

Aristotle, Natural Right, and the Challenge of Modern Science

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Prepared for delivery at the 2016 Canadian Political Science Association
Conference in Calgary, AB

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Abstract

This paper is a study and defense of natural right in the face of the greatest challenge posed to it by modernity. The 20th century saw renewed interest in classical political philosophy (Grant, MacIntyre, Arendt, Gadamer, Sandel, et al.). However, this revival has been tempered by skepticism regarding the extent to which classical thought could speak to the modern world with any relevance. One of the reasons for this reticence is the belief that the central teachings of classical political philosophy, especially Natural Right, have been scientifically disproven. Modern physics, which for my purpose can be summed up as the belief that the natural world consists of nothing but matter in motion, is often thought to empirically disprove ancient theories regarding teleology and natural purposes. This paper will make a necessary first step towards refuting this popular belief by exploring the role that conceptions of scientific inquiry play in what counts as scientific knowledge. It will argue that rather than being an empirical claim, natural right is the culmination of Aristotelian investigation into nature, which sought the ultimate causes of a thing, not simply whatever could be observed and quantified. To this end, the majority of the paper will be an interpretation of the first 2 books of Aristotle's *Physics*. It will close with a brief comparison to the early modern conception of scientific inquiry, in order to highlight the reasons why it is usually thought to have disproven natural right.

At the risk of generalizing, one of the central claims of ancient political thought is that the universe is a moral order, in which ways of life and regime types can be judged according to how closely they align with natural goods; this has been called the doctrine of natural right. The life of philosophy and moderation was superior to immoderate pleasure-seeking because, in part, that nature of the human soul is such that indulgence, injustice, and tyranny do not satisfy its deepest needs. Thus, in keeping with Plato's model, regime types that mirror the indulgent and tyrannical soul are unjust. Despite Aristotle's disagreements with Plato, he agreed that a political arrangement that encouraged civic duty and participation was superior to tyranny because, in part, human flourishing required attachment to and involvement in the public deliberation of one's community. Similarly, his controversial defense of natural slavery rested on his view that the nature of some souls makes them fitted for obedience and physical labour.

All of this was based on the cosmological belief that purposes are inherent in the nature of things, and that what is best for something depends on the kind of thing that it is. Modern physics, which for my purpose can be summed up as the belief that the natural world consists of nothing but matter in motion, is often thought to empirically disprove this very cosmological belief. If what we call the natural world is nothing but bits of matter bumping into each other at random and behaving according to impersonal and non-teleological patterns of behavior, then it makes no sense to speak of norms being given by nature. This paper is an attempt to weaken the belief that modern science has disproven the ancient belief in a teleological cosmos, which was the basis for the doctrine of natural right.

It is often assumed that the central difference between ancient and modern science is that ancient science analyzed non-empirical concepts whereas modern science turned to observation. My argument is that this difference cannot be sustained. The real difference between the two

approaches to science is that ancient science was interested in understanding the ontological structure of natural motions – that is, the ultimate causes of such motion – whereas modern science is interested only in patterns of behavior. More on this in the discussion of Aristotelian motion.

Aristotle's *Physics* is a study of motion. Its namesake – *physis* – is greek for nature, which Aristotle describes as “a certain source and cause of being moved and of coming to rest” (192b). A work devoted to *physis*, then, will be devoted to uncovering and investigating motion and rest.¹ To that end, the book defines motion, analyzes that in which motion occurs – i.e. place and time – and culminates in an argument for an unmoved mover. However, before turning his attention to motion as such, the first two books of the work serve as a prolegomena of sorts, introducing necessary concepts and presuppositions pertaining to the basic constituents of nature and the meaning and kinds of causality. It is in these first two books that Aristotle articulates his conception of scientific inquiry. The third book, in which Aristotle attempts to define motion, reveals how his conception of scientific inquiry translates into an understanding and explanation of natural phenomena as being fundamentally goal-oriented.

The notion that nature is goal-oriented is the central insight of the *Physics*, and so final causality will be the lens through which the text is interpreted. In order to answer the questions of what final cause is and how it operates, a number of other issues must first be addressed, including Aristotle's broader doctrine of causality, the relationship between all four causes, and the relationship between chance and purpose. Having addressed these issues the central question of final causality can be addressed. Aristotle's conclusion is that final causes, or natural ends, play an active role in bringing about and determining change in nature; indeed, final cause is

¹ “Since nature is a source of motion and of change, and our pursuit is for nature, we must not let what motion is remain hidden” (220b).

architectonic, in that it gathers together and governs the operations of all the other causes.

Because natural ends are thus an intrinsic part of natural change, it is the task of the Aristotelian study of nature – i.e. science – to discover the natural ends toward which things are aimed, and in which they achieve the good particular to them.

