CHAPTER 2

ARISTOTLE AND CAUSATION
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A cause has traditionally been thought of that which produces something and in terms of which that which is produced, its effect, can be explained. Aristotle's concept of cause readily comes to one's mind, whenever one thinks of the traditional view of cause. To know is to know by means of causes. It is therefore the business of physics to learn the causes of physical change. It is necessary to specify for what kinds of causes the physicist must be on the look-out, and Aristotle's answer to this question is that there are four kinds.

1) The term 'cause' is said to be applied first to 'that out of which a thing comes to be and which is present as a constituent in the product', as a statue is made out of bronze and has bronze in it.

2) It is applied to 'the form or pattern, i.e., the formula of what it is to be the thing in question'; as the ratio 2:1 is the formula of the octave.
3) It is applied to 'that from which comes the immediate origin of the movement or rest'. This cause may be found in the region of conduct (he who advises an act is the cause of it), and in that of nature (the father is cause of the child); the relation is, in general, that of agent to thing done, of producer of change to thing changed.

4) The term 'cause' is applicable to 'the end or aim'; health is in this sense the cause of our walking.

Aristotle, drawing upon the traditions of his predecessors, distinguishes four quite different kinds of causes or explanatory principles and these he calls the material cause, the formal cause, the efficient cause and the final cause.

Certain important points are made in connexion with the four causes:

1) A thing has causes of more than one of these kinds.

2) Two things may be causes of one another; exercise is the efficient cause of health, health the final cause of exercise.
3) We may, in the case of each of the four causes, state either the proximate cause of a thing, which will be commensurate with it, or a distant cause, some genus which includes the commensurate cause; the cause of health may be said to be ‘a professional man’ no less than ‘a doctor’.

4) If A is a concomitant of B which is the cause of C, A may be said to be per accidens the cause of C.

5) We may state the cause of an effect B either as A, the owner of the faculty, or as ‘A exercising the faculty.’ The cause of a house’s being built is either ‘a builder’ or ‘a builder building’.

6) Actual and individual causes are simultaneous in origin and in cessation with their effects; potential causes are not. A house and its builder need not perish simultaneously, but if a builder is house-building, a house must be being built, and vice-versa.

7) We should aim at stating the precise cause. Example, it
may be said that a man is the cause of a house, but it is not because he is a man but because he is a builder that he is so, and a builder builds a house only because he possesses the building art; this, in virtue of which other things cause the effect, is itself its precise cause.

Aristotle's doctrine of causation is developed typically against the background of a discussion of his predecessor's ideas. He notes that change takes place between opposites of one kind or another and this provides the basis of his own general theory of form and privation. Change takes place between a pair of opposites such as hot and cold, one of which represents the form, the other the privation. But a further factor is necessary besides the opposites, namely that which is subject to or undergoes the change or substratum. So far then, we have identified two types of causes:

1) form-change being either from the form to the privation or vice-versa and
2) matter or the substratum. Aristotle adds two further types of causes, the moving or efficient cause and the
final cause.

The four causes are then, form, matter, moving cause and final cause. It is one thing to account for the relations that hold between force, velocity and mass; it is another to explain the mechanisms by which that force is imparted and by which the motion of objects is maintained. There can be, for Aristotle, no action at a distance. Furthermore with the fundamental distinction between natural and forced motion, all motions must ultimately originate in the action of some agent for which that action is proper and natural to it. Thus a rod may move a stone, and a man's hand moves the rod; but the man's hand is moved by the man, and nothing moves him, he is a proper locus of the initiation of motion; one may describe both the proximate and ultimate causes of the stone's motion as causes with no impropriety - but only the latter is properly the cause. Here there is no real problem with explaining the mediation of the causal activity, since every item of the chain is in contact with some other. It is worth stressing that, for Aristotle, an efficient cause of some event is, canonically at least, supposed
to be operating at the time of the event.

Aristotle believes that these four causes should be taken into account when considering change of any sort. The four are always logically distinguishable. But it is easy to see that while logically distinguishable, they are not always distinguishable in fact. In particular, matter is often contrasted with the other three causes taken together. The relation between these three causes is particularly important.

We think of matter and form not as relative to an event which they cause but as static elements which analysis discovers in a complex thing. This is because we think of cause as that which is both necessary and sufficient to produce a certain effect. But, for Aristotle none of the four causes is sufficient to produce an event; and speaking generally we may say that in his view all four are necessary for the production of any effect. We have, then, to think of his 'causes' as conditions necessary but not separately sufficient to account for the existence of a thing, and if we look at them in this way we shall cease to be surprised that matter and form are
called causes. For, certainly without them no natural thing can be or come into being. Aristotle is, in fact, bringing together here under the general head of ‘cause’, i.e., necessary condition, the two internal or constituent elements already discovered by the analysis of becoming (privation, which was a precondition but not a constituent, being omitted) and the two external conditions which naturally suggest themselves, the efficient cause or *vis a tergo* and the final cause or *vis a fronte*.

