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Aristotle on Nature and the Moral Life

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Aristotle’s teleological view of nature has become increasingly difficult to understand and to accept the further we move from him in time. The goal of this dissertation is to offer a way of looking at Aristotle’s teleology that will make it more accessible to the contemporary reader while remaining true to Aristotle’s vision of nature. I compare his account of nature to his theory of moral action.

Since Aristotle’s natural teleology is directly related to his definition of nature as an inborn principle of change or rest, the dissertation begins by examining Aristotle’s understanding of nature, focusing on the convergence of formal, final, and efficient causes in natural objects. For Aristotle, natural objects possess their own principles of change and rest and are therefore directed from within their own being. This means that natural processes are not simply the result of objects external to them acting in accordance with natural laws.

The dissertation then distinguishes Aristotle’s account of natural causality from that of modern mechanism and further distinguishes it from the account he gives of the causality at work in artifacts, both of which lack the convergence of causes that Aristotle sees in natural objects. I argue that the concept of *energeia*, actuality, lies at the heart of Aristotle’s account of natural objects and is necessary for understanding the convergence of causes he finds there. The
dissertation contrasts Aristotle’s teleology with the contemporary functionalist account, again focusing on the role of *energeia*.

The most common analogy for understanding nature in Aristotle has been making, i.e., craftsmanship or the design and production of artifacts. The dissertation concludes by arguing that Aristotle describes the moral life in a way that in some respects parallels the teleology found in nature. In particular, the orientation of the moral life toward human flourishing highlights the concept of *energeia*, and to that extent provides a better model for natural objects than artifacts do. After considering the benefits and drawbacks of both the moral life and artifact models, we propose the moral life as a supplementary model for natural teleology.
This dissertation by Margaret Ross Cecere fulfills the dissertation requirement for the doctoral degree in philosophy approved by Jean De Groot, Ph.D., as Director, and by Richard Hassing, Ph.D., and Tobias Hoffmann, Ph.D., as Readers.

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Introduction

It is a stock truth of classical scholarship that Aristotle subscribed to a teleological view of nature. It is perhaps also a stock truth that his teleological view has become increasingly difficult to understand and to accept the further we move from Aristotle in time. The goal of this dissertation is to offer a way of looking at Aristotle’s teleology that will make it more accessible to the modern reader while remaining true to Aristotle’s vision of nature.

I. A Brief History of Teleology

Aristotle’s teleology is directly related to his definition of nature as a principle of change or rest. Changes are directed toward ends; rest occurs when the end has been reached. For Aristotle, natural objects possess their own principles of change and rest and are therefore directed from within their own being. This means that natural processes are not simply the result of objects external to them acting in accordance with natural laws. Rather, natural processes arise from within natural objects and are directed toward particular goals. For Aristotle, this inherent directionality is what distinguishes natural objects from artifacts (Ph. II.1, 192b13–32). Thus, natural objects can be distinguished and identified, in part, by their natural goals, so-called final causes. Fire distinguishes itself by moving up, not down; a cat distinguishes herself by bearing kittens, not puppies. These goals, or final causes, toward which objects are naturally directed, constitute what Aristotle calls the ὥν ἐνεκά, “that for the sake of which” the object exists or changes.

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1 This point is made explicit in Wallace’s “Finality in Aristotle’s Definition of Nature,” 62–63, but is affirmed by other scholars. See, for example, Irwin, Aristotle’s First Principles, 94–96; Ross, Aristotle, 66–68 and 71–75; and Owens, “The Teleology of Nature in Aristotle,” 137.
Final cause has always been a source of debate in Aristotelian scholarship, but this debate has deepened since the beginning of the modern era, when teleology itself came under direct attack.\(^2\) Prior to that time, natural teleology had been subject to criticism by atomists such as Democritus and Leucippus, who held that natural motions were, at heart, due to chance.\(^3\) Further, teleology, along with any other theory that implies realism, would also have been suspect to those philosophers who held that the goal of science is primarily saving the appearances (σώζειν τὰ φαινόμενα) rather than giving objectively true accounts of what natural processes and objects are.\(^4\) However, in the Middle Ages, atomism remained a minority view, and the threat of anti-realism to teleology was mitigated by the Christian faith in a purposive God. In the early modern era, criticism of teleology became more pronounced and more serious.

The theory of primary and secondary qualities, propounded by Galileo and reiterated by Descartes and Locke, presupposed a version of atomism that differed from that of the classical atomists by insisting that atoms obey regular laws, but was similar to the classical theory in that

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\(^3\) It is a problem to see just how Democritus and Leucippus understood the motions of atoms and the natural bodies that result, but on the whole the motions seem due to chance. Some relevant fragments are *DK* 67A1, 67A6, 67A14, 68A37, 68A40, 68A58, 68A61, and 68A135. For a discussion on the interpretation of these passages see Kirk, Raven, and Schofield, *The Presocratic Philosophers*, 413–27. The main problem is determining to what extent the aggregation of atoms is to be attributed to their shape, size, and weight, and to what extent it is to be attributed to the principle of like-to-like attraction that is at work throughout nature (KRS, 426–7). The latter principle seems to make the formation of bodies something less than sheer chance, though it probably does not constitute a final cause. The chance nature of the formation of bodies in atomism is more clear in Lucretius, who attributes this to a swerve of atoms “at a quite uncertain time and in uncertain places.” See Lucretius, *On the Nature of Things*, 2.216, 225, 251, and 284. These passages are excerpted in Inwood and Gerson, *Hellenistic Philosophy*, 64–65.