Aristotle's Doctrine of Causality

The doctrine of causality is the foundation of Aristotelianism. See, for example, the opening statements of his *Politics*² and *Nichomachean Ethics*,³ which frame the respective investigations in the context of causality, and especially final cause. By “causality” Aristotle does not mean simply the direct influence of one object on another. By “cause” he means any possible answer to the question “why?” To know the cause of a thing is to have “taken hold of the why of it” (194b). To this end, Julius Moravcsik has argued in favour of referring to Aristotle’s theory of causality in broader terms as a theory of adequate explanations – it is not hard to see his point (Moravcsik 1974). However, before the “why” of a thing can be asked, one must know what constitutes a thing in the first place. This is the subject of book 1, but it is not a mere preface to the discussion of causality in book 2; the question of the fundamental constitution of things is in the context of the possibility of change itself, change being a necessary precondition of causality. Against his predecessors, Aristotle rejects the extreme positions that either nothing is in motion or that everything is in constant flux. That is, he sought to allow for a world with being as well as becoming, motion as well as rest. His solution follows

² “Since we see that every city is some sort of partnership, and that every partnership is constituted for the sake of some good (for everyone does everything for the sake of what is held to be good), it is clear that all partnerships aim at some good, and that the partnership that is most authoritative of all and embraces all the others does so particularly, and aims at the most authoritative good of all. This is what is called the city or the political partnership” (1252a).

³ “Every art and every inquiry, and similarly every action as well as choice, is held to aim at some good” (1049a).

a complex line of argument, in which he proves that the fundamental building-blocks of the world are contraries. Any change is from not-X into X, or from X into not-X, and therefore at least some sets of contraries must be said to exist. Furthermore, all contraries can be reduced to a more fundamental set of contraries, namely “exceeding” and “falling short” (189b). Big and small, light and dense, educated and uneducated are all various articulations of the more fundamental opposition between exceeding and falling short.⁴

However, in the transition from one contrary to the other, there must be something that persists and makes the transition from one contrary to the other. “The underlying thing,” as Aristotle calls it at this point of the argument, is that on which the contraries act (189a). The man who becomes educated underlies the change and persists throughout it, although he now has the term “educated” predicated of him as opposed to the contrary “uneducated.” Between the underlying thing and the two contraries, there are thus three principles of nature. The contrary into which the underlying thing changes is the *form*, the underlying thing is eventually given the name *material*, and the contrary from which the material has come is first called *privation*, but becomes the basis of the more adequate notion of *potency*. Privation is so open-ended that it becomes causally indeterminate, and indeed Aristotle himself is not quite sure whether it should be treated as a principle of nature at all. He vacillates from sentence to sentence:

Hence there is a way in which the starting points are *two*, and another in which they are *three*; and there is a way in which they are contraries, as if one were to speak of the educated and the uneducated, or the hot and cold, or the concordant and the discordant, but another in which they are not, since it is impossible for contraries to be acted upon by one another (190b; emphasis mine).

The material in its pre-formed or pre-articulated state is only incidentally opposite to its eventual form. The fact that the uneducated man suffers from a deprivation of education is true

⁴ When these contraries are later developed into the categories of form and potency, potency corresponds to falling short and form corresponds to exceeding.

but virtually meaningless, as he also suffers from a deprivation of wings or of the ability to prove logical contradictions. It is true but offers no scientific knowledge of how or why the change occurs. Aristotle alerts his reader to this fact in a curious way that has confused most translators. At 191b, in allegedly summing up the results of the previous chain of argument, he writes the following:

But in this way what is does come into being, in the same way as if animal were to come from animal, or a certain animal from a certain animal, for example, if a dog were to come into being [from a dog, or a horse] from a horse.

The words in square brackets are not in any of the original manuscripts, but have been added by confused translators in the attempt to make this sentence intelligible. However, as David Bolotin argues, this is a mistake (Bolotin 1998: 14-15). So long as material, form, and privation are taken as the three principles of nature, there is nothing to prevent a dog coming into being from a horse. Privation is so open-ended that it can lead to almost anything, as a man is presumably deprived of many things in addition to what he eventually becomes, or can potentially become.

Aristotle resolves this difficulty by clarifying what he had meant all along by privation: “another [way to go] is that it is possible to mean these things in respect to potency as well as to their being-at-work” (191b). The concept of potency narrows down the endless possibilities implied by mere privation, and avoids the absurdity of a horse giving birth to a dog. The semen of a horse is *deprived* of the form of dog, but it does not have the *potency* to become a dog. “Being-at-work,” in *Metaphysics* 1048a, is contrasted to potency as that which a thing is when it is fully itself. A block of wood is potentially a statue, but when the statue has been fully carved – i.e. made actual – we can speak of its being-at-work. The main idea seems to be that whenever something is truly, and not just potentially, it is fully at work being itself. When Aristotle speaks of “things in respect to potency as well as to their being-at-work,” he is replacing open-ended privation, and its implication that matter simply takes on whatever form happens upon it, with

the idea that matter exists as potency for a limited range of fulfillments, or forms. Each particular variety of matter is potentially some things but not others. We can then clarify Aristotle's teaching on this matter by saying that the three principles of nature are form, matter, and *potency* (which resides in matter and partially determines the forms it can take).

