
The Four Causes

The “four causes” are the answers that Aristotle gives to four questions that can and should be asked about the changes with which we are acquainted in our common experience. They are common-sense questions, and so are the answers. Let us begin by considering them as they apply to changes brought about by human beings, especially the things they produce or make. That will help us to consider the four causes as they operate in the workings of nature.

The first question about any human production is: What is it going to be made of? If you asked this question of a shoemaker at work, the answer would be “leather.” If you asked it of a jeweler, fashioning bracelets or rings out of precious metals, the answer might be “gold” or “silver.” If you asked it of a gunsmith producing a rifle, the answer would probably be “wood and steel.” The kind of material named in each case, on which the craftsman works and out of which he is producing a particular

product, is the *material* cause of the production. It is one of four indispensable factors—factors without which the production would not and could not occur.

The second question is: Who made it? That would appear to be the easiest question of all, at least when we are dealing with human productions. It may not be so easy when we come to the changes that take place in nature and to the things produced by nature rather than by men. So far as human productions are concerned, the question has already been answered in what was said in answer to the first question: the shoemaker is the maker of the shoe, the jeweler of the bracelets or rings, the gunsmith of the gun. The maker in each case is the *efficient* cause of the production.

The third question is: What is it that is being made? On the face of it, that question is so easy that it may make you impatient to have to consider it. It is obvious, you may say, that what is being made by the shoemaker is a shoe, by the jeweler a ring, and so on. But when I tell you that Aristotle called the answer to this question the *formal* cause of the change or production, you may be puzzled by the introduction of that word “formal,” though it is, as you will soon see, the precise word to pair with “material,” the first of the four causes. I will return to the explanation of “formal” after we have considered the last of the four causes.

The fourth question is: What is it being made for? What purpose is it intended to fulfill? What objective or use did the maker have in mind as the end to serve? In its simplest form, the question is: Why is it being made? And the answer, with regard to the productions we have been talking about, comes quickly. We all know what shoes and rings and guns are for—what function they perform or what purpose they serve.

This fourth factor in human productions Aristotle called the

final cause, calling it that because the factor being referred to is an *end* in view. When you or I make anything, the end we have in mind is something that we achieve last or finally. We must finish making it before we can put it to use for the purpose we had in mind.

I said earlier that the four causes are indispensable factors that must be present and operative whenever men produce anything. To call them indispensable is to say that, taken together, they are that without which the production could not have taken place. Each of the four factors, taken by itself, is necessary, but none by itself is sufficient.

All four must be present together and operate in relation to one another in a certain way. The workman must have material to work on and must actually work on it. By doing so, he must transform it into something that the materials in hand can be made to become. And what has been made must be of some use to the person making it. In other words, he must have had a reason for making it, for without that, he would probably not have expended the effort to make it.

You may question the last of these statements. You may wonder whether the final cause—the reason for making something—must always be present and operating. Isn't it possible for someone to produce something without having a reason for doing so—without having in mind, in advance, a deliberate purpose that he wishes to serve?

That question is not easy to answer with certainty, though you must admit that, for the most part, human beings do make the effort to produce things because they need or want the things they are engaged in producing. Yet they may also, on occasion, fiddle around with materials and, as a result, produce something unexpected—aimlessly or, shall we say, playfully.

When this happens, there would appear to be no final cause,

no end result being aimed at. A purpose for the object produced, a function for it to perform, may be thought up after the production is completed, but the producer of it did not have it in mind in advance. It could, therefore, hardly have been an indispensable factor, or a cause, of what occurred.

When we turn from human productions to the workings of nature, the question about the presence and operation of final causes becomes more insistent. We cannot avoid facing it squarely, for we should certainly be uneasy about saying that nature has this or that in mind as the end result that it aims at. Perhaps, when I am able to explain why Aristotle calls the third of the four causes the *formal* cause, I will also be able to answer the question about the operation of final causes in the workings of nature.

Before I do so, let me summarize the four causes by describing them in the simplest terms possible. Because these statements about the four causes are so very simple, they may also be difficult to understand. We must pay close attention to the key words that are *italicized* in each statement.

1. Material cause: that *out of which* something is made.
2. Efficient cause: that *by which* something is made.
3. Formal cause: that *into which* something is made.
4. Final cause: that *for the sake of which* something is made.