The doctrine of the four causes provides a resume of the factors that Aristotle believes have to be taken into account in describing natural or artificial change. But he also analyses change in another way which puts more emphasis on the dynamic aspects of the process of change. If the clearest examples to illustrate the distinctions between the four causes come from artificial production, the notions of potentiality and actuality are best seen in the case of natural growth. But while the ideas of potentiality and actuality are obviously relevant to natural growth, Aristotle generalises the doctrine and applies it to other types of change as
well. Aristotle himself calls attention to the difference in the meaning of potentiality. Form and the final cause are found in the end-product of natural and artificial changes. But the doctrine of potentiality allows Aristotle to suggest that even the relatively formless matter is potentially what the end-product is actually.

Aristotle’s primary concern is with explanation; and that he claims, among other things, that chance happenings are those for which there is no proper explanation. But it is equally clear that this does not mean that we cannot in some sense give an account of them.

Physics is concerned with the world of change. In a distinction that was to form the backbone of the mediaeval world picture which persisted at least until Galileo, Aristotle considered the universe to divide into two distinct parts: those which exist by nature, and those which exist for other reasons. The paradigm cases of things existing by nature are living things - plants, animals and the heavenly bodies; but their elements - earth, water, air and fire (and the fifth element, the ether which makes up the heavenly
bodies) are also natural in this sense.

The causes of things are sometimes classified not according to the regular fourfold schema of material, formal, efficient and final causes, but according to a simpler two fold schema, where 'what happens from necessity' is contrasted with 'what happens for the sake of what is better'.

It is the business of all sciences to discover causes, and Aristotle holds that an incomplete analysis of causation was not the least of the errors of previous physicists. When we analyse some process of becoming, whether natural or artificial, four elements are found, each of which is necessary to a total statement of the cause. The doctrine of four causes is taken along with the other main conceptions-form, matter, potency, act.

Aristotle recognises a plurality of system of principles which lie unconnected side by side and cannot be reduced in their turn to a common higher principle (one thinks of matter-formprivation; potentiality-actuality; the division into categories; the doctrine of four causes).
Knowledge is the object of our inquiry and men do not think they know a thing till they have grasped the 'why' of it (which is to grasp its primary cause). That out of which a thing comes to be and which persists is called 'cause', example, the bronze of the statue, the silver of the bowl and the genera of which the bronze and the silver are species.

In another sense the form or the archetype i.e., the statement of the essence and its genera are called 'causes'. Again the primary source of the change or coming to rest; example, the man who gave advice is a cause, the father is the cause of the child and generally what makes of what is made and what causes change of what is changed. Again in the sense of end or that for the sake of which a thing is done; example, health is the cause of walking about.

As the word has several senses, it follows that there are several causes of the same thing not merely in virtue of a concomitant attribute, example, both the art of the sculptor and the bronze are causes of the statue. These are causes of the statue *qua* statue, not in virtue of anything else that it may be only not in the
same way, the one being the material cause, the other the cause whence the motion comes. Some things cause each other reciprocally, example, hard work causes fitness and vice-versa, but again not in the same way, but the one as end and the other as the origin of change. Further, the same thing is the cause of contrary results. For, that which by its presence brings about one result is sometimes blamed for bringing about the contrary result by its absence. Thus we ascribe the wreck of a ship to the absence of the pilot whose presence was the cause of its safety.

The modes of causation are many, though when brought under heads they too can be reduced in number. For ‘cause’ is used in many senses and even within the same kind one may be prior to another; example, the doctor and the expert are causes of health and always what is inclusive to what is particular. Another mode of causation is the incidental and its genera. All causes, both proper and incidental may be spoken of either as potential or as actual: example, the cause of a house being built is either ‘house-builder’ or ‘house builder building’.
Similar distinctions can be made in the things of which the causes are causes, example of ‘this statue’ or of ‘statue’ or of ‘image’ generally, of ‘this bronze’ or of ‘bronze’ or of ‘material’ generally.

All these various uses, however, come to six in number, under each of which again the usage is two fold. Cause means either what is particular or a genus, or an incidental attribute or a genus of that and these either as a complex or each by itself; and all six either as actual or as potential. The difference is this much, that causes which are actually at work and particular exist and cease to exist simultaneously with their effect; example, this healing person with this being-healed person and that house building man with that being-built house; but this is not always true of potential causes-the house and the house builder do not pass away simultaneously.

In investigating the cause of each thing it is always necessary to seek what is most precise. Further, generic effects should be assigned to generic causes, particular effects to
particular causes; example, statue to sculptor, this statue to this sculptor; and powers are relative to possible effects, actually operating causes to things which are actually being effected.