Potency is a different kind of principle than material and form, as it reaches out toward form and seeks its eventual destruction. A thing, properly understood, is what happens when potency gives way to form; this entails that a thing is a unity of material and form. This doctrine, which came to be known as *hylomorphism*, was simultaneously a critique of the materialist pre-Socratics as well as Platonic idealism. Nature is not merely matter, as some pre-Socratics believed, but neither can a full understanding of the cosmos be had by ignoring the importance of matter, as Aristotle thought his master had done.

The precise character of form will be given in the discussion of the causes themselves, but suffice to say for now that the preliminary definition of it is that which is predicated of an object. The definition of material, on the other hand, is not so simple. The Aristotelian concept of pure material, in the absence of any form, strictly speaking, refers to something that does not exist. Any matter that exists in the real world is of a certain kind, and bears some attributes instead of others. Wood is never pure and undifferentiated wood, but is always oak, or birch, or maple, or some other kind of wood; that is to say, it always participates in some particular form. Material in the precise meaning here intended refers to a state of pure potency with no actuality; that is to say, stuff which does not partake of any form whatsoever. Aristotle insists that it can be known only through analogy, "as the formless is before taking on its form" (191a). It is later described simply as the "that out of which" something has come into being (194b). Perhaps the clearest illustration of this in a non-Aristotelian context is the description of the world before

God's creative activity: "The earth was formless and void" (Genesis 1:2a; New American Standard Version). In this instance, the material spoken of has already been created, but awaits the ordering activity of its prime mover to shape it into form. Indeed, prior to being shaped into a form, it is likened to a void; in other words, formless material, as such, does not exist.

The question of the causes, then, is simply "Why does this particular thing consist of this particular matter and this particular form?" According to Aristotle, the various answers to this question can be grouped into four categories:

1. That out of which a thing has come (material cause)
2. What it is for it to be (formal cause)
3. That from which the first beginning of change or rest is (agent of motion/efficient cause)
4. That for the sake of which (final cause)

For everything that exists, an answer can be found for each of these four aspects. Each thing, by virtue of being a thing, consists of matter and form, as was demonstrated in book 1, so any adequate scientific knowledge must speak to these. However, in the case of natural as well as artificial change, there must have been something which sparked the movement or change into the thing presently before us and, what is controversial to modern readers, genuinely scientific questioning must seek the end for the sake of which the present motion was brought about.

Moreover, as if to remove all doubt about what he means by "that for the sake of which,"

Aristotle insists on using normative language to explain his intention: at one point he likens the end to "the best thing...the good itself" (195a), and at another point, "because it is better thus"

(198b). In Aristotle's common example of a statue, the material cause is bronze, the formal cause is the shape of the statue, the cause of the motion is the sculptor, and the final cause is the sculptor's desire for beauty, or to honour the gods, or some other such aim. To reiterate, in order

for knowledge of something to be complete, it must know all four of these answers to the question “why?”⁵

The question of how the causes work together to bring about an object is never given a clear answer – or rather, it is given more than one answer. One thing that seems clear is that material and formal cause are brought together by the efficient cause; in the case of the statue, the *bronze* is shaped into a *statue* by the *sculptor*. Moreover, Aristotle writes that in some cases the form, end, and mover are the same, such that the form is both the purpose of the change and the mover (198a). By this he means that the form itself, being motionless, is the initiator of the change from potency to actuality; because the movement is caused by the form itself, the form acts as the end, or that for the sake of which. Any change that has occurred in this way, Aristotle writes, happened because “this is what it is for it to be, and because it is better thus, not simply, but in relation to the thinghood of each thing” (198b). This argument is made in the context of natural things, so the implication is that natural change happens because it is good for the things changing, or because of their inherent strivings to achieve their telos.

However, the causes seem to be differently arranged in the constitution of artificial things. As far as man-made objects are concerned, the final cause is in the maker’s mind, and is what compels him to bring together material and form. The sculptor, because of his desire to honour a god, shapes the unformed bronze into the form of a statue. This is thus an instance in which the *end* does not reside in the *form*, but rather in the mind of the *mover*. This difference in the arrangement of the causes reflects Aristotle’s earlier distinction between natural and artificial things, wherein natural things have in themselves the sources of motion and rest, and artificial things have no such innate impulse of change, but require the agency of an extrinsic mover to

⁵ “[S]ince there are four causes, it belongs to the one who studies nature to know about all of them” (198a).

move from potency to actuality (192b). However, Aristotle insists numerous times that art imitates nature, which would indicate that the causes of artificial things should be analogous to the causes of natural things (194a, 199a). How can Aristotle's belief that art imitates nature be reconciled with the fact that causality operates differently in the natural and human realms? In order to answer this question, we must turn to his examination of the relationship between chance and purpose.