\(^4\) Losee, *A Historical Introduction to the Philosophy of Science*, chapter 6. For a discussion of saving the appearance in ancient astronomy and a comparison of ancient and modern views on this issue, see Lloyd, “Saving the Appearances.”
it deflated teleology.\textsuperscript{5} If the existence and action of medium-sized objects can be exhaustively explained by mass, extension, position, and other primary atomic qualities, then a final cause is impossible at the atomic level and superfluous at the level of medium-sized objects. Thus, like the ancient theory, the modern theory of atomism posed a theoretical threat to teleology by making it unnecessary in terms of explanation. But the modern theory posed a greater practical threat to teleology than the ancient theory had. The ancient atomic theory provided an underlying picture of atomic motion that sought to be compatible with the behavior of medium-sized objects, but this picture was not founded in experiment, nor borne out by accurate predictions. As John Losee observes, the ancient atomists “offered a picture-preference, a way of looking at phenomena, but there was no way to check the accuracy of the picture.”\textsuperscript{6} By contrast, modern atomism contributed to the formulation of specific physical laws, in particular Newton’s laws of motion, which actually appeared to be accurate in practice. Although Newton’s scientific procedure was Aristotelian in certain respects (e.g. his method of analysis and synthesis), his rejection of “hypotheses”—theories that appeal to hidden, immeasurable qualities—and his agreement with Galileo that physics should appeal only to primary qualities would seem to rule out teleology, and teleology clearly played no role in the practical and predictive success of his laws of motion.

Teleology did make two notable appearances in modern philosophy, in Leibniz and in Kant, but in each case the teleology was markedly different from Aristotle’s. Aristotle’s teleology is rooted in his concept of the prime mover—divine, but unaware of the natural world—as an ultimate cause, and in his concept of natural essences as proximate final causes.

\textsuperscript{5} Ibid., chapter 7.  
\textsuperscript{6} Ibid., 25.
Leibniz’s teleology, by contrast, was underwritten by his belief in a benevolent, all-knowing deity who orders all the monads, and even the laws of motion themselves, for the best. Like the modern atomists, Leibniz believed that his metaphysical commitments should be borne out at the level of medium-sized objects. Thus, Leibniz seems to have thought that this metaphysical teleology would enable us to interpret the natural world in specific ways. For example, he used the assumption of perfection to argue for the truth of Snell’s Law and for the conservation of *vis viva*. Since monads unfold in a perfect way, and the unfolding of the monads underlies the natural world, scientists may expect the natural world to exhibit certain features of that perfection, and—again, in contrast to Aristotle’s teleology—these teleological features should be describable in mathematical terms. Leibniz, then, held a teleological view of nature—albeit one quite different from Aristotle’s in its particulars. But a view such as Leibniz’s could not defeat the empiricists’ atomistic theory, which did not appeal to unseen forces or benevolent deities, and which gave more accurate predictions in terms of mechanics.

Kant, too, believed that we could and must use teleological reasoning, though unlike Leibniz he asserted that we cannot know what is going on teleologically at the level of things in themselves. Hume had worried that we could know nothing about causes (teleological or otherwise) since their existence could not be established empirically. Kant essentially agrees, but responds to Hume’s skeptical worries by asserting that although causes themselves cannot be known empirically, nevertheless the concepts of causality are necessary for rational judgment

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8 Losee, *A Historical Introduction to the Philosophy of Science*, 89–90.
9 Aristotle asserts that mathematical objects have no final cause (*Metaph.* III.2, 996a18–b26).
10 Kant, *Critique of Pure Reason*, Book I, First Division, Chapter II, Section 1, A91/B124.
about the world and are therefore necessary concepts of the understanding.\textsuperscript{11} Thus, when teleology makes its appearance in Kant, it does so as a regulative principle of reflective judgment, not as a real feature of things in themselves.\textsuperscript{12}

William Wallace has attributed the contemporary view of science, in which both relativism and pragmatism are popular, in part to the skepticism of Hume and Kant.\textsuperscript{13} One effect of this skepticism is that teleology is viewed as a kind of myth—a human interpretation of nature that may not be strictly true, but that nonetheless helps us to study nature. I explore this issue, as it applies to Aristotle, in more detail below in part II of this introduction. Here it is sufficient to observe that Kant’s modern concept of teleology is, on the face of it, quite different from Aristotle’s, which is rooted in nature rather than in human cognition alone.

In short, the modern era ushered in fresh criticism of causality in general and teleology in particular. We have seen that part of this criticism represents worries about whether causes exist or can be known. In addition, there is a second feature of modern philosophy of science that leads to puzzlement regarding teleology—the modern emphasis on mechanical explanation. I discuss mechanism at some length in chapter 1. Here it is enough to note that early modern science distinguished itself in part by considering only mechanical explanations—those that accept only spatially extended entities and their geometrico-mechanical activities—as intelligible, that is, as genuine explanations of natural phenomena.\textsuperscript{14} And although the conception of what counts as “mechanical” has undergone a succession of changes since the

\textsuperscript{11} See especially Kant on the second analogy of experience; Kant, \textit{Critique of Pure Reason}, Book II, Chapter II, Section 3, part 3, A189/B232–A211/B256.
\textsuperscript{12} Kant, \textit{Critique of Judgment}, 20–24.
\textsuperscript{13} Wallace, \textit{The Modeling of Nature}, xii.
\textsuperscript{14} Dear, \textit{The Intelligibility of Nature}, 16–17, 26.
early modern period, the term “mechanism” remains a hallmark of intelligibility in science. The underlying theory of mechanism has arguably remained the same.

How might the modern emphasis on mechanical explanation be understood in Aristotelian terms? One might say that an emphasis on mechanical explanation implies that the realm of nature (φύσις) is in fact the realm of violence (βία—force producing motion)—the realm in which objects are acted upon, rather than acting from within (Cael. III.3, 301b17–21, MM I.15, 1188b12–14). When an object does appear to have a source of motion within itself, that phenomenon is to be explained not by appealing to the object’s form, as Aristotle would have done, but by appealing only to underlying mechanisms—to the smaller entities and activities that make up the object as a whole. Of course, not all mechanists are strict reductionists in this way. But those who do not embrace ontological reductionism frequently embrace a pragmatic reductionism nonetheless, insofar as they argue that teleological accounts are useful aids in understanding complex processes rather than realistic accounts of natural phenomena.