This must suffice for our account of the number of causes and the modes of causation. But chance and spontaneity are also reckoned among causes; many things are said both to be and to come to be as a result of chance and spontaneity. We must inquire therefore in what manner chance and spontaneity are present among the causes enumerated and whether they are the same or different and generally what chance and spontaneity are. Some people say that nothing happens by chance, but that everything which we ascribe to chance or spontaneity has some definite cause. Many things both come to be and are by chance and spontaneity, and although all know that each of them can be ascribed to some cause, nevertheless they speak of some of these things as happening by chance and others not.
We must inquire what chance and spontaneity are, whether they are the same or different, and how they fit into our division of causes.

We observe that some things always come to pass in the same way, and other for the most part. It is clearly of neither of these that chance is said to be the cause, nor can the effect of chance be identified with any of the things that come to pass by necessity and always, or for the most part.

Some events are for the sake of something, others not. Events that are for the sake of something include whatever may be done as a result of thought or of nature. Things of this kind, then, when they come to pass incidentally are said to be by chance. For just as a thing is something either in virtue of itself or incidentally, so may it be a cause.

Chance is an incidental cause in the sphere of those actions for the sake of something which involve purpose. It is necessary, no doubt, that the causes of what come to pass by chance be indefinite; and that is why chance is supposed to belong to the
class of the indefinite and to be inscrutable to man, and why it might be thought that, in a way, nothing occurs by chance.

Both chance and spontaneity belong to the mode of causation, for either some natural or some intelligent agent is always the cause; but in this sort of causation, the number of possible causes is infinite. Spontaneity and chance are causes of effects which though they might result from intelligence or nature, have in fact been caused by something incidentally. Spontaneity and chance, therefore are posterior to intelligence and nature. Hence, however true it may be that the heavens are due to spontaneity, it will still be true that intelligence and nature will be prior causes of this all and of many things in it besides.

Causality as a category of relation implies on the one hand, occurrence; on the other, its dependence on prior existence. Causation is the manifestation of energy in its effect. The law of causality is a law of mind recognising it as a necessary truth, that there must be power adequate to account for every occurrence. Cause in physical science is best represented by transformation of
energy; but cause in the stricter sense implies origin of occurrence, such as is known in consciousness. Guided by the law of causality research becomes ultimately a search for the first cause as uncaused.

Matters do not improve when we turn to the other two characterisations of metaphysics, the study of first causes and Theology. It may seem easy enough to connect these two characterisations to one another, for we need only suppose that the gods, the subject matter of theology, are identical with the first causes, the subject of the science of first causes.

What exactly does the study of first causes study? We may reasonably suppose that the study will include both the philosophical analysis of the different types of causation or explanation and also the philosophical investigation of the concepts which these types of causation or explanation involve. In addition, the study will need to explain what makes a cause a first or primary-cause.
First causes are first not in a chronological sense: Aristotle is not interested in tracing the chain of causes back through time nor indeed does he believe that there are first causes in this sense. Rather the causes are first in the sense of being ultimate.

But Aristotle’s science of first causes ought presumably to contain more than these analytical exercises; the exercises are surely preparatory, and the substantive task of the science must be to determine what first causes of things actually are.

Since we are seeking the first principles and the highest causes, it is plain that there must be something to which these belong in virtue of its own nature. And if our predecessors who sought the elements of existing things were seeking these same principles, then these elements must be the elements of being not accidentally but in virtue of the fact that they are beings. Hence it is of beings qua being that we must grasp the first causes.

We are seeking the first causes of beings, these first causes must be first causes of something qua that thing: hence the causes are causes of beings qua being.
It is an argument but it is a baffling argument. To say that $x$ is a cause of $y$ qua $F$ presumably means that $x$ explains why $y$ is $f$; so that a cause of something $qua$ being will be a cause which explains why the thing exists. No doubt there are numerous causes which explain why numerous things exist and let us grant that there are first causes among them - items which explain why other things exist and whose existence itself is inexplicable. Aristotle does suppose that the first causes of existence in Botany will be different from the first causes of existence in Geometry.

Aristotle, using the word cause in a wide sense to include all that is concerned in the production of anything, enumerates four classes - material, formal, efficient and final. The efficient is that with which modern usage connects the name, as the source. According to Aristotle, the first is the form proper to each thing. This is the quidditas of the schoolmen, the *causa formalis*. The second is the matter and the subject, *causa materialis*. The third is the principle of movement which produces the thing, *causa efficiens*. The fourth is the end for the sake of which the thing is
done-the reason and good of all things; for the end of all phenomenon and of all movement is good, *causa finalis*.

The four causes are four ways of answering different but equally crucial questions about why things are, how they are. If we cannot answer these questions, Aristotle holds, we cannot really know the objects of which we speak. Episteme involves knowing the fundamental structure of things, of why they are the sorts of things they are; and to this end, Aristotle distinguishes four general classes of explanation:

i) in one way the cause is said to be the existing thing out of which something comes to be, example, the bronze of the statue, or the silver of the phial, and the genera of these things.

ii) another is the form or the template (paradeigma): this is the formula (logos) of the what-it-is-to-be, and its genera.......... 

iii) Furthermore, that from which the primary origin (arche) of change and rest, example, the responsible
deliberator, or the father of the child, and in general the agent of the thing produced, and the changer of the thing changed.

iv) moreover there is the end (telos). This is that for the sake of which, example, health of walking; for why does he walk? In order, we say, to be healthy, and in so saying we think that we have given the reason (action).