Accidental Versus Essential Causes

The third chapter of book 2 presents the four causes, as well as the various ways they act as causes. Aristotle follows this, in chapters four through seven, by posing the problem of events that do not seem to be caused by anything in particular, but appear to have come about by chance or fortune. His ultimate concern is the view of his predecessors that the entire cosmos came to be by chance, and is still governed by it. The local patterns we observe in the life-cycle of birth, reproduction, and death, are just that – local patterns within a broader cosmos of chance and fortune. This is a potential impasse because he has just argued that in tracing back the “why” to the four previously mentioned causes one has indeed given complete knowledge of the thing in question. If, however, there are some things that do not owe their existence to any purpose, or a “because it is better thus” (198b), then Aristotle's causal model fails and the cosmos is unintelligible. And it certainly does appear that many things are not the result of order or purpose.

To understand Aristotle's method of solving this problem, as well as the main alternative approaches found in the secondary literature, a few central terms must be defined. Nature, in this context, refers to “things always happening in a certain way...[or] for the most part” (196b); that

is, a process that is natural will exhibit an intelligible orderliness, always occurring in the same, or a similar, manner. An example of a natural process might be the life cycle of living things: all of them are born and then die, and usually leave genetically similar offspring behind. Like begets like. Similarly, the falling of heavy objects is a repeatable phenomenon, and thus a natural phenomenon.⁶ In addition, natural processes, as Aristotle has previously argued, always happen for the sake of something; a natural motion is one governed by the end for which it strives.

There is also a distinction between *per se* causes and *per accidens* causes. A *per se*, or essential, cause is one that acts for the sake of the cause in question, as a house is the proper effect of a house builder, whereas the housebuilder is only a *per accidens* cause of a bird building its nest in the chimney. The bird building a nest in the chimney is, however, *per se* an effect of its natural inclination to build nests for its young. It just so happened that it built its nest in that particular chimney. *Per se* effects, like natural processes, always happen for the sake of something. The housebuilding art is for the sake of houses, as the bird builds nests for the sake of its young. *Per accidens* effects, on the other hand, are not for the sake of anything. There is no broader purpose to account for a particular bird choosing a particular chimney, or for the fact that the builder of this house happens to be white, or musical, or any other incidental predicate.

With these preliminary definitions in mind, Aristotle's usage of chance and fortune becomes intelligible. *Per se* causes and effects are natural causes and effects, in which the effect is proper to the cause and is that for the sake of which the cause acted. On the other hand, an effect can be said to have been caused by chance if it is not the end for which what caused it had

⁶ Technically, this inference from repeatability to naturalness represents the phenomenological character of knowing. We infer naturalness from repeatability. Ontologically, however, naturalness is prior to repeatability.

aimed. That is, things come about by chance insofar as they are incidental by-products of causes acting for the sake of something else. If a man happens to look down at the precise moment at which a \$100 bill is in front of him, it can be said that he found it by chance. His looking down was not for the purpose of finding the money, because he did not know it was there. Rather, his looking down for the sake of, perhaps, ensuring that his shoes were tied resulted in something outside the purview of his intention. Because chance events are incidental, and do not follow repeatable patterns, chance accounts for the anomalies, aberrations, or anything that departs from the usual patterns of the world. For example, Aristotle places genetic defects under this category, as well as scorching heat in winter and cold days in mid-summer.

Moreover, fortune is nothing but a subset of chance: chance events that occur in the realm of human affairs. The man finding \$100 is *fortunate*, but a hailstorm in August is by *chance*. What is common to both, however, is that they are incidental effects of causes which were for the sake of something else. The significance of this definition of chance is that it entails that chance requires for its existence a broader framework of final causality. If chance occurrences are by-products of causes for the sake of ends, those end-driven causes are more fundamental: “[i]t is clear that fortune is an incidental cause among things proceeding from choice, which in turn are among those for the sake of something” (197a).