In the end, modern mechanism is a threat to teleology because it makes it superfluous. Mechanical explanations, whatever entities and activities they might include, explain phenomena without recourse to final causes. The emphasis, since the 1500s, on mechanical explanation has

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17 For example, Craver et al. urge that the reductive models that have been offered thus far do not explain phenomena in neuroscience or molecular biology. Their point, however, is not that these models are inaccurate, but that they lack utility: “Higher-level entities and activities are . . . essential to the intelligibility of those at lower levels . . . . It is the integration of different levels into productive relations that renders the phenomenon intelligible and thereby explains it.” (Emphasis mine.) See Craver, et al., “Thinking about Mechanisms,” 23. This pragmatic argument for why reduction is not helpful is strikingly similar to Nussbaum’s comments in her commentary on De Motu Animalium. See Nussbaum, Aristotle’s De Motu Animalium, 68–71.
made teleology seem an outdated notion, eradicated at last by a modern sweep of Ockham’s razor.

Our modern philosophical and scientific heritage is the backdrop against which we must pursue our study of final causes. It is a heritage of skepticism about causality in general and final cause in particular. This skepticism has resulted in the removal of final causes from physics, chemistry, and cosmology, and in the serious questioning of the meaning and validity of such causes in biology. Today, contemporary science has relegated final causes to conscious human intentions, goal-directed craft objects, and perhaps some biological entities.

It is important to see that these modern attitudes are not Aristotle’s and that part of the obscurity of final cause arises from our own modern perspective. Aristotle is not an atomist and does not attribute natural motions to chance. He does not have a concept of primary and secondary qualities and does not limit physics to a study of the former. Aristotle shares neither Hume’s skepticism about causality nor Kant’s agnosticism about the things in themselves. And although, as we shall see in chapter 1, some theory of mechanism is to be found in Aristotle, it is markedly different from modern conceptions of mechanism and is essentially bound up with his teleology.

Thus, understanding Aristotle’s teleology will mean setting aside our modern views of nature as the realm of βίος, and trying to understand Aristotle’s quite different conception of nature as an inborn principle of change.

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18 The literature on the role of teleology in biology is extensive. For an overview, see Allen, Beckoff, and Lauder, *Nature’s Purposes* and Buller, *Function, Selection and Design*. Other important sources are Ayala, “Teleological Explanations in Evolutionary Biology”; and Canfield, “Teleological Explanation in Biology.” Rosenberg has a nice discussion of some of the major themes in the contemporary debate over teleology in his *Philosophy of Science*, 56–61.

19 For further discussion, see chapter 3, section I, below.
II. Natural Sources of Obscurity and the Role of Modeling

It is important to note that our modern philosophical heritage is not the only reason why final causes are obscure to us. As Aristotle himself observes, scientists begin with what is clear to us and proceed towards what is clear in itself (Ph. I.1, 184a10–18). Causality is part of the discovery made by natural philosophy—it is something more clear in itself. If it were an immediately clear and accessible feature of nature, there could not be so much debate over its very existence. Nevertheless, Aristotle does believe that scientific investigation can ferret it out.

Beginning an investigation of Aristotle’s causal theory with the Physics, we are warned at the outset that while causes are vital to knowledge of any kind, they are nevertheless among those things that Aristotle conceives to be less immediately accessible and clear to us.

When the objects of an inquiry, in any department, have principles, causes, or elements, it is through acquaintance with these that knowledge and understanding is attained. For we do not think we know a thing until we are acquainted with its primary causes or first principles. . . . The natural way of doing this is to start from the things which are more knowable and clear to us and proceed towards those which are clearer and more knowable by nature; for the same things are not knowable relatively to us and knowable without qualification. (Ph. I.1, 184a10–18)20

Causes themselves are among things remote from us, not accessible through immediate experience, but rather attained through demonstration. We should not be surprised, then, that the subject of causality continues to be an area of philosophical interest and deeply divided debate.21 One of the most contested aspects of Aristotle’s own theory of causality deals with teleology, with what Aristotle terms the ὁ ἐνέκα, the “that for the sake of which,” or final cause. If Aristotle is right about causes in general being less clear to us and gained only through further

20 Unless otherwise noted, all quotes from the works of Aristotle are taken from Aristotle, The Complete Works of Aristotle, ed. J. Barnes.
21 Rosenberg provides a good overview of the contemporary issues in Philosophy of Science, ch. 2, 21–47; an annotated bibliography on recent work in causality and explanation appears on 45–47.
investigation, then it is perhaps to be expected that final cause in itself will be somewhat obscure to us. Indeed, Aristotle observes that some of his predecessors missed teleology entirely.\textsuperscript{22}

However, to say that causality in general and the final cause in particular are initially obscure, is not to say that either is ultimately mysterious or unintelligible. Aristotle’s point in the passage quoted above is that science’s job is to explain and make intelligible things that are not immediately well known. That the sky is blue; that cats bear kittens; that plants send their stems up and their roots down—these things are obvious, and science does not investigate them as facts. But the reasons \textit{why} these things happen is not so obvious, and it is the job of science to investigate the reasons. Thus, the goal of science is not to discover mere facts, but \textit{reasoned facts}. And such reasoned facts are by no means impossible to establish, in Aristotle’s view. Moreover, when we do establish them, we have arrived, not at a mystery, but at something that is more intelligible in itself than the initial, obvious fact with which we began.\textsuperscript{23}

Aristotle’s philosophy of nature distinguishes four causes—the material, formal, efficient, and final causes. The material cause is generally the “stuff”—physical or otherwise—out of which the object is made. It is the wood of the table, or the letters of the word. The formal cause is the object’s shape, structure, organization, and functionality. It is the design of the table, the order of letters in a word and the way in which the word functions grammatically. The efficient

\textsuperscript{22} \textit{Physics} II.2, 194a19–20: “If we look at the ancients, natural science would seem to be concerned with the \textit{matter}. (It was only very slightly that Empedocles and Democritus touched on form and essence.)” We are authorized to assume that if they missed form or essence, they missed final cause as well, since form, rather than matter, is the final cause (\textit{Ph.} II.8, 199a33). Also, Aristotle’s argument in favor of teleology at \textit{Physics} II.8 is directed against a thought he takes to be Empedoclean (\textit{Ph.} II.8, 198b32). So it is clear that part of his criticism of his predecessors is their failure to acknowledge final cause in nature.