So Aristotle introduces the material, formal, efficient and final causes. He notes the possibility of causal intermediaries (like tools or drugs), through which various actions or productions are brought to completion, although he does not classify them as causes.

The remark concerning genera simply points to the fact that we may refer to the explanatory item in question in a variety of

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1Jonathan Barnes - Cambridge Companion to Aristotle, Cambridge University Press,

Cambridge, 1995, p. 121.
ways. We may designate the statue's matter as bronze, or generically as metal, but in that case unless we are specifically concerned with some feature the statue has in virtue of its simply being metallic our designation will be explanatorily misleading.

Hume, reducing the relation of cause and effect to that of constant conjunction contends that we have no proper idea of cause as implying power to produce, nor of any necessary connection between the operation of this power and the production of the effect. All that we see or know is mere successions antecedent and consequent having seen things in this relation, we associate them together and imagining that there is some connection between them, we call the one the cause and the other the effect. The idea of cause and effect is derived from experience, which informs us that such particular objects in all past instances have been constantly joined with each other.

Hume tries to answer the following two questions:
1) Why we conclude that particular causes must necessarily have such particular effects and why we form an inference from one to the other.

2) What is our idea of necessity, when we say that two objects are necessarily connected together?

He rejects the following two questions as pseudo questions since they do not admit of answers. Does the manner in which we arrive at conclusions concerning causes and effects guarantee in any way the truth of these conclusions? And what method ought we to adopt in order to secure that we should arrive only at true conclusions?

That is to say, he believes that there can be no question of justification of any causal inference, but only of description and analysis. The first question is answered in the terminology of impressions and ideas with the help of his theories of association of ideas and belief. The second question is much more difficult and in order to understand this question, we need to understand the following points.
According to Hume, two things are essential, but not sufficient, for causal connexion, namely spatial contiguity and temporal priority. He calls these two features conjunction of cause and effect. His explanation of how we come to infer an effect from a cause is as follows: Suppose, A is the cause and B is its effect. We have observed A and B constantly conjoined in the past, and so the ideas of A and B become associated. Then, if we see A the idea of B occurs to us, and is raised to the status of a belief in virtue of its association with the impression of A. In other words, if we always see A followed by B, we get into the habit of expecting B when we see A. Thus according to Hume, causal inference is nothing more than customary expectations. In fact, ‘causal inference’ is not an inference at all in the strict sense.

According to Hume’s constant conjunction view of causality:

“anything may produce anything, and... we shall never discover a reason, why any object may or may not be the cause of any other, however great, or however little the resemblance
may be betwixt them."\textsuperscript{2}

So for Hume, no \textit{a priori} considerations prevent us from supposing that an extended thing can produce effects (e.g. ideas) in an unextended thing. The mistaken notion that this is an unintelligible supposition arises as follows. First one thinks he understands perfectly the causal efficacy involved in one material object pushing or pulling another, and he therefore treats pulling and pushing as the prototype for all intelligible causal efficacy on the part of material objects. Then when he realises that it is nonsense to speak of an unextended substance being pulled or pushed, he concludes at once that it is nonsense to speak of an extended thing exerting a causal influence on an unextended one, since his favoured prototype fails for such cases. But according to Hume, we do not in the least understand the connection between two physical objects when one of them pulls or pushes the other and we would therefore be wrong to treat that kind of causality

as the model for any possible causal efficacy or the part of physical objects or the ground that it alone is intelligible. We are in fact perfectly free to admit the possibility that physical objects can produce causal effects (e.g. ideas) in spiritual substances; that kind of causal connection is as intelligible as - i.e., no less unintelligible than any other.

So far, Hume has explained, with some show of plausibility, how we come to 'form an inference' from A to B, that is, how we come to expect B whenever A occurs. But he has not explained how we come to believe, or to say, that A causes B, or that B is a necessary result of A. The natural consequence of his account is either that, when we say A causes B, we mean only that A and B have always occurred in conjunction or we mean that we have formed a habit of expecting B whenever A occurs. The first alternative does not seem strong enough, and the second seems absurd. For on the second alternative, A causes B only when we have formed a certain habit, and not before. Thus the objection is that Hume's account of causal inference, taken in its simplest form, gives an inadequate or an absurd meaning to the words 'cause' and
‘necessity’. It is for this reason that it is essential for him to answer the second question ‘what is our idea of necessity’? He must try to give an analysis of necessity which will agree with his account of causal inference and make it plausible.

