it may seem impossible to interpret social or vital changes according to laws of causation. Still, animals and men are moving bodies; and it is recognised that their thoughts and feelings are so connected with their movements and with the movements of other things acting upon them, that we can judge of one case by another; although the connection is by no means well understood, and the best words (such as all can agree to use) have not yet been found to express even what we know about it. Hence, a regular connection being granted, I have not hesitated, to use biological and social events and the laws of them, to illustrate causation and induction; because, though less exact than chemical or mechanical examples, they are to most people more familiar and interesting.

In practical affairs, it is felt that everything depends upon causation; how to play the fiddle, or sail a yacht, or get one's living, or defeat the enemy. The price of pig-iron six months hence, the prospects of the harvest, the issue in a Coroner's Court, Home Rule and Socialism, are all questions of causation. But, in such cases, the conception of a cause is rarely applied in its full scientific acceptation, as the unconditional antecedent, or 'all the conditions' (neither more nor less) upon which the event depends. This is not because men of affairs are bad logicians, or incapable of scientific comprehension; for very often the reverse is conspicuously true; but because practical affairs call for promptitude and a decisive seizing upon what is predominantly important. How learn to play the fiddle? "Go to a good teacher." (Then, beginning young enough, with natural aptitude and great diligence, all may be well.) How defeat the enemy? "Be two to one at the critical juncture." (Then, if the men are brave, disciplined, well armed and well fed, there is a good chance of victory.) Will the price of iron improve? "Yes: for the market is oversold": (that is, many have sold iron who have none to deliver, and must at some time buy it back; and that will put up the price–if the stock is not too great, if the demand does not fall off, and if those who have bought what they cannot pay for are not in the meanwhile obliged to sell.) These prompt and decisive judgments (with the parenthetic considerations unexpressed) as to what is the Cause, or predominantly important condition, of any event, are not as good as a scientific estimate of all the conditions, when this can be obtained; but, when time is short, the insight of trained sagacity may be much better than an imperfect theoretical treatment of such problems.

Section 4. To regard the Effect of certain antecedents in a narrow selective way, is another common mistake. In the full scientific conception of an Effect it is the sum of the unconditional consequences of a given state and process of things: the consequences immediately flowing from that situation without further conditions. Always to take account of all the consequences of any cause would no doubt be impracticable; still the practical, as well as the scientific interest, often requires that we should enlarge our views of them; and there is no commoner error in private effort or in legislation than to aim at some obvious good, whilst

overlooking other consequences of our action, the evil of which may far outweigh that good. An important consequence of eating is to satisfy hunger, and this is the ordinary motive to eat; but it is a poor account of the physiological consequences. An important consequence of firing a gun is the propulsion of the bullet or shell; but there are many other consequences in the whole effect, and one of them is the heating of the barrel, which, accumulating with rapid firing, may at last put the gun out of action. The tides have consequences to shipping and in the wear and tear of the coast that draw every one's attention; but we are told that they also retard the rotation of the earth, and at last may cause it to present always the same face to the sun, and, therefore, to be uninhabitable. Such concurrent consequences of any cause may be called its Co-effects: the Effect being the sum of them.

The neglect to take account of the whole effect (that is, of all the co-effects) in any case of causation is perhaps the reason why many philosophers have maintained the doctrine of a "Plurality of Causes": meaning not that more than one condition is operative in the antecedent of every event (which is true), but that the same event may be due at different times to different antecedents, that in fact there may be vicarious causes. If, however, we take any effect as a whole, this does not seem to be true. A fire may certainly be lit in many ways: with a match or a flint and steel, or by rubbing sticks together, or by a flash of lightning: have we not here a plurality of causes? Not if we take account of the whole effect; for then we shall find it modified in each case according to the difference of the cause. In one case there will be a burnt match, in another a warm flint, in the last a changed state of electrical tension. And similar differences are found in cases of death under different conditions, as stabbing, hanging, cholera; or of shipwreck from explosion, scuttling, tempest. Hence a Coroner's Court expects to find, by examining a corpse, the precise cause of death. In short, if we knew the facts minutely enough, it would be found that there is only one Cause (sum of conditions) for each Effect (sum of co-effects), and that the order of events is as uniform backwards as forwards.

Still, as we are far from knowing events minutely, it is necessary in practical affairs, and even in the more complex and unmanageable

scientific investigations, especially those that deal with human life, to acknowledge a possible plurality of causes for any effect. Indeed, forgetfulness of this leads to many rash generalisations; as that 'revolutions always begin in hunger'; or that 'myths are a disease of language.' Then there is great waste of ingenuity in reconciling such propositions with the recalcitrant facts. A scientific method recognises that there may be other causes of effects thus vaguely conceived, and then proceeds to distinguish in each class of effects the peculiarities due to different causes.

Section 5. The understanding of the complex nature of Causes and Effects helps us to overcome some other difficulties that perplex the use of these words. We have seen that the true cause is an immediate antecedent; but if the cause is confounded with one of its constituent conditions, it may seem to have long preceded the event which is regarded as its effect. Thus, if one man's death is ascribed to another's desire of revenge, this desire may have been entertained for years before the assassination occurred: similarly, if a shipwreck is ascribed to a sunken reef, the rock was waiting for ages before the ship sailed that way. But, of course, neither the desire of revenge nor the sunken rock was 'the sum of the conditions' on which the one or the other event depended: as soon as this is complete the effect appears.