As we saw, Aristotle began this entire discussion of chance and fortune in response to some of his predecessors, who claimed that the cosmos arose by chance, and is still governed by it. If this is true, as Aristotle recognized, it would invalidate his ontological prioritizing of purpose over chance. His refutation of this primordialist ontology⁷ consists of a reversal of the

⁷ “By contrast, primordialist ontologies such as those of the pre-Socratics and Sophists stress that life is fundamentally characterized by strife, chance, and motion, the concomitant human behavior for which would elevate selfish impulse and the quest for domination over others as the most ‘natural’ behavior” (Newell 2013: 21).

chance-order relationship, according to which chance is by definition derived from the broader network of order and final causality. A chance event, in other words, requires a *per se* cause that was directed for the sake of something. The most fundamental order of causality, therefore, is that which is aimed at particular ends. That is, final causality is both ontologically and chronologically prior to chance, and to whatever extent chance is responsible for the cosmos, order and purpose are more fundamental.

Natural and Artificial Change

The preceding discussion of accidental and essential causes and effects was undertaken in the hope that it would shed light on Aristotle's vagueness with respect to the proper relationship between natural and artificial change. It was noted that he described causality as it pertains to artificial objects differently than as it pertains to natural objects. In the case of artificial objects, the end is located in the mind of the mover, and not in the form itself, whereas the end of natural change resides in the form itself, and is brought about, at least in part, because of the inherent striving, or being-at-work, of the potency of the material. This difference between natural and artificial causality is made all the more strange because Aristotle goes on to say that artificial change imitates natural change, which seems strange given the differing composition of each. The fundamental question at the heart of Aristotle's doctrine of causality, then, is "Which of these models of causality is more fundamental?" His resolution of the problem of chance and fortune, according to which accidental causes are embedded within a broader network of essential causes, provides two clues for a successful resolution of the current impasse. There are two ways in which the model of an ontologically prior level becomes the stratum in which an

ontologically derivative layer is embedded can be applied to the alleged tension between artificial and natural causality.

The first is in the chance-order relationship. Chance causality is embedded within an ontologically prior order of final causes. Accidental causes and effects are different than essential causes and effects, but not in such a way that renders them incommensurable with essential causes. Rather, they operate within the larger context of essential causality, not outside of it altogether.

Second, fortune is a subspecies of chance. Chance causes are incidental causes of effects that happened for the sake of something else; this type of incidental cause is found throughout nature, from inclement weather that happens to spoil crops to a creditor happening upon his debtor in the marketplace. Fortune, however, is the name given to incidental causes and effects within the realm of human choices and purposes, so the creditor seeing his debtor is fortunate (although probably not the debtor), whereas the early rains are not. Fortune thus being incidental cause in the realm of human affairs, must operate within the confines of chance, which is incidental cause in natural affairs. That is to say, the incidental causes of human things are part of the larger framework of incidental causes of natural things.

Because chance and fortune are here treated as similar, if hierarchical, there must not be any real tension in how they operate. Moreover, if human *incidental* causes are subordinate to natural *incidental* causes, it follows that human *essential* causes must be subordinate to natural *essential* causes. Human causality is a subset, and thus a part of, natural causality more broadly. It is embedded within it. If this is true of incidental causes, it must be true of essential causes too, for incidental causes are a part of the network of essential causes. Incidental effects are

nothing but unintended (in the case of fortune) or extrinsic (in the case of chance) effects of the four essential causes (material, efficient, formal, final).

To explicitly answer the question at hand, just as chance is embedded within a larger framework of order and purpose, and incidental human causality is embedded within a larger framework of natural incidental change, artificial causality more broadly is embedded within a larger body of natural causality. That is to say, natural change, in which the end is in the mover instead of the form, is embedded within the ontologically prior occurrence of natural change, in which the end is present in the form and acts as the efficient cause.

How can this be? How can these two models of causality be embedded, if they have different relationships between the causes? Put simply, this can be because humans themselves are natural beings. There is no such thing as pure art or convention; the artificial is ontologically and chronologically derived from the natural. Human beings themselves, including all of their conventions and extrinsic ends and purposes, are part of the natural telos of the cosmos. Human ends and purposes, therefore, can only be understood in light of the natural ends for which they are fitted. This entails that even the purposes they impose on nature are products of natural final causality.

Let us return to Aristotle's favorite example of the bronze statue. While the cause of the bronze's being shaped into a statue was the sculptor acting for the sake of his desire to honour a god, the chain of causality does not stop there. It goes beyond the realm of artificial change, and can be traced back to the potency of human beings to live together in political community, which for Aristotle included religious as well as strictly political life. The cause of the statue, qua artificial object, is the sculptor's desire to honor a god, but the cause of the statue, qua part of the human world of political and religious life, is the form of the good life, which acts as an end

compelling the material – i.e. the citizen – to contribute to the life of the polis. This embeddedness of human causes within natural causality permeates artificial change, such that all art can be traced further back to nature. That is, every artificial motion, explained by *end* acting on the *mover* instead of as the *form*, is ultimately the result of a natural motion, explained by the *form* acting as the *end* and therefore as *mover*. The difference between natural and artificial causality can be reconciled with Aristotle's dictum that art imitates nature in the following manner: natural change is ontologically prior to artificial change and displays characteristics of purpose and intentionality despite the absence of an ordering intelligence, and artificial change imitates this appearance of intentionality by being explicitly end-directed by minds. This is likely what Aristotle meant with the following words:

And in general, art in some cases completes what nature is unable to finish off, but in others imitates nature. If then, what comes from art is for the sake of something, it is clear that what comes from nature is too, for the series of things from art, and from nature are alike, each to each, in the way that the later things are related to the earlier (199a).