Hume attacks certain theories of causality. He attacks all accounts of causation in terms of the notion of a ‘necessary connexion’ between objects or happenings which are said to be causally related. Here, ‘necessary connexion’ means necessary connexion considered as objectively holding between the objects or events which are said to be causally related. Hume argues that the phrase ‘necessary connexion’ is meaningless. The argument goes like this: since it cannot be verbally defined, the phrase ‘necessary connexion’ does not have a complex meaning and since we do not experience instances of ‘necessary connexion’, that phrase does not have a simple meaning either. Therefore, it has no meaning at all. He comes to this conclusion on the basis of his simple/complex dichotomy which is an adaptation of Locke’s distinction of simple and complex ideas.
Those perceptions, which enter with most force and violence, we may name impression; and under this name I comprehend all my sensations, passions and emotions, as they make their first appearance in the soul. By ideas I mean the faint images of those in thinking and reasoning.\(^3\)

In defence of the claim that the phrase ‘necessary connexion’ cannot be verbally defined, Hume says the following:

“The terms of efficacy, agency, power, force, energy, necessity, connexion and productive quality, are all nearly synonymous; and therefore ‘tis an absurdity to employ any of them in defining the rest.”\(^4\)

In accordance with the diversity of senses, a single thing can have several causes at the same time. Thus, for the statue, one can assign to it as causes both the art of the sculptor who has made it and the bronze of which it is made and not in any other

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sense then as a statue. The two causes are not to be understood in the same sense; they differ in that, one is the material and the other is the source of the movement. It is also because of this that there can be said to be things that are reciprocally the causes of each other.

Since causes are spoken of with various meanings, it follows that there are several causes (and that not in an accidental sense) of the same thing, example—both *statutory* and bronze are causes of the statue; not in different connexions, but *qua* status. However, they are not causes in the same way, but the one as material and the other as the source of motion. And things are causes of each other, as for example, labour of vigour and vigour of labour— but not in the same way; the one as the end, and the other as source of motion. And again the same thing is sometimes the cause of contrary results; because that which by its presence is the cause of so-and-so we sometimes accuse of being, of being, by its absence, the cause of the contrary— as for example, we say that the absence of the pilot is the cause of a capsize, whereas his
presence was the cause of safety. And both, presence and privation are moving causes.

The modes of causes are numerically many, although these two are fewer when summarised. For causes are spoken of in many senses, and even of those which are of the same kind, some are causes in a priori and some in a posteriori sense; example, the physician and the expert are both causes of health, and the universals which include a given cause are causes of its particular effects. Again a thing may be a cause in the sense of an accident and the classes which contain accident.

And besides the distinction of causes as proper and accidental, some are termed as causes in a potential and others in an actual sense; example, the cause of building is either the builder or the builder who builds. And the same distinction in meaning will apply to the effects of the causes; example, to this statue, or a statue, or generally an image; and to this bronze, or bronze or generally material.

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Moving causes are causes in the sense of pre-existent things, but formal causes co-exist with their effects. For it is when the man becomes healthy that health exist, and the shape of the bronze sphere comes into being simultaneously with the bronze sphere.

"Hume's two definitions of the concept of 'cause' are as follows:

1) An object precedent and contiguous to another, and where all the objects resembling the former are plac'd in like relations of precedency and contiguity to those objects, that resemble the latter.

2) A cause is an object precedent and contiguous to another, and so united with it, that the idea of the one determines the mind to form the idea of the other, and the impression of the one to form a more lively idea of the other."\(^5\)

The causes being four, it is the business of the physicist to know about them all, and if he refers his problems back to all of-

them, he will assign the ‘why’ in the way proper to his science -
the matter, the form, the mover, ‘that for the sake of which’. The
last three often coincide; for the ‘what’ and ‘that for the sake
of which’ are one, while the primary source of motion is the same
in species as these (for man generates man), and so too, in general,
are all things which cause movement by being themselves moved;
and such are not of this kind are no longer inside the province of
Physics, for they cause motion not by possessing motion or a
source of motion in themselves, but being themselves incapable of
motion.

The question ‘why’, then, is answered by reference to the
matter, to the form, and to the primary moving cause.

According to Hume, the concept of cause has three
ingredients, namely, spatial contiguity, temporal priority and
necessary connexion. Spatial contiguity is no longer considered to
be an ingredient of the concept of cause, for ‘action at distance’ is
possible. The temporal priority is also being questioned by some
modern philosophers. The third ingredient that is, necessary
connexion, is much more important and fundamental than the other two ingredients, according to Hume.

"An object may be contiguous and prior to another, without being considered as its cause. There is a necessary connexion to be taken into consideration; and that relation is of much greater importance than any of the other two above mention’d".6

All the causes mentioned can be reduced to four very obvious kinds.

The letters of the alphabet are the causes of the syllables; the material is the cause of the things which art produces; fire and the other elements are the causes of the bodies which they compose; the parts are the cause of the whole and the propositions are the causes of the conclusions which are drawn from them. Each of these is a cause since it is that out of which the other thing comes.