\textsuperscript{23} See the discussion of demonstration in \textit{Posterior Analytics} I.2, 71 b9–24. Demonstrations show the causes of the facts (\textit{πράγματες}), and they begin with things that are “true and primitive and immediate and more familiar than and prior to and explanatory of [\textit{αίτίαν}] the conclusion.”
cause is origin of the object’s being what it is—the parents of the child, the woodworker who builds the table, the utterer of the word. The final cause is the purpose or beneficiary for which or whom the object was made, or in the case of natural objects, their inborn goals or natural inclinations. Among the four causes, the final cause is perhaps the most significant component of Aristotle’s philosophy of nature, both because his view of teleology represents a departure from his predecessors, and also because it so thoroughly colors his own philosophy, affecting an array of topics including his conception of causality itself, animal behavior, animal and plant morphology, the motions of the heavenly bodies, the elements, and the weather. In fact, there is probably no topic in Aristotle’s natural philosophy that is untouched by his teleology. Yet his teleology remains one of the most debated features of his philosophy. I suggest that this is due not only to our modern philosophical and scientific heritage, but to features inherent in final cause itself—features which make final cause one of the things that is more intelligible in itself, but less immediately knowable.

24 I have noted that Aristotle took at least some of his pre-Socratic predecessors to have missed teleology. Plato, of course, is another matter. The Good does appear to be a τέλος for the cosmos as a whole, and there is indication that Plato thinks this teleology extends down to the behavior of living natural objects, since these depend on the sun for their existence and the sun is the offspring of the Good (Republic 509b3–4; 506e3). But Plato offers no detailed philosophy of nature of the sort found in Aristotle’s Physics or his biological works. In fact, the location of natural objects in the second part of the first half of the divided line (Republic 510a) would seem to preclude any science of nature, and Socrates’s dismay with the physics of his day is well known (Phaedo 95–99). For a helpful discussion of Plato’s teleology and how it forms a background for Aristotle’s work, see Hassing, Final Causality in Nature and Human Affairs, “Introduction,” 2–5.

25 Monte Ransome Johnson articulates the main issues in this debate succinctly: “Is teleology about causation or explanation? Does teleology exclude or obviate mechanism, determinism, or materialism? Is teleology focused on the good of individual organisms, or is god or man the ultimate end of all processes and entities? Is teleology restricted to living things, or does teleology apply to the cosmos as a whole? Does teleology identify objectively existent causes in the world, or is it merely a heuristic for our understanding of other causal processes?” Aristotle on Teleology, 2. The literature on each of these issues is too large to be summarized here, but Gotthelf’s “Report on Recent Work” is helpful.
Although Aristotle clearly thinks the causes to be distinct features of objects (as I shall argue in chapter 1), in natural objects three of these causes (the formal, efficient, and final) are frequently represented by the same entity:

Now, the causes being four, it is the business of the student of nature to know about them all, and if he refers his problems back to all of them, he will assign the ‘why’ in the proper way to his science—the matter, the form, the mover, the for the sake of which. The last three often coincide \( \varepsilon r\eta\tau\a\varepsiloni\tau\a\ \delta\varepsilon \ \tau\acute{a} \ \tau\acute{r}i\alpha \ \varepsilon i\varsigma \ \varepsilon \nu \ \pi\omicron\lambda\lambda\acute{a}k\iota\varsigma \); for the what and that for the sake of which are one, while the primary source of motion is the same in species \( \tau\delta \ \varepsilon\iota\delta\epsilon\iota \) as these. (Ph. II.7, 198a22–26)

I shall argue that this “coming down to one,” or convergence, of causes is the source of much of the obscurity of teleology, because it has the effect of hiding the causes from our view. A natural object is something like a skein of yarn—there are distinct strings, but they are bound up with one another, and the inner strings are hidden from view. This makes natural objects somewhat opaque with respect to their causal structure. With philosophical effort, and in particular with the help of the artifact model, we can tease apart each cause and examine it in isolation. When we use the artifact model, each cause becomes more clear, because we are able to view each cause in isolation. But when we do this, we pay a price. Individual causes become more clear, but the structure of the whole—the relationships among the causes—becomes harder to grasp, precisely because we have pulled each cause out of its natural structure.

A phenomenological approach might clarify the causal opacity of natural objects by appealing to the concepts of part/whole, and presence/absence. In phenomenological terms, Aristotle’s four causes are normally parts of natural objects, but they are parts in the sense of being moments, rather than pieces.\(^{26}\) Unfortunately, we tend either to focus on the parts that are

\(^{26}\) For a more thorough discussion of parts, wholes, pieces, and moments, see Sokolowski, *Introduction to Phenomenology*, 22–27.
pieces and neglect moments, or mistake moments for pieces. This is especially the case when we use artifacts as models for natural objects, because their causes play different roles as parts than the causes of natural objects do.

A piece is a part of a whole that can subsist independently—it can be detached and viewed as a whole in its own right. For example, an apple can subsist independently of the rest of the bushel; a leg can subsist independently of a table. All of the four causes can be parts of their objects, but this occurs differently in artifacts than in natural objects. In artifacts, the causes—when they are parts at all—are parts in the sense of being pieces. But in natural objects—in which all four causes are almost always parts—they are usually parts as moments. (Parents as efficient causes of offspring are the obvious exception—they exist independently and are not parts at all.) This is because on the one hand, the material cause is dependent for its identity on being part of the object, and on the other hand, the formal, efficient, and final causes are aspects of one thing—the soul.

