

The Four Causes

1. Aristotle's doctrine of the four causes is crucial, but easily misunderstood. It is natural for us (post-Humeans) to think of causes in terms of cause-and-effect. This is misleading in several ways:
 - a. Only one of Aristotle's causes (the "efficient" cause) sounds even remotely like a Humean cause.
 - b. Humean causes are **events**, and so are their effects, but Aristotle doesn't limit his causes in that way. Typically, it is **substances** that have causes. And that sounds odd.
2. But to charge Aristotle with having only a dim understanding of causality is to accuse him of missing a target he wasn't even aiming at. We must keep this in mind whenever we use the word "cause" in connection with Aristotle's doctrine.
3. What is it Aristotle says there are four of? The Gk. word is *aition* (plural *aitia*); sometimes it takes a feminine form, *aitia* (plural *aitiai*). And what is an *aition*? Part of Aristotle's point is that there is no one answer to this question.
4. An *aition* is something one can cite in answer to a "why?" question. And what we give in answering a "why?" question is an **explanation**. So an *aition* is better thought of as an explanation than as a cause.
5. Even so, that's not enough: for Aristotle thinks that you can ask what the *aitia* of this table are, and it's not clear what sense, if any, it makes to ask for an explanation of the table. So we're still not in the clear about what an *aition* is. But "explanation" or "explanatory factor" (Ackrill) is a good start.
6. TEXTS: *Phys.* II.3; *APo.* II.11; *Met.* A.3 ff. (extensively) and Δ.2; *PA* 639b12 ff.; *GC* 335a28-336a12.
7. The traditional picture and terminology (not all Aristotle's terminology):
 - a. **Material** cause: "that from which, <as a constituent> present in it, a thing comes to be ... e.g., the bronze and silver, and their genera (= metal?), are causes of the statue and the bowl."
 - b. **Formal** cause: "the form, i.e., the pattern ... the form is the account of the essence ... and the parts of the account."
 - c. **Efficient** cause: "the source of the primary principle of change or stability," e.g., the man who gives advice, the father (of the child). "The producer is a cause of the product, and the initiator of the change is a cause of what is changed."

d. **Final** cause: “something’s end (*telos*)—i.e., what it is for—is its cause, as health is <the cause> of walking.”

8. Aristotle’s doctrine is that *aition* is **ambiguous**.

Aristotle warns us of the ambiguity at 195a5:

... *causes are spoken of in many ways* ...

This is his usual formula for telling us that a term is being used ambiguously. That is, when one says that *x* is the *aition* of *y*, it isn’t clear what is meant until one specifies what **sense** of *aition* is intended:

a) *x* is what *y* is [made] **out of**.

b) *x* is what it is to be *y*.

c) *x* is what **produces** *y*.

d) *x* is what *y* is **for**.

9. This makes it hard for us to get clear on what Aristotle was up to, since neither “cause” nor “explanation” is ambiguous in the way Aristotle claims *aition* is. There is no English **translation** of *aition* that is ambiguous in the way (Aristotle claims) *aition* is. But if we shift from the noun “cause” to the verb “makes” we may get somewhere.

10. Aristotle’s point may be put this way: if we ask “what makes something so-and-so?” we can give four very different sorts of answer—each appropriate to a different sense of “makes.” Consider the following sentences:

1) The table is **made of** wood.

2) Having four legs and a flat top **makes** this a table.

3) A carpenter **makes** a table.

4) Having a surface suitable for eating or writing on **makes** this a table.

Aristotelian versions of (1) - (4):

1a) Wood is an *aition* of a table.

2a) Having four legs and a flat top is an *aition* of a table.

3a) A carpenter is an *aition* of a table.

4a) Having a surface suitable for eating or writing on is an *aition* of a table.

These sentences can be disambiguated by specifying the relevant sense of *aition* in each case:

- 1b) Wood is what the table is **made out of**.
- 2b) Having four legs and a flat top is **what it is to be** a table.
- 3b) A carpenter is what **produces** a table.
- 4b) Eating and writing on is what a table is **for**.

11. Matter and form are two of the four causes, or explanatory factors. They are used to analyze the world **statically**—they tell us how it is. But they do not tell us how it came to be that way.

For that we need to look at things **dynamically**—we need to look at causes that explain why matter is formed in the way that it is.

Change consists in matter taking on (or losing) form, potentiality becoming actual. Efficient and final causes are used to explain why change occurs.

12. This is easiest to see in the case of an artifact, like a statue or a table. The table has come into existence because the carpenter put the form of the table (which he had in his mind) into the wood of which the table is composed.

The carpenter has done this for the purpose of creating something he can write on or eat on. (Or, more likely, that he can sell to someone who wants it for that purpose.) This is a **teleological** explanation of there being a table.

13. But what about **natural** objects? Aristotle (notoriously) held that the four causes could be found in nature, as well. That is, that there is a final cause of a tree, just as there is a final cause of a table.

Here he is commonly thought to have made a huge mistake. How can there be **final** causes in nature, when final causes are **purposes**, what a thing is **for**? In the case of an artifact, the final cause is the end or goal that the artisan had in **mind** in making the thing.