Aristotle's famous doctrine of causation occupies an important place in his system and has exerted a profound influence

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on the history of philosophy. Causation is regarded by Aristotle as among the most important of the categories. The categories or predicaments were believed to be an enumeration of all things capable of being named; an enumeration by the summa genera that is, the most extensive classes into which things could be distributed; which, therefore, were so many highest predicates one or the other of which was supposed capable of being affirmed with truth of every nameable thing whatsoever. The following are the classes into which, according to this school of philosophy, things in general might be reduced—Substantia, Quantitas, Qualities, Relatio, Actio, Passio, Ubi, Quando, Situs, Habitus. To know, he says, is to know by means of causes.

Of Aristotle's four causes, only two viz., "the efficient and the final, answer to the natural meaning of 'cause' in English". Matter and form are not regarded as relevant to the production of a thing, nor relative to the event or occurrence, but as static features present in any complex thing. But, for Aristotle none of the four causes is sufficient to produce an event; and speaking generally,
we may say that in his view all four are necessary for the production of any effect. Causation, in Aristotle's view, ultimately reduces itself to 'actualisation' that is change of form. 'Form' is used by him in a variety of senses, but the central conception is that it is the shape, structure, organisation or configuration of a thing. Physical things at any rate have definite forms; they are formed materials, and in the Physics Aristotle is concerned with material things.

Matter is not, for Aristotle, a certain kind of thing, as we speak of matter in opposition to mind. It is a purely relative term-relative to form. It is the materials of a thing as opposed to the structure that holds them together, the determinable as opposed to the determinant.

Form, for Aristotle, embraces a variety of meanings. Sometimes it is used of sensible shape, as when the sculptor is said to impose a new form on his material. Aristotle often indicates the identity of form with efficient and with final cause. The form is the
plan of structure considered as informing a particular product of nature or of art.

But the Aristotelian causes are ‘Conditions’ in the modern sense of the term. For, according to him none of the four causes is sufficient by itself for the production of an effect, but requires the co-operation of the other three. Aristotle tends further to merge the formal, efficient and final causes into one another, for while ‘form’ is used by him to stand for sensible shape, more often he regards it as an object of thought - as the inner nature of a thing that is expressed in its definition, the plan of its structure.

It may be asked whether Aristotle’s doctrine of causation is not a mere restatement of the Platonic view. The reply is that the two views lie at opposite poles. Plato’s cause is wholly constituted by the form which has no essential connexion with matter, while the Aristotelian cause is a formed material or matter with a definite form. The former is a timeless logical entity unaffected by change; the latter is a concrete individual undergoing change at every moment. But in spite of this difference the two views agree on one
point-both regard the cause as a substance.

In Aristotle's theory the causal relation is one of continuity. The cause becomes the effect: in the process of causation matter takes on a new form. And since matter is nothing but potentiality, causation is the actualisation of the potential.

Aristotelian account of causation which is metaphysical, has no pragmatic value, because the discovery of specific causes, which used to be a main objective of science, gets little help from the doctrine of fourfold causation. Aristotle also shows the relation between the categories of substance and causality, the cause being at bottom a substance-not static but efficient. For centuries there often, the Aristotelian theory of causation was accepted as gospel truth and discussed with varying shades of emphasis on its different aspects.

Closely related to the predicables is another set of categories, the categories perhaps the single most heavily discussed of all Aristotelian notions. The categories are ten in number: what-it-is, quantity, quality, relation, location, time,
position, possession, doing, undergoing. An accident, a genus, a peculiar property and a definition will always be in one of these categories.

Ambiguity, as we normally understand it, is multiplicity of senses; a word is ambiguous when it has more than one meaning. Aristotle sometimes talks in these terms; but this common way of invoking the phenomenon of harmonymy is by saying something of the form “F’s are so-called in several ways” or “things are called F in several ways”. Thus the theory of the “four causes” might be introduced by a remark to the effect that causes are so-called in different ways.

In making this remark, does Aristotle mean that the word ‘cause’ or rather the Greek word “aitia” is ambiguous? If so, then he is not rehearsing a theory of four causes at all; there are not four distinct types of cause - rather the word ‘cause’ is used in four different senses. To speak of four types of cause would be like speaking of three types of mole: the rodent, the jetty, the spot. And this does not sit well with most of what Aristotle says about
causes. Rather he seems to hold that there are four types or kinds of cause, so that he is committed to the view that the word ‘cause’ or ‘aitia’ has single meaning and is not ambiguous. But although the word ‘cause’ has only one pertinent sense, what it is for x to be cause of y may be different from what it is for z to be cause of w - x is cause of y, perhaps, in so far as x is the object which produced or made y, whereas z is the law of w in so far as z is the matter or stuff of which w is composed. In general F’s are so called in several ways if what it is for x to be F is different from what it is for y to be F.

Indeed, aitia can be picked out in more specific or more general ways. We may say that the doctor caused health, or that some skilful person did. And we can refer to something as aities under a description which is incidental to the fact of its responsibility, example, when we say that Polycleitus is the cause of the sculpture (since the sculptor happens to have that name) or more generally still a man, or even an animal.
The concern with how we pick out the causal factors underlines the fact that it is explanation which is at issue; but on the other hand his willingness to allow generic and incidental references to those factors indicates that Aristotle is sensitive to the extensional nature of causal (as opposed to explanatory) talk, as well as the fact that he is concerned with both explanation and cause.