In the case of material cause, the bronze is a piece of the bowl. It remains the same bronze whether it holds the shape of the bowl or not. A sign of this is that if the bowl is melted down, the bronze may again be formed into a bowl—its potential remains the same. But where living beings are concerned, Aristotle tells us that their matter is "matter with potential for life" (de An. II.1, 412a20). When a tree is cut, sawn into boards, and dried, the wood remains, but it is no longer the same object because it no longer has potential for life. Likewise, the matter of a dead animal no longer holds potential for life. In being detached, the matter loses an important

27 Two objections are pertinent here. First, one might argue that the rotting matter still has potential for life in the sense of providing food for carrion, bacteria, etc., and thus being assimilated into a living body and becoming part of its matter. Second, one might suggest that with modern biotechnology, the
dimension of its being—the potential that made it the matter of a living body. Thus, the wood or flesh that is the matter of the natural object is no longer itself when detached from the whole. The leg of the table can be reattached, or the bronze again melted and formed, without loss of function. But a lost limb or shed skin is no longer matter for the natural object.28

The efficient causes of artifacts are usually not part of the artifacts at all. The efficient cause is the “primary source of change or rest . . . [it is] generally what makes of what is made

remaining matter can be used for cloning, again making it matter with potential for life. Both of these cases can be addressed by pointing out that matter is an individuating principle for Aristotle. What it is to be a material cause is to be the matter of this particular object. If the rotting flesh has potential for life through assimilation or cloning, it is the potential to be a different object than the original one. In the case of cloning, the second object may bear an uncanny biological resemblance to the first one, but it is nonetheless a different object. Further, one might argue that Aristotle would view generation through cloning as an artificial rather than natural process, since it represents a human intervention in nature. On the other hand, one might argue that even if he did treat cloning as a natural process, he would focus on the role of form in cloning rather than the matter. Very little of the matter of the donor is used in cloning—only the nuclear DNA, which lays out the basic genetic code for the natural object. Cloning, then, makes more use of the donor’s form than its matter. (And even the resulting object’s form is only partly identical to the donor’s, since it will have other, unique genetic material in its mitochondria.) Thus, even considering possible biological uses of the detached natural material, we conclude that the matter of a natural body is—with regard to that particular natural body—a moment rather than a piece. Of course, there is a metaphysical puzzle here even regarding artifacts—if the entire bronze of the bowl is melted down and then reformed, is it the same bowl, or a different one? That is, if matter is the individuating principle, then if two successive objects with identical forms are made from the same matter, are they really the same object? If so, then it would seem that the matter of an artifact is a piece rather than a moment; if not, then the matter would be a moment, incapable of becoming the same object again. For our purposes, it does not much matter which answer we give to this question, although it is a genuinely puzzling one. If we answer that the matter is the only individuating principle, and that therefore the two bowls are the same, then we have the clearest contrast with natural objects, since natural matter cannot be used in this way. Or, if we answer that matter is not the only individuating principle—that, for example, time of generation or production counts as well—then we must still admit that the matter of artifacts is capable of use in a different way than natural matter, since it can still be used to produce a remarkably similar object, whereas natural matter cannot. In this second case, both types of matter appear as moments, but again, only when we consider what happens if the matter is entirely removed from the object. If a part of the matter (in the sense of a limb, leg, handle, etc.) is removed, then it is clear that in artificial objects, such parts are always pieces, whereas in natural objects they are always moments.

28 Again, modern surgical technology allows us to intervene in many cases to reattach limbs by repairing blood vessels and nerves. But as with cloning, this is arguably more related to form than to matter per se. An human arm cannot be reattached to the body as the arm of a statue can be repaired by gluing it in place. The human arm must be reintegrated into the vascular and neural system of the whole body. If this formal relationship cannot be re-established, the arm will wither and will no longer be an arm, properly speaking, for it will no longer be the matter of this body.
and what changes of what is changed” (*Ph. II.3, 194b30–31*). The source of movement or change in artifacts usually lies outside of them—the metalworker is not part of the bowl, but a separate entity. In natural objects, this is also true in the cases of sensation and procreation. The object of sensation, which lies outside of the perceiving subject, is the efficient cause of a sensory experience—a movement within the subject. Likewise, in procreation, the parents are the efficient cause of their offspring, which exists separately from them. However, in many cases—locomotion, imagination, and discursive thought, for example—the animal soul itself is an efficient cause of change or motion in the animal. And the animal soul itself is a moment of the form-matter compound—for Aristotle, the soul cannot subsist independently of the body; it is a part of the living being that cannot be detached. Moreover, the efficiency of the soul is not detachable from the soul itself. There is no special piece of the soul that acts as an efficient cause and could be removed and treated separately from the soul as formal or final cause. Rather, the soul’s efficiency is a moment of the soul, and the soul is a moment of the living creature. We will find the same to be true of the formal and final causes. The soul is a single thing that plays three causal roles, and can be analyzed into three moments.

This is perhaps most evident in the formal cause. In both artifacts and natural objects, the formal cause is a moment rather than a piece. However, in artifacts, form has greater independence from matter than is the case in natural objects, in the sense that artificial forms are imposed through human choice and that choice admits of a fair amount of freedom. Many different forms may be imposed upon a single type of matter—there are silver bowls, silver spoons, silver coins. Likewise, a single type of form may be imposed on a variety of types of matter—there are wooden bowls, bronze bowls, ceramic bowls, and so on. An animal or plant
form, however, has a distinct type of matter in which it must exist. Further, the soul as form is not detachable from the soul as motive power, nor from the soul as the τέλος of the object.