What do we mean when we say "that *into which* something is made"? The leather out of which the shoe was made by the shoemaker was not a shoe before the shoemaker went to work on it. It became a shoe or got turned into a shoe by the work he did, which transformed it from being merely a piece of leather into being a shoe made out of leather. That, which at an earlier time was leather not having the form of a shoe, is now at a later time leather formed into a shoe. That is why Aristotle says

that "shoeness" is the formal cause in the production of shoes.

The introduction of that word "shoeness" will help us to avoid the worst error we can make in dealing with formal causes. We might be tempted, very naturally, to think of the form of a thing as its shape—something we are able to sketch on a piece of paper. But shoes come in a wide variety of shapes, as well as colors and sizes. If you stood in front of a shoestore window with sketch pad in hand, you would find it very difficult or impossible to draw what is common to the various shapes of the shoes in the window.

You can think of what is common to them, but you cannot draw it. When you do have an idea of what is common to all shoes, of every shape, size, and color, then you have grasped the form that Aristotle calls *shoeness*. Without there being such a form, shoes could never be made; the raw materials out of which shoes are made could never be transformed into shoes.

Please notice that word "transform." It contains the word "form." When you transform raw materials into something that they are not—leather into shoes, gold into bracelets, and so on—you are giving them a form that they did not previously have. A shoemaker, by working on raw materials, transforms them into something they can become but which, before he worked on them, they were not.

We can get further away from the mistake of thinking that the formal cause is the shape a thing takes by considering other kinds of change that we discussed before—changes other than the production of things such as shoes, rings, and guns.

The tennis ball you set in motion moves from your racket across the court to your opponent's baseline. You are the efficient cause of that motion, propelling the ball by the force of your stroke. The ball is the material cause—that which is being acted on. But what is the formal cause? It must be some place

other than the place from which the ball started out when you hit it. Let us suppose that the ball lands on the other side of the net; is missed by your opponent, and comes to rest against the back fence. The place where it comes to rest is the formal cause of the particular motion that ended there. From having been *here*, on your side of the net, its position or place has been transformed into being *over there*, against the back fence.

The green chair that you paint red is similarly transformed in color. So, too, the balloon you blew up; it is transformed in size. *Redness* is the formal cause of the change you brought about by painting the chair, just as *overthereness* is the formal cause of the change you brought about by hitting the tennis ball. In each of these changes, you are the efficient cause. In one of them, the green chair is the material cause, that which you acted on in painting it red. In the other, the collapsed balloon is the material cause, that which you acted on when you blew it up.

The three kinds of change just considered also occur naturally, without man entering the picture as efficient cause. When we examine their natural occurrence, identifying the four causes becomes more difficult, and some new problems arise. However, what has already been said about humanly caused changes will be of some help to us.

Sunshine ripens the tomato and turns it from green to red. The rays of the sun are the efficient cause of this alteration, and the tomato itself, the subject undergoing the change, is the material cause of it. Here, as in a person's painting a green chair red, redness is the formal cause. From having been green in color, that is what the tomato becomes. But here there is no final cause distinct from the formal cause just named.

The person who painted the green chair red may have done so for the sake of having it match a set of chairs in a certain room. The purpose or end the individual had in mind was dis-

tinct from the redness that was the formal cause in the transformation of the chair's color. But we would hardly say that the sun, in shining on the tomato, wished to make it red as a sign that it had at last become edible. The end result of the tomato's ripening, so far as its surface color is concerned, consists in its being red. Its being red is both the formal and the final cause of the change.

Much the same can be said about the rock that wears away under the battering of the waves, becoming smaller in size as a result of that process. This process may go on for a long time, but at any given moment, the size of the rock at that time is both the formal and the final cause of the change—the decrease in size that has occurred so far.

The account just given of a natural alteration in color and a natural decrease in size applies as well to a natural change of place. The tennis ball that is accidentally dropped falls to the ground and eventually comes to rest there. That local motion comes to an end at the place where the ball comes to rest, and that place is the formal as well as the final cause of the motion.

If, in this case, one were to ask about the efficient cause, the force of gravity would probably be named—an answer that most of us learned in school, but that would have puzzled Aristotle. That fact does not affect our understanding of the difference between an efficient cause, on the one hand, and material, final, and formal causes, on the other. However it is named or designated, it is always that which, in any process of change, acts upon a changeable subject or exerts an influence upon it that results in that changeable subject's becoming different in a certain respect—red, from having been green; smaller, from having been larger; there, from having been here.