Thus Aristotle’s scheme incorporates the matter which is the locus for the change and the potential bearer of form (and of its privation); the form, or structural organisation which is realised in the matter; the agent, or efficient cause, which brings that information about; and (in some cases at least) the goal, or final end, towards which that process tends.

Aristotle seems to treat what we call ambiguities as special cases of homonymy but this would be an error. Aristotle holds that sharp is homonymous between “the knife is sharp” and “the note is sharp”. This is presumably a case of ambiguity. It is a case of homonymy. We do not find a clear and unified account of
homonymy and its relation to ambiguity in Aristotle’s works. Again and perhaps more clearly, not all homonymies are ambiguities. Thus Aristotle holds that ‘we say homonymously of the necessary’ that it is possible. He does not mean absurdly, that one sense of the word possible is necessary; he means that in some cases, what makes an item possible is precisely the fact that it is necessary.

Aristotle might have argued that all entities are causes or effects, explanatory or explained, so that the notions of cause and effect and of explanation are ‘topic neutral’. They are thus part of the subject matter of logic or the study of beings qua being.

Final causes are invoked by Aristotle in two distinct ways. First, he appeals to teleology to explain those things that occur always or for the most part. It is the regularity that required a final cause explanation. Aristotle’s basic notion is that no description of the physical world that concentrates solely on material and efficient principles can account for the order and repeatability of natural physical processes.
Secondly, Aristotle treats the relation of part to whole in animal's structures as being essentially teleological - animals have the parts they have in order to be able to perform the functions for which they are designed.

It is standard Aristotelian doctrine that there are four ways in which one can cite a 'cause' of something: One can specify its matter (the material cause), specify what sort of thing it is (the formal cause), say what brought it about (the efficient cause) and say what the thing is for (the final cause).

The theory of the four causes might be introduced by a remark to the effect that causes are so called in different ways. It is worth stressing that for Aristotle, an efficient cause of some event is, canonically at least, supposed to be operating at the time of the event. Aristotle insists throughout his biology that efficient, material and final causes must all be taken into account in the course of giving a complete explanation of things.

Philosophers have distinguished other kinds of causes, many of which overlap each other as well as the four of Aristotle.
Modern science arose in opposition to Aristotelian thought, which had in the late middle ages become allied with Christian Theology and there has since been a pronounced tendency to eschew Aristotelian concepts wherever possible.

It is quite common to refer to objects or substances as causes. Thus, one says that malaria is caused by certain mosquitoes, that the earth is warmed by the sun, and so on. Most writers on the subject agree, however, that causes and effects are ordinarily changes in the states of things or substances or, less commonly, unchanging persistence of the states of substances. Succumbing to malaria, for instance, is a change, and it is caused not by a mosquito as such, but by being bitten by a certain mosquito, which is also a change or event. The earth is not warmed by the sun as such, but rather certain parts of the earth are warmed by becoming turned towards the sun, and these again are changes or events.

To assert that causation is universal is to assert that no change even occurs without some cause—in short, that every event
has a cause. To affirm on the other hand, that causation is uniform is to affirm that the causal relations between changes or states can be expressed in the form of general laws or in short, that similar causes always produce similar effects. David Hume, J.S. Mill and others have expressed the principle of uniformity in the dictum “the future will resemble the past”.

Aristotle insists throughout his biology that efficient, material and final causes must all be taken into account in the course of giving a complete explanation of things. Aristotle compares what can perceive with what is combustible; the latter never catches fire of its own accord, but requires an agent which has the capacity to ignite it. This is surely right; if the causes of perceptual activity were internal to the subject, perception would not fulfil its purpose.

It has been suggested that final causes are irreducible potentialities for form, irreducible just in that they cannot be attributed to the matter of which things are made up. It seems clear that Aristotle needs to think something of the sort—but it is quite
unclear whether it can be rendered at all plausible. If suitable material-efficient conditions really do necessitate their outcomes, they must do so however they are described: the intensionality of explanation is irrelevant here. A description of those conditions which fails to mention their habitual outcomes may be explanatorily misleading, but it will not be causally false. Only if we can make sense of the notion that, had the final cause not been the way it is, then precisely these material-efficient conditions would have failed to bring about the result, does it seem as though the final cause genuinely has a role to play. Yet that is precisely what the thesis of material sufficiency denies.

The causes with which wisdom or philosophy deals are enumerated in the *Physics*, and are four in number:

i) the substance or essence of a thing

ii) the matter or subject

iii) the source of motion or the efficient cause and

iv) the final cause or good.
Aristotle investigates the views of his predecessors, in order, he says, to see if they discussed any other kind of cause besides the four he has enumerated.