Last, the final cause of an artifact lies outside of it, in its human purpose and use, and is not a part of the object at all. Natural objects, however, contain their final causes in themselves. The final cause is not separable, but is an activity of the soul as formal cause that is achieved through the soul’s efficient causality.29

Part of the confusion regarding final cause perhaps arises from our tendency to mistake moments for pieces. Consider Julia Annas’s comment that final causes run the risk of seeming like “ghostly tugs from the future.”30 Final cause is only ghostly if we try to consider it as something that acts independent of the natural object. The easiest causes to grasp are those that are, at times, pieces. The matter of the object is separable (although not, according to Aristotle, without loss of being). The parents of the animal are separate. That very separateness or independence makes the causes easier to grasp, because they present themselves as objects in their own right. There is a natural tendency, then, to try to view causality in general in that way. With respect to the formal and final causes, the result of that attempt is a kind of spookiness—self-subsisting souls and future states of affairs that somehow take on present being and drag animate or inanimate natural objects toward them. But this is not how Aristotle describes natural causality. Rather, he describes causes as non-independent moments. The recognition of soul as instigating motion is a different cognitive act from the recognition of soul as organizing the matter or perfecting the object, and that is why

29 All natural objects have an immanent final cause, which is a moment of the object. For a discussion of final cause in inanimate natural objects, see chapter 1, esp. sections II.2-4. There is some debate over whether Aristotle really argues that there is an over-arching universal final cause for the cosmos. Such a final cause would not be any kind of part of the natural object. For a discussion of immanent and universal teleology, see section III.2 below.
Aristotle has different terminology for each of the causes. Each represents something real in the object that we can perceive by means of a different cognitive act. But these separate acts of recognition properly performed involve perceiving the parts of the soul as interconnected moments, rather than as separable pieces.

If the challenge in understanding Aristotle’s philosophy of nature is to see the four causes as moments of the natural object, then we will have to bear constantly in mind their relationship to one another and to the whole, because when we confuse moments and pieces, we fail to see the object in its reality. Consider, for example, a color, which is always a moment and never a piece. Part of what it is to consider a color is to consider that it is necessarily a moment of a surface. If there is no surface present to reflect light, then there is no color for us to perceive. Yet in imagination, we can consider color independently of surface. When an art student uses a tool such as Color-aid to produce color studies, he considers color as hue and tone alone and treats it as if it had an independent existence—almost as if there were a Platonic εἴδωλος of primary red or cool gray #3. For the artist, this is not a mistake, since art is aware that it is concerned with imagination, and since the artist is more concerned with the practical than the theoretical—with what he can do with color than with what color is in itself. But when the scientist—who is more concerned with the reality of color than with productions that use color—studies it, he must consider color as a moment of a surface or he will fail to grasp its reality. We might compare the attitude of the physicist interested in optics with the attitude toward color adopted by some of the false sciences. Historically, astrology and other forms of divination have considered colors as important to their disciplines, but their symbolism—which treats colors as independent entities that exert power over objects and states of affairs—has no scientific validity. There are probably
many reasons for the falsity of these sciences, but I suggest that one is a failure to distinguish correctly between pieces and moments and instead to pull moments out of their necessary context and treat them as separate entities. It is interesting that words like “ghostly” and “occult” occur in criticisms of Aristotle’s teleology. If we misunderstand the four causes, and take them to be pieces rather than moments, we will end with a sort of occult natural science. But that is not what Aristotle intended.

In conclusion, if we miss the fact that the four causes are normally moments of natural objects, we neglect important features of their reality. This is especially true of the final cause, which in natural objects is almost always a moment. To consider a final cause (in the case of natural objects) is partly to consider that it is a moment of the object. In particular, we must consider that it is an activity of the form of the object, and that that activity and the way in which it is to be achieved are determined by the sort of form the object has. In this way, there is a network of connections among the causes within the object itself, and if we are to understand Aristotle’s teleology, we must understand those connections.

A second difficulty in understanding the final cause in particular can be described in the phenomenological terms of presence and absence. Presence and absence are modes of intention—we intend an object in its presence when we are directly aware of it in intuition and our intention is thus fulfilled; if the intention is empty because the object is spatially or temporally distant, then we intend it in its absence. It is important to notice that final cause is generally intended in its absence. Most natural objects are encountered in stages of either growth or decay—in the course of their movement toward or away from their perfect activity of

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31 For a more thorough discussion of presence and absence, see Sokolowski, *Introduction to Phenomenology*, 33–41.
flourishing. Thus, our intentions of final cause are normally empty. The final cause is what could
be in the future, or what was or should have been in the past. It is seldom present as an
immediate intuition. We are able to intend final cause in its absence through the mediation of
present form and efficiency. That is, by intending a future (or past) activity of the form, we
intend final cause. In observing a kitten—the size of his ears and paws, his markings, and what
little personality, habits, and functionality he has—I am able to intend him as a flourishing adult.
My intention is unfulfilled—indeed it may never be fulfilled, either because of its inaccuracy or
because of pending disaster—but the object at which it aims—the goal of his current potential is
nonetheless real as potential.

We also intend the final cause by perceiving the efficient cause. Through recognition that
the natural object changes and grows, we emptily intend future or past change and growth toward
or away from the final cause. In Physics II.8, when Aristotle discusses natural signs that point
toward final cause, he focuses on the regularity of change. “For teeth and all other natural things
either invariably or for the most part come about in a given way; but of not one of the results of
chance or spontaneity is this true” (Ph. II.8, 198b34–35). By observing the regularity of efficient
causality, we intend the final cause in its absence. In this way, we intend the final cause as a
future actualization of present potential. Viewed in this way, we can see that there is nothing
ghostly about our intuition of final cause—we intend things in their absence constantly. As I
gather ingredients to cook dinner, I intend enjoying the finished meal. The absent meal is
intended through the present recipe and my manipulation of the ingredients. Although the meal is
absent, I have no difficulty intending it. In fact, I must intend it in order for my present actions to
have any meaning or coherence. If we could not intend in this way, our most ordinary activities
would fail to make sense. Thus, far from being esoteric or spooky, our ability to intend the future and to see how what is present to us is oriented toward that future is vital to our normal cognitive functioning.