We have also seen the true effect of any state and process of things is the immediate consequence; but if the effect be confounded with one of its constituent factors, it may seem to long outlive the cessation of the cause. Thus, in nearly every process of human industry and art, one factor of the effect–a road, a house, a tool, a picture–may, and generally does, remain long after the work has ceased: but such a result is not the whole effect of the operations that produce it. The other factors may be, and some always are, evanescent. In most of such works some heat is produced by hammering or friction, and the labourers are fatigued; but these consequences soon pass off. Hence the effect as a whole only momentarily survives the cause. Consider a pendulum which, having been once set agoing, swings to and fro in an arc, under the joint control of the shaft, gravitation and its own inertia: at every moment its speed and direction change; and each change may be considered as an effect, of which the antecedent change was one

condition. In such a case as this, which, though a very simple, is a perfectly fair example of all causation, the duration of either cause or effect is quite insensible: so that, as Dr. Venn says, an Effect, rigorously conceived, is only "the initial tendency" of its Cause.

Section 6. Mill contrasted two forms under which causation appears to us: that is to say, the conditions constituting a cause may be modified, or 'intermixed' in the effect, in two ways, which are typified respectively by Mechanical and Chemical action. In mechanical causation, which is found in Astronomy and all branches of Physics, the effects are all reducible to modes of energy, and are therefore commensurable with their causes. They are either directly commensurable, as in the cases treated of in the consideration of the mechanical powers; or, if different forms of energy enter into cause and effect, such as mechanical energy, electrical energy, heat, these different forms are severally reducible to units, between which equivalents have been established. Hence Mill calls this the "homogeneous intermixture of effects," because the antecedents and consequents are fundamentally of the same kind.

In chemical causation, on the other hand, cause and effect (at least, as they present themselves to us) differ in almost every way: in the act of combination the properties of elements (except weight) disappear, and are superseded by others in the compound. If, for example, mercury (a heavy, silvery liquid) be heated in contact with oxygen (a colourless gas), oxide of mercury is formed (red precipitate, which is a powder). This compound presents very different phenomena from those of its elements; and hence Mill called this class of cases "the heteropathic intermixture of effects." Still, in chemical action, the effect is not (in Nature) heterogeneous with the cause: for the weight of a compound is equal to the sum of the weights of the elements that are merged in it; and an equivalence has been ascertained between the energy of chemical combination and the heat, light, etc., produced in the act of combination.

The heteropathic intermixture of effects is also found in organic processes (which, indeed, are partly chemical): as when a man eats bread and milk, and by digestion and assimilation converts them

into nerve, muscle and bone. Such phenomena may make us wonder that people should ever have believed that ‘effects resemble their causes,’ or that ‘like produces like.’ A dim recognition of the equivalence of cause and effect in respect of matter and motion may have aided the belief; and the resemblance of offspring to parents may have helped: but it is probably a residuum of magical rites; in which to whistle may be regarded as a means of raising the wind, because the wind whistles; and rain-wizards may make a victim shed tears that the clouds also may weep.

Section 7. Another consideration arises out of the complex character of causes and effects. When a cause consists of two or more conditions or forces, we may consider what effect any one of them would have if it operated alone, that is to say, its Tendency. This is best illustrated by the Parallelogram of Forces: if two forces acting upon a point, but not in the same direction, be represented by straight lines drawn in the direction of the forces, and in length proportional to their magnitudes, these lines, meeting in an angle, represent severally the tendencies of the forces; whilst if the parallelogram be completed on these lines, the diagonal drawn from the point in which they meet represents their Resultant or effect.

Again, considering the tendency of any force if it operated alone, we may say that, when combined with another force (not in the same direction) in any resultant, its tendency is counteracted: either partially, when the direction of the resultant is different; or wholly when, the other force being equal and opposite, the resultant is equilibrium. If the two forces be in the same direction, they are merely added together. Counteraction is only one mode of combination; in no case is any force destroyed.

Sometimes the separate tendencies of combined forces can only be theoretically distinguished: as when the motion of a projectile is analysed into a tendency to travel in the straight line of its discharge, and a tendency to fall straight to the ground. But sometimes a tendency can be isolated: as when,–after dropping a feather in some place sheltered from the wind, and watching it drift to and fro, as the air, offering unequal resistances to its uneven

surface, counteracts its weight with varying success, until it slowly settles upon the ground,–we take it up and drop it again in a vacuum, when it falls like lead. Here we have the tendency of a certain cause (namely, the relation between the feather and the earth) free from counteraction: and this is called the Elimination of the counteracting circumstances. In this case indeed there is physical elimination; whereas, in the case of a projectile, when we say that its actual motion is resolvable (neglecting the resistance of the air) into two tendencies, one in the line of discharge, the other earthwards, there is only theoretical elimination of either tendency, considered as counteracting the other; and this is more specifically called the Resolution or Analysis of the total effect into its component conditions. Now, Elimination and Resolution may be said to be the essential process of Induction in the widest sense of the term, as including the combination of Induction with Deduction.

The several conditions constituting any cause, then, by aiding or counteracting one another's tendencies, jointly determine the total effect. Hence, viewed in relation one to another, they may be said to stand in Reciprocity or mutual influence. This relation at any moment is itself one of co-existence, though it is conceived with reference to a possible effect. As Kant says, all substances, as perceived in space at the same time, are in reciprocal activity. And what is true of the world of things at any moment (as connected, say, by gravity), is true of any selected group of circumstances which we regard as the particular cause of any event to come. The use of the concept of reciprocity, then, lies in the analysis of a cause: we must not think of reciprocity as obtaining in the succession of cause and effect, as if the effect could turn back upon its cause; for as the effect arises its cause disappears, and is irrecoverable by Nature or Magic. There are many cases of rhythmic change and of moving equilibria, in which one movement or process produces another, and this produces something closely resembling the former, and so on in long series; as with the swing of a pendulum or the orbit of a planet: but these are series of cause and effect, not of reciprocity.