But what is the final cause of a dog, or a horse, or an oak tree?

- a. What they are used for? E.g., pets, pulling plows, serving as building materials, etc.? To suppose so would be to suppose Aristotle guilty of reading **human** purposes and plans into nature. But this is not what he has in mind.
- b. Perhaps he thinks of nature as being like art, except that the artisan is God? God is the efficient cause of natural objects, and God's purposes are the final causes of the natural objects that he creates.

- c. No. In both (a) and (b), the final cause is **external** to the object. (Both the artisan and God are external to their artifacts; they impose form on matter from the outside.) But the final causes of natural objects are **internal** to those objects.

14. Final causes in nature

- a. The final cause of a **natural object**—a plant or an animal—is **not** a purpose, plan, or “intention”. Rather, it is whatever lies at the **end** of the regular series of developmental changes that typical specimens of a given species undergo.

The final cause need not be a purpose that someone has in mind. Text:

It is strange for people to think there is no end unless they see an agent initiating the motion by deliberation. Even crafts do not deliberate. Moreover, if the shipbuilding craft were in the wood, it would produce a ship in the same way that nature would. And so if what something is for [i.e., a final cause] is present in craft, it is also present in nature. This is clearest when a doctor applies medical treatment to himself—that is what nature is like. (*Phys.* II.8, 199^b28)

Aristotle is clear that the final cause in nature is the **form**. Texts:

Nature is of two sorts, nature as matter and nature as form, and the form is the end, and since everything else is for the end, **the form must be what things are for**. (*Phys.* II.8, 199^a30)

There are four causes: first, the final cause, that for the sake of which a thing exists; secondly, the formal cause, the definition of its essence (and these two we may regard pretty much as one and the same). (*GA* 715^a4ff)

As the *GA* passage makes clear, the form of a given natural object is the essence, the what it is to be, for that kind of object. I.e., where *F* is a biological kind: the *telos* of an *F* is what embryonic, immature, or developing *F*s are all tending to grow into. The *telos* of a developing tiger is **to be a tiger**.

- b. Aristotle opposes final causes in nature to **chance** or **randomness**. Indeed, he rejects an alternative explanatory hypothesis (that natural phenomena do **not** have final causes, but occur solely due to **necessity**) on the grounds that without final causes there would not be regularity, but only chance and randomness.

[The details of his argument for final causes in nature are in II.8. How convincing is this argument? This is a good question (and a good paper topic).]

Aristotle regards it as indisputable that there is regularity in nature—as he says, things in nature happen “always or for the most part.” That is, we observe that biological

individuals run **true to form**. So this end, which developing individuals regularly achieve, is what they are “aiming at”.

- c. This helps to explain why “form, mover, and *telos* often coincide” (198^a25; see also *de An* 415^b10). I.e., formal, efficient, and final causes “coincide”, Aristotle says.

The *telos* of a (developing) tiger is just (to be) a tiger (i.e. to be an animal with the characteristics specified in the definition of a tiger. Thus, Aristotle says (198^b3) that a source of natural change is “a thing’s form, or what it is, for that is its end and what it is for.”

Claims like “a tiger is for the sake of a tiger” or “an apple tree is for the sake of an apple tree” sound vacuous. But the identification of formal with final causes is not vacuous. It is to say, about a developing entity, that **there is something internal to it which will have the result that the outcome of the sequence of changes it is undergoing—if it runs true to form—will be another entity of the same kind as the ones that produced it**—a tiger, or an apple tree.

- d. So form and *telos* coincide. What about the **efficient** cause? The internal factor which accounts for this cub’s growing up to be a tiger (a) has causal efficacy, and (b) was itself contributed by a tiger (i.e. the cub’s father).

This can be more easily grasped if we realize that for Aristotle questions about causes in nature are raised about **universals**. Hence, the answers to these questions will also be given in terms of universals. The questions that ask for formal, final, and efficient causes, respectively, are:

1. What **kind** of thing do these flesh-and-bones constitute?
2. What has this (seed, embryo, cub) all along been developing **into**?
3. What **produces** a tiger?

The answer to all three questions is the same: “a tiger”. It is in this sense that these three causes coincide.

- e. Aristotle’s account of animal reproduction makes use of just these points (cf. *GA* I.21, II.9 and *Metaph.* Z.7-9):

1. The basic idea (as in all change) is that matter takes on form. The form is contributed by the male parent (which actually does have the form), the matter by the female parent. This matter has the potentiality to be informed by precisely that form.

2. The embryonic substance has the form potentially, and can be “called by the same name” as what produces it. (E.g., the embryonic tiger can be called a *tiger*, for that is what it is, potentially at least.) [But there are exceptions: the embryonic mule cannot be called by the name of its male parent, for that is a *horse* (1034^b3).]
3. The form does not come into existence. Rather, it must exist beforehand, and get imposed on appropriate matter. In the case of the production of artifacts, the pre-existing form may exist merely potentially. (E.g., the artist has **in mind** the form he will impose on the clay. Nothing has to have the form in actuality.)