The question of Aristotelian final causality can be resolved, then, in the following manner: final cause, qua the end for which all change occurs, acts as the efficient cause of change. The form into which the underlying thing changes is the end of the change, and the change is a product of the inherent striving of the potency of the pre-formed material. To simplify as much as this complex relationship permits, the purpose of the change is responsible for the character of the change as well as its occurrence. It is thus, as claimed earlier, architectonic among the causes, in that it brings all of them together in such a way as to produce the object brought about, whether natural or artificial.

We are now in a position to comment on Aristotle's conception of science. It has been demonstrated that a faithful account of Aristotle's doctrine of causality asserts the primacy of final causes, and that even artificial change, in which final cause seems only indirectly related to

the actual change – by acting on the human source of change – can ultimately be accounted for in terms of natural change, in which the end directly acts as the agent and determinant of change. Moreover, it is clear that Aristotle thought that any knowledge of nature must know all of the causes: “since there are four causes, it belongs to the one who studies nature to know about all of them” (198a). Rather than designing his inquiries around the ideal of empirical observation, with its increased promise of certainty, Aristotle inquired into whichever causes bore the most responsibility for the change in question. This, as has been shown, led him to treat order and purpose as the most fundamental causes of the natural and human worlds.

Motion

Let us now turn to the main topic of the *Physics*: motion itself. The parameters of this discussion have been firmly defined by the preceding discussion in a number of ways. First, Aristotle’s goal in studying motion is not merely to predict or understand the patterns of motions, or to discern how individual motions come to be. These investigations would fall under the categories of material and efficient causation, which we have seen are not his primary target. Instead, the primacy of final cause entails that the study of motion must culminate in knowledge of either the purpose of motions, how motion is subservient to purposes, or the relationship between motion and the good. Second, all of the important aspects of his theory of motion have been introduced and cursorily defined, including potency and being-at-work. Third, motion is related to change, which was the lens through which the causes had been articulated. The conclusion of the first two books that final cause ultimately holds sway over both natural and artificial change indicates the direction his analysis of motion will take. The discussion of motion reveals the way in which Aristotle’s conception of inquiry frames the scope and

conclusion of his investigations. Because his aim is wisdom of the most responsible causes, not the ability to predict the behavior of motions, very little time is spent analyzing *motions*; instead, he focuses on analyzing the intrinsic character of *motion* itself.

His definition of motion brings the above considerations together. The most basic fact about it is that it is conceptually bound up with natural goods or ends. In many ways, the discussion of motion does no more than flesh out the implications of books 1 and 2. Because motion is intrinsically end-directed, the *Physics* is, at its core, a study of natural ends. Motion is always toward a specified end or goal, not just open-ended movement or transition from one place or condition to another. The latter, motion as mere movement or open-ended transition, is closer to the modern, Cartesian view, which is essentially circular and meant to serve utilitarian purposes.⁸ Remi Brague quotes the *Logique de Port-Royal*: “to whom was it [Aristotle’s definition] ever *useful* for explaining any of the properties of motion?” (Brague 1990: 2). One does not require an ontological theory of motion in order to predict and harness the power of individual motions.

The central concepts involved in the definition of motion are being-at-work, being fully active, and being potentially. Being-at-work has been alluded to above as what it is for a thing to be, and it was initially placed opposite to potency. In book 1 being-at-work refers to a thing that has fully reached its potential, as a block of wood that has been carved into a statue is “at work” as a statue, whereas it was previously only potentially a statue. The meaning of the terms carries over into the present discussion of motion, although more nuance is added. In book 3 a

⁸ However, circular definitions are not solely the claim of modern thinkers. Thomas Aquinas criticizes the traditional interpretation of Aristotelian motion – “a going out from potency to act which is not sudden” for defining motion by way of “elements that are posterior to motion” (Aquinas 1999: 146). In addition to being incorrect, simply, such interpretations miss Aristotle’s intention, which was to define motion by elements that are prior to, or more fundamental than, it.

completed thing is called fully active whereas *potential* things still exist only *as* potential. But here Aristotle adds the claim that each of them has a being-at-work particular to it, instead of only the fully active, as it was in book 1; that is, even the potentially existing has a being-at-work that is proper to it. The being-at-work of the fully active is its *thinghood*, or what-it-is-for-it-to-be; the being-at-work of the potential thing, on the other hand, is *motion*, or what one could clumsily call what-it-is-for-it-to-become.