Hume has two different tasks to carry out concerning the concept of cause:

1) He must analyse the cause-effect relationship between events, and give a clear definition of it and
2) He must expound his claim that the cause-effect relation is a natural relation, and pursue the factual consequences of this claim.

To say that a relation $R$ is philosophical is to make a factual empty statement; as relations are philosophical. Since all relations are philosophical, there is no classification of all relations into two kinds, philosophical on the one hand and natural on the other. Thus the cause-effect relation, being a rotation, is a philosophical relation and therefore to define it as a philosophical relation is simply to define it.

Definition (1), therefore, is Hume’s definition of cause-effect
relation. He analyses the cause-effect relation as nothing more than an instance of a general uniformity of concomitance between two instances of particular occurrences, and as quite independent of any association of ideas which may or may not exist in human minds.

"As to what may be said, that the operation of nature are independent of our thoughts and reasoning, I allow it, and accordingly have observ’d, that objects bear to each other the relations of contiguity and succession; that like objects may be observ’d in several instances, to have like relations; and that all this is independent of, and antecedent to, the operation of the understanding."7

Thus definition (2) is not a definition at all, but simply a re-statement of the proposition that the (already defined) cause-effect relation is a natural relation, in a somewhat elliptical formulation.

Hume is definitely mistaken to have offered it as a definition. Definition (1) omits the element of inevitability or necessity. Since it will shock those who believe mistakenly that it should be included in the definition, he offers in (2) a compromise.

The Humean view of ‘causation’ has the following form:

The difference between, ‘e₁ caused e₂’ and ‘e₁ proceeded e₂’ is that the former entails that there is a law which........ (all events are caused). This formula is incomplete because it does not say anything about how the relevant law relates to e₁ and e₂. One possible position is as follows: ‘The F event caused the G event’, while F and G stand for suitably law-connected-properties so that the move from the singular causal judgement to the law is automatic. The truth of the law is based on the truth of this singular causal judgement. There is another possible position which is the thesis of pure extensionality: the statement that e₁ caused e₂ is true if these two events have appropriate law-connected properties—a singular causal statement entails that there is a relevant law but does not entail the relevant law.
Hume attacks certain theories of causality. His discussion on causality can be divided into two parts, namely 1) negative account of causation in which he points out the contradictions that are involved in some theories of causation, especially that of John Locke, and 2) positive account of causation which contains his own theory of causation.

Hume raises the question, 'do we have any impression of necessary connexion' between events? If any one tries to give an affirmative answer to this question, the following will be the only possible basis: when I act voluntarily, I am conscious within myself of a necessary or more-than-inductive connection between the act of my will and the effect of such an act. For example, when I wish to raise my arm, my arm goes up. Hume rightly questions this basis for saying that there are 'impressions of necessary connexion' between events.

We need to understand Locke's position concerning the concept of cause in order to understand the criticism of Hume.
Locke tries to explain the empirical basis for our concept of causing, which we call our ‘idea of power’ as follows:

“Power also is another of those simple ideas which we receive from sensation and reflection. For observing in ourselves that we do and can think and that we can at pleasure move several parts of our bodies which were at rest; the effect, also, that natural bodies are able to produce in one another occurring every moment to our senses - we both these ways get the idea of power”\(^8\).

Hume denies that causal laws are logically necessary. The logical necessity of causal laws consists in the following: ‘an F event occurs’ can support ‘a G event will occur’ because it is logically impossible that an F event should fail to be followed by a G event. It is not clear as to why Hume rejects this sort of view.

Hume’s most powerful argument to show that causal laws are not logically necessary runs as follows: If two events, say, F

and G are causally connected, it is possible to conceive an event (F) occurring without being followed by another event (G). And he argues that if it is conceivable, then it is logically possible. Therefore, he comes to the conclusion that there cannot be any necessity in this sort of prediction. He says:

"There can be no demonstrative arguments to prove, that those instances, of which we have had no experience, resemble those, of which we have had experience. We can at least conceive a change in the course of nature; which sufficiently proves, that such a change is not absolutely impossible. To form a clear idea of anything, is an undeniable argument for its possibility, and is alone a refutation of any pretended demonstration against it.\(^9\)"

This argument does not prove that causal laws are not logically necessary for the following reasons. The premises of this argument are:

a) Those instances of which we have had no experience

do not resemble those of which we have had experience.

b) We can conceive a change in the course of nature. The conclusion that causal laws are not logically necessary do not follow from these two premises taken together. Therefore, this argument is a non sequitur.

Modern empiricists support the main Humean contention that there is no necessary connection between cause and effect. Though causality has been severely limited, science marches on. If a priori status is claimed for causality, it would unduly narrow the field of research.

We note that human experience always tries to find out some necessary connection between events, and includes them within the general concept of causality. According to Kant, the idea of a necessary or causal connection is the form, the framework in which we rationalise our sense impressions to yield experience; it is not a part of experience itself. Philosophical analysis discusses causation in more abstract way, perhaps, because it addresses the
problem of causality in general not particularly specified for physical sciences.