Let us consider one other kind of change—the growth of a living thing that, though it involves increase in size, involves

much more than this. Aristotle uses the familiar example of the acorn that falls to the ground from an oak, takes root there, is nurtured by sunshine, rain, and nutrients in the soil, and eventually develops into another full-grown oak tree.

The acorn, he tells us, is an oak in the process of becoming. What it is to be oak is both the final and the formal cause of the acorn's turning into an oak. The form that the acorn assumes when, through growth, it reaches its full development is the end that the acorn was destined to reach simply by virtue of its being an acorn.

If, instead of being an acorn, the seedling had been a kernel taken from an ear of corn, our planting it and nurturing it would have resulted in a different end product—a stalk of corn with ears on it. According to Aristotle, the end that is to be achieved and the form that is to be developed in the process of growth are somehow present at the very beginning—in the seed that, with proper nurturing, grows into the fully developed plant.

They are not present actually, he would acknowledge, for then the acorn would already be an oak, and the kernel a stalk of corn. But they are present potentially, which is simply the opposite of their being present actually. It is the difference between the potentiality that is present in the acorn, on the one hand, and the potentiality that is present in the corn kernel, on the other, which causes the one seed to develop in one way and the other seed to develop in another.

Today we have a different way of saying the same thing. Aristotle said that the "entelechy" of one seed differed from the "entelechy" of the other. All he meant by that Greek word was that each seed had in it a potentiality that destined it to reach, through growth and development, a different final form or end result. We say, when we use the language of modern science, that the genetic code in one seed gives it a set of directions for

growth and development that is different from the set of directions given by the genetic code in the other seed.

We think of the genetic code as programming a living thing's growth and development from the very moment when that process starts. Aristotle thought of a living thing's inherent potentialities as guiding and controlling what it becomes in its process of growth and development. Up to a certain point, the two descriptions of what happens are almost interchangeable. The observable facts to be accounted for remain the same. Acorns never turn into cornstalks.

That this is so must be because there is something initially different in the matter that constitutes the acorn, on the one hand, and in the matter that constitutes the kernel of table corn, on the other. Calling what is there genes that program growth and development or calling them potentialities that guide and control growth and development does not make much difference to our understanding of what is going on. But, as most of us know, it does make a difference to what human beings can do to interfere with natural processes.

Our scientific knowledge of DNA (an abbreviation for a term in biochemistry) enables us to experiment with the genetic code of an organism and, perhaps, to make significant changes in the directions it gives. Aristotle's philosophical understanding of the role that potentialities play did not enable him, nor does it enable us, to interfere in the slightest way with the workings of nature.

I shall have more to say in the next chapter about potentialities and actualities, and also about matter and form, as fundamental factors in changes of all sorts, both natural and artificial. These four factors, although not identical with the four causes, are closely related to them.

To whet your appetite for what is coming next, let me ask

you to consider again one more change that has already been mentioned—the special kind of change that Aristotle called coming to be and passing away. As an example of that special kind of change, I am going to take an occurrence that is most familiar to us in our everyday life.

We sit down to dinner and, in the course of it, we eat a piece of fruit. The apple on our plate, when taken from the tree, had finished growing. But it is still a living thing, with seeds in it that can be planted to sprout more apple trees. It shows no signs of decay or rotting. We eat it, all but the core. What has become of the apple?

We have not only eaten it, chewed it up, digested it, but we also have drawn some nourishment from it, which means that it has somehow become part of us. Before we started eating it, the organic matter of that piece of fruit had the form of an apple. After we finished eating, digesting, and drawing nourishment from it, the matter, which once had the form of an apple, has somehow become fused or merged with our own matter, which has the form of a human being.

The apple has not become a human being. Rather, it would appear, matter itself has been transformed, from having the form of an apple to having the form of a human being. It ceased to be apple matter and became human matter.

What is meant by “matter itself” as opposed to “apple matter” and “human matter”? Can we say that matter itself is that which remains the permanent underlying subject of change in this remarkable kind of change that happens every day when we eat the food that nourishes us?

I hope I can throw some light on these “matters” in the next chapter.