Having briefly introduced the main concepts, Aristotle's definition itself can begin to make sense: "the being-at-work-staying-itself of what is potentially, whenever, being fully at work, it is at work not as itself, but just as movable, is motion" (201a).

The central idea is that motion has to do with the being-at-work of potency, or what the potency does qua potency. Having mentioned above Aristotle's clarification of being-at-work such that it belongs to both the fully active and the potential, there are three separate thoughts contained within this definition. For the purpose of clarity, each will be discussed in turn before combining them to present the full import of the definition.⁹

"*The being-at-work-staying-itself of what is potentially...*" Being-at-work and being-at-work-staying-itself, while carrying difference sets of nuances, mean roughly the same thing. What was said above regarding being-at-work holds true here for being-at-work-staying-itself, namely that it refers to what it is for a certain thing to be, either as fully active or as potential. We see here that motion arises out of things that exist as potency, and pertains to the essence of said potency. Insofar as it is the very being-at-work-staying-itself of potency, and the very meaning of what it is to exist potentially, motion is intrinsic to potency. In other words, motion

⁹ The following exposition is indebted to Brague (1990).

seems to be the very “what-ness” of potency; it is what potency does or is that makes it a potency.

“...*whenever, being fully at work...*” This clause introduces a distinction between potency at work and potency not at work, or active versus inactive potency. This distinction can be paraphrased as the distinction between actually becoming versus merely possessing the capacity to become. A potency is fully at work when the transformation is currently in progress, or when it is actively taking on the goal for which it strives. A healthy man who keeps to a strict diet and fitness regime has the potency to become sick even though the potency is not currently active – the man is not currently becoming sick. On the other hand, a sick man who is undergoing treatment for his illness and is getting better each day has an active potency for health – he is actively reaching his potential. This provides clarification to the first clause in the definition insofar as it asserts that simply possessing a particular potency does not a motion make. Just as a stable ice cube is not in motion towards water unless it is melting, a potency must be actively at work in order for motion to be said to exist.

“...*it is at work not as itself, but just as movable.*” The final clause draws on Aristotle’s earlier discussion of accidental versus essential causes and effects. An essential effect is the effect for the sake of which the action was undertaken, and the accidental effect is anything else that may have followed. It is the same with causes; the cause for the sake of which an effect happens is essential and all others are accidental. In regards to motion, Aristotle argues that it must not simply be that in which the potency resides that is actively at work, but the potency *qua* potency must be at work as the essential cause.

Broken down into its three constituent clauses, this definition connects motion to potency. Whenever potency as such is fully at work, there is motion. When the buildable is

being built, there is a motion called building. When the growable is growing, there is a motion called growth, and so forth. Aristotelian motion, then, can be described as potential which is in the process of being fulfilled, although it should be stressed that Aristotle avoids circularity by shying away from discussing motion in terms of progress towards a goal, or movement from potentiality to actuality. The motion consists in the nature of potency itself, whenever it is fully at work, hence my above term, *what-it-is-for-it-to-become*. Aristotle repeats his definition in various places, each time making the same point: “the being-at-work-staying-itself of whatever is only potentially, *just as such*, is motion,” “the being-at-work-staying-itself of a potency, *as a potency*, is motion,” “motion is the being-at-work-staying-itself of the movable, *as movable*” (201a; 201b; 202a).

Motion is the activity of potency, or in other words, it is what potency does *as potency*. Since we know that a potency is always for something specified,¹⁰ motion is thus necessarily tied to specific ends, goals, or *telois*. Each motion, therefore, is the being-at-work of a potency toward its goal. The obvious implication of this is that nature, being a source of motion, is end-directed and that truly scientific explanations must reveal the end towards which the potency strives. Any explanation that does not refer to the *telos* of the potency does not adequately explain the motion itself, but merely describes its behavior as if it was a brute fact.

The justification of this definition is twofold. First, as already stated, it is primarily a fleshing out of the principles of nature and of the relationship between the causes as articulated in the first two books of the *Physics*. As long as nature is composed of contraries acting upon an underlying thing and the causes are as described, motion must be as here depicted, that is, as the being-at-work of potency.

¹⁰ Recall the above transition from privation to potency, for the reason that privation is too open-ended to be explanatorily useful (191b).