But in the case of natural generation, the pre-existing form must exist **in actuality**: “there must exist beforehand another **actual** substance which produces it, e.g. an animal must exist beforehand if an animal is produced” (1034^b17).

- f. So the final cause of a natural substance is its form. But what is the form of such a substance **like**? Is form merely **shape**, as the word suggests? No. For natural objects—living things—form is more complex. It has to do with **function**.

We can approach this point by beginning with the case of bodily organs. For example, the final cause of an eye is **sight**. That is what an eye is **for**.

And this function, according to Aristotle, is part of the **formal** cause of the organ, as well. Its function tells us what it **is**. What it is to be an eye is to be an organ of **sight**.

To say what a bodily organ **is** is to say what it **does**—what function it performs. And the function will be one which serves the purpose of preserving the organism or enabling it to survive and flourish in its environment.

Since typical, non-defective, specimens of a biological species do survive and flourish, Aristotle takes it that the function of a kind of animal is to do **what animals of that kind typically do**, and as a result of doing which they survive, flourish, and reproduce.

Charlton (*Aristotle’s Physics, Books I and II*, p. 102):

... the widest or most general kind of thing which all non-defective members of a class can do, which differentiates them from other members of the next higher genus, is their function.

- g. To say that there are *telê* in nature is **not** to say that nature has a purpose. Aristotle is not seeking some one answer to the question of purpose in nature. Rather: natural objects (plants and animals) develop and reproduce in regular ways, the processes involved (even where not consciously aimed at or deliberated about) are all **toward** certain ends.

15. Teleology and Necessity

The key question: what is the relation between teleological explanation and the other forms of explanation? In particular, with what one might call “mechanical-efficient” explanations—those appealing to efficient causes that are spelled out in totally non-intentional, non-purposive terms.

- a. Are teleological explanations **reducible** to mechanical-efficient ones? Aristotle clearly thinks that they are **not**.
- b. Are teleological explanations **compatible** with mechanical-efficient ones? Aristotle seems to think that they **are**.

For evidence: cf. *PA* 639b11-642b4. Cf. also *Companion* pp. 129, 158. This passage (*PA* 663b12-15) is typical:

Deer are the only animals in which the horns are solid throughout, and are also the only animals to shed them, on the one hand for the sake of the advantage gained by the increased lightness, on the other hand from necessity because of their weight.

But the compatibility thesis leads to a problem: for if the mechanical-efficient cause (M-E) of x is **causally sufficient** for x to occur—if it **necessitates** x —then that threatens to make the final cause (T) of x causally irrelevant. That is, if M-E necessitates x , then the occurrence of M-E is by itself sufficient for x to occur. In other words:

Necessarily, if M-E occurs, then x occurs (even in the absence of T).

The deer’s antlers, being heavy, would still fall off (due to their weight) even if it weren’t to the advantage of the deer for them to do so. So final causes seem to be left out.

16. Aristotle’s response: Conditional vs. Simple Necessity

Aristotle addresses this issue in *Physics* B.9, 199b35-200a15.

The material properties of a thing are only **conditionally** necessary, not **simply** necessary. The antlers of a deer are not necessarily heavy (full stop); but they must be heavy **if** they are to perform their function. A saw has certain material features (it is hard, durable, capable of being sharpened, etc.) not out of simple necessity, but **conditionally**:

Why does a saw have such and such features? In order to perform this function, and for this end. But this end cannot come to be unless the saw is made of iron; and so it is necessary for it to be made of iron if there is to be a saw performing its function. What is necessary, then, is conditional (200a10-14).

So although it may be a matter of simple necessity that objects with the material properties of a saw can cut wood, or that objects with the material properties of a stag's antlers will fall off periodically, it is **not** a matter of simple necessity that there should be objects with those properties (i.e., that there should be saws, or stags' antlers).

It is a matter of simple necessity that iron that is hard and sharpened can cut wood; similarly, it is a matter of simple necessity that heavy antlers will fall off. But these physical necessities are not sufficient to explain the **existence** of saws or of antlers. Nor are they sufficient to explain why saws and antlers have the material constitution that they have. To explain why saws are made of iron, or why antlers are made of dense, heavy, bone, one must appeal to what saws and antlers are **for**. So final causes are not eliminated from explanations about the behavior of saws or antlers.

The denial of "simple necessity" to the material constitution of natural things amounts to this: the essential properties of the material constituents of an organism (e.g., the heaviness of bone) do not necessitate their being constituted as they are in that organism, even though they may necessitate some of the features of the organisms they constitute.

The essential properties of the matter that antlers are made of makes them heavy, and that makes them fall off. That is, in one sense, why they fall off. But why does a stag have antlers in the first place? It is not because they are heavy, but because of the function they fulfill in the life of the stag.

There is much that can be said in opposition to such a view. But at least it is not ridiculous, as is sometimes supposed. In so far as functional explanation still figures in biology, there is a residue of Aristotelian teleology in biology. And it has yet to be shown that biology can get along with teleological notions. The notions of function, and what something is for, are still employed in describing at least some of nature.