In conclusion, the intention of final cause normally involves a manifold of presentations—an absent moment presented through other present and absent moments. If we fail to grasp this manifold, we fail to grasp natural objects as Aristotle understood them. The temptation to remove the causes from their context or to see them as real only to the extent that they are present largely accounts for the initial obscurity of final cause to ordinary understanding. That obscurity is why we need science and philosophy to discover its structure.

As part of our scientific and philosophical projects, we are often inclined to make use of models. Models are of use in both philosophy and science, because they enable us to use objects that are familiar to us to conceptualize those that are not yet familiar. One model for causality, used by Aristotle himself, is the artifact model, in which natural objects are likened to the products of human craft. The artifact model pulls apart and isolates the causes, and I shall argue that in doing so, it does some damage to all four. To isolate the form of the cat and see it strictly in terms of morphology would be a mistake—functions must be taken into account, and these imply a relationship between the formal and efficient causes. Likewise, to understand the cat as an efficient cause without understanding how the cat’s abilities as an agent are determined by its form and directed toward an end is to misunderstand the efficient cause. The material cause, too, can be misunderstood when taken in isolation from form, because “matter” is a relative term for Aristotle. Again, the proper matter of a living body is matter with potential for life, and what
counts as proximate matter at one level may count as form at a higher level. (For instance, the body as matter is relative to the soul, but bones and flesh are matter relative to the body).

But although isolation leads to an inadequate understanding of the material, efficient, and formal causes, it does not lead to a complete misunderstanding of them. Without understanding the whole causal structure, we can still grasp the formal, efficient, and material causes, albeit with some loss of meaning. The formal cause is envisioned as a sort of blueprint, not currently in use, the efficient cause as perhaps a kind of impetus, and matter as the proximate stuff of which the natural object is composed. All three of these conceptions are inaccurate, but not completely so. The final cause, however, is another matter. Without a grasp of the relationship among the three causes, teleology unavoidably sounds like either anthropomorphizing or theologizing, both of which are largely unacceptable to contemporary philosophers of science. Final cause, however, taken without reference to formal and efficient cause, becomes a puzzle. Unless we understand that the final cause of a cat is being a cat by instantiating cat form and engaging in cat activities, then the question, “What is the final cause of a cat?” can only be answered by reference to some external object. The cat must be seen as serving some divine purpose, or some human benefit, or some ecological function, or some combination of the three. And Aristotle may have thought that cats do serve such ends. But each of these ends misses what I take to be the central feature of Aristotle’s natural philosophy—that there is an immanent teleology at work in natural objects themselves, a teleology in which the natural forms are also final causes. It is this teleology that we find so clearly displayed in the Physics and the biological works.

32 That Aristotle’s teleology has been taken in just these ways is well documented. See Johnson, Aristotle on Teleology, 2–3, esp. n. 4–12.
Therefore, it is one of the theses of this dissertation is that although the artifact model is useful in several respects, it does not fully elucidate the final cause. The particular obscurity of final cause in nature is that it remains within the natural object and is a moment of the object’s form, alongside other moments—the formal and efficient causes. Such an interrelatedness of formal, efficient, and final cause is simply lacking in artifacts, which in general do not move themselves, and whose final causes are always external to them. Since artifacts lack this kind of causal interrelatedness, they leave a conceptual gap when we use them to model final cause. Aristotle himself frequently uses an artifact model to illustrate the four causes, and as we will see, this model has many benefits. But it has one significant drawback—it teases apart the causes and isolates them too much. This does little damage to the formal, efficient, and material causes, but it seriously inhibits our understanding of the final cause, which cannot be understood outside of its status as ἐνέργεια.

The moments of formal, efficient, and final cause in natural objects are well expressed by Aristotle’s concept of ἐνέργεια, and one of the goals of this dissertation will be to examine ἐνέργεια at some length. In doing so, we will see how the causes are presented to us—in both their presence and absence—in natural objects. We will conclude that the fact that the final cause is essentially an ἐνέργεια means that the expression of the final cause is inseparable from the natural object’s being and acting. Thus, we seek to understand the final cause in context.

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33 Thus, Aristotle distinguishes natural science from the practical and productive sciences by the causal structure of its objects: “And since natural science, like other sciences, confines itself to one class of beings, i.e. to that sort of substance which has the principle of its movement and rest present in itself, evidently it is neither practical nor productive. For the principle of production is in the producer . . . , while the principle of action is in the doer . . . .” (Metaph. VI.1, 1025b19–22)
The final goal of this dissertation, therefore, is to propose a supplemental model for natural teleology that not only illustrates the final cause itself, but also maintains the integrity of the context in which it exists in natural objects. In particular, the model I offer will show how the final cause is related to the formal and efficient cause and how the final cause is, because of these relationships, an ἐνέργεια. Thus, the goal of this dissertation is to explain why final cause is obscure, both to us as moderns and on its own; to examine Aristotle’s thinking on final cause, including his use of modeling techniques; to make a careful analysis of the two activities designated as production (ποιήσις) and action (πρᾶξις); and finally, to propose a supplementary model, based on the moral life, that I believe can help us better understand final cause.

III. Aristotelian Teleology
Before beginning our investigation in earnest, we must establish some basic knowledge about teleology in Aristotle. In particular, a general discussion of the role of ἀρτια in Aristotle’s philosophy as both causes and explanations is appropriate, as are a few words about teleology as either universal or immanent or both. Section III.1 provides a discussion of causality in general, and of the final cause in particular. I begin with some general remarks about Aristotle’s conception of causality, giving particular attention to what has become a traditional problem in the literature—the question of whether ἀρτια are for Aristotle causes or explanations or both. I take the position that they are both, and urge that this in part explains some of the obscurity of the causes in general—that, in the beginning of our investigations into nature, ἀρτια are both metaphysically and epistemically distant for us. Section III.2 briefly discusses an issue that
concerns Aristotle’s teleology in general—the tension between immanent and universal teleology. I will suggest that while both forms of teleology are clearly present in Aristotle’s work, we may, for the purposes of this dissertation, limit ourselves to a consideration of immanent teleology, and still have our investigation bear fruit.

III.1 Αἴτια as Causes, Αἴτια as Explanations

One important issue regarding causality in Aristotle is the status of αἴτια in general. Precisely what does Aristotle mean by the word αἷτιον? Is this identical to contemporary usage of “cause”? Does Aristotle have a theory of causation, or only a theory of explanation? Are all four αἴτια equally causes or explanations?

Michael Frede has shown that Aristotle’s understanding of cause belongs to an earlier conceptual framework in which the distinction between explanation and cause is not yet so sharp as in modern philosophy.34 Interestingly, the beginnings of this distinction appear in Plato and his predecessors, in which αἷτιον (neut. sing.) is generally used to refer to the agent responsible for the effect, while αἴτια (fem. sing.) most often designates the event or action that brings about the effect.35 For the sake of consistency, I shall use αἷτιον (pl. αἴτια), but Aristotle himself alternates between the neuter and feminine versions quite freely, with no clear distinction between them.36 Whether the contemporary conception of cause originates with the Stoics (as

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35 Ibid., 223.
36 Ibid., 222.
Frede argues) or with Hume, Kant or other modern philosophers, it is clear that Aristotle’s concept of ἀιτία is different from our current, more limited conception of cause.

Currently, one popular line of interpretation suggests that Aristotle’s ἀιτία are not causes in the full sense but are merely “becauses”—that is, they are concepts that possess explanatory value, but do not necessarily point to real entities at work in nature. This view emphasizes the modern concept of causes as producers—something that the material, formal and final ἀιτία clearly are not. Thus, Max Hocutt, Martha Nussbaum, Richard Sorabji and Julia Annas regard ἀιτία in general as explanations, while regarding the efficient ἀιτία alone as truly causal. A large part of the motivation for this view comes from the desire to salvage Aristotle’s theory of ἀιτία from modern attack by making his conception of causation more clearly match our own, and such interpretations sometimes seem to be motivated by physicalist or functionalist programs. Hocutt, for instance, wishes to show that Aristotle’s concept of explanation is importantly similar to that found in Carl Hempel and Paul Oppenheim’s contemporary philosophy of science, and he begins by discussing the “grotesque implications” of considering non-efficient ἀιτία as causes, implications that would render Aristotle’s theory not only out of date but absurd. Annas, too, insists that the four ἀιτία “cannot all be causes without absurdity (we cannot have the bronze producing the statue, or the goal exercising ghostly tugs from the

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37 Hocutt, “Aristotle’s Four Becauses.”
38 See, for example, Nussbaum, Aristotle’s “De Motu Animalium,” esp. 67–70. At no point does Nussbaum evaluate the issue of whether final cause or mechanism more accurately accounts for biological phenomena by virtue of causal power. Rather, she defends teleology solely on the grounds of explanatory power—generality, predictive power, etc. Functionalist treatments of formal cause and their relationship to teleology are discussed more fully in chapter 3, pp. 165–178.
39 Sorabji, Necessity, Cause, and Blame, 40.
41 Hocutt, “Aristotle’s Four Becauses,” 386.
This view—that only the efficient ἀττικον matches up with the contemporary conception of a cause—relies on the conception of a cause as something that actively brings forces into play to bring about an effect. In Hocutt’s words, causes are essentially producers. Since matter, form, and end do not exert a productive force, they must be dismissed as causes, although they are explanatorily helpful in their predictive power, generality, and simplicity. The upshot is that non-efficient causes must be merely “explanatory”—citing them contributes to an explanation of an effect, although they themselves are not responsible for bringing about the effect.

Wolfgang Wieland’s neo-Kantian interpretation ultimately takes a similar view, although he begins from a different starting point. Wieland suggests that ἀττικα are best understood as Kantian concepts of reflection, that is, regulative rather than constitutive concepts. Thus, although there are four ways of speaking about ἀττικα, this does not mean that there are actually four distinct ἀττικα at work in the world. This, Wieland explains, is perhaps why Aristotle did not find it necessary to give an argument for the existence of four distinct causes, but simply presents his finished theory. The four ἀττικα do not represent four distinct concepts that constitute things in themselves, but rather four distinct ways in which the human mind regulates its own activity and reflects upon reality.

[W]e are really dealing only with topos, with the classification of the points of view which we adopt in answering the questions ‘Why?’. From this point of view there is no deficiency if the doctrine of the four senses of the notion of cause is not argued in greater detail. It is not a doctrine in the narrow sense of a theorem which admits of deductive

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43 Hocutt, “Aristotle’s Four Because,” 386.  
44 Nussbaum argues convincingly that the final cause meets all three of these criteria. See Nussbaum, Aristotle’s “De Motu Animalium,” 70–74.
proof; rather, it is simply an aid in the quest for particular causal connections. . . . [T]here is nothing of fundamental importance for the concept of cause in the fact that there are just four ways in which we speak of causes. 

The four αἴτια are modes of reflecting on the world, four τόποι, four common ways in which we respond to the question, “Why?” But these modes of thinking and speaking may not indicate anything about the nature of cause itself; they are not constitutive concepts, to be found in things themselves, but regulative or reflective ones that inform rational thinking about the world. Like Kant’s concepts of the understanding, they are a priori and say more about the structure of reason than about objects in the world. Although Wieland’s neo-Kantian starting point is quite different from the starting points of the philosophers cited earlier (Annas, Hocutt, etc.), in one important sense the end result is similar—for both Wieland and the other contemporary philosophers mentioned