However, Aristotle also provides a brief *post hoc* justification. The basic point is that neither potential being as such nor fully active being explains movement or change, and the only remaining option is that motion is “a certain being-at-work, but incomplete” (201b); neither *being-at-work* as such nor *potency* as such, but rather the *being-at-work of potency*. Potency by itself would never move toward its goal, but fully active being has already reached its goal; a middle term is required in order to bridge the gap. In other words, the work proper to potency is the fulfillment of that which it has the potential to become. The “necessary condition of being moved” (201b), to use Aristotle’s criteria for a definition of motion, is a potency doing what is appropriate to it qua potency. This seems to Aristotle to be the only logically satisfactory way of locating motion between inactive potency, on the one side, and complete being-at-work, on the other; “difficult to bring into focus, but possible to be” (202a).

I have hinted at two possible interpretations of Aristotle’s account of motion: the circular and the non-circular. Aquinas refers to commentators that introduce circularity, and Ross describes Aristotelian motion as “actualization” (Aquinas, 1999; Ross 2004: 83). These are variations of what Sachs calls the “standard account of Aristotle’s view of motion” (Sachs, nd). Most likely due to the strangeness of Aristotle’s stated definition, conceiving of motion as the transition, or movement, from potency to actualization seems plausible enough. However, as Brague, Sachs, and Aquinas correctly claim, defining motion as a certain movement or transition is no definition at all, but at best a clarifying description. Given Aristotle’s insistence that a definition of motion must provide a “necessary condition of being moved” (201b), the non-circular definition, which locates the basis of motion in the being-at-work of the potency instead of the basic fact of movement or transition, must be closer to Aristotle’s intent.

The definition of motion was not in any way reached on the basis of empirical observation. In the opening pages of the *Physics*, Aristotle articulates his method of discovering the ultimate causes of natural phenomena, which leads him to highlight form and potency as the contraries which act upon underlying matter, as well as the role of final cause in orchestrating the network of causality that obtains in the natural world. In other words, the search for ultimate causes led Aristotle to final causality, or the good for which each thing strives and the mode of being most proper to it. This division of being into potency and being-at-work, as we saw, is the ontological basis for motion-as-active-potency. That is, Aristotle's definition of motion arises out of his conception of natural inquiry, insofar as the search for ultimate causes led him to define motion in such a way. The obvious implication is that empirical discoveries, playing no role in the formulation of this definition, can have no bearing on whether or not it is plausible. This definition of motion does not purport to understand or predict the behavior of motions – i.e. what would later be called laws of nature – but attempts to explain the structure of motion, and the ontological conditions that must be in place if there is to be motion and change in the world.

This analysis of the *Physics* has been intended to demonstrate that because Aristotle's aim was wisdom he attuned himself to whatever was most responsible for the phenomena. In book 2 he tells us that “we do not yet know each thing until we have taken hold of the why of it (and to do this is to come upon the first cause)” (194b); in book 3 he writes that an explanation must provide the “necessary condition” (201b) of the phenomenon in question, referring to whatever is ontologically prior. That is, one has knowledge of something to the extent that he or she knows what is ontologically prior, or *is* more truly. Motion is understood in light of the potency of which it is the being-at-work. Potency, for its part, insofar as it is latent in the material cause, is drawn up and set into action by the final cause, which is the most fundamental

of the causes. In this manner, Aristotle's aim of wisdom culminates in his description of all motions as expressing the being-at-work of a potency striving for its end, or good.

This analysis is not yet a positive defense of natural right, or even of Aristotle's *Physics*, per se, nor is it meant to be. It is merely an attempt to undercut the view that modern empirical science has disproven the existence of teleology. The belief in the end-directedness of nature was not simply an inference from observation, such that it could be shown to be false by new and improved observations. Neither did it purport to give predictive power, such that a theory with superior predictive power could displace it. On the contrary, Aristotle's intention was to uncover the true causes – or explanations – of visible reality, or the ontological structure of motion itself. Modern science, in contrast and by way of an extremely brief summary, was driven by the goal of unlocking the power to predict motion. Bacon, Descartes, and their followers paid no attention to the ontology of motion, and instead turned their attention to the laws of behavior governing all matter. Knowledge of such “laws of act” can be harnessed for the relief of man's estate, argued Bacon (Bacon 2000: 45).¹¹

However, the crucial point is that the findings of modern science that appear to contradict Aristotle's teleological view of motion do not in reality contradict anything Aristotle said because they do not refer to the same thing. Aristotle's claims pertain to what the nature of reality must be like in order for change to exist – modern laws of motion deduce patterns of individual motions. They ignore, rather than refute, the claim that motion is the being-at-work of potency. In other words, the difference between ancient and modern science is one of aims and

¹¹ In the preface to his *Great Instauration*, Bacon advises the reader to “reflect on the true ends of knowledge,” which are “not to seek it for amusement or dispute, or to look down on others, or for profit or for fame or for power or for any such inferior ends, but *for the uses and benefits of life, and to improve and conduct it in charity*” (Bacon 2000: 13; italics mine).

intentions, not poor versus sophisticated observation, such that the different findings of modern science do not at all disprove the end-directedness of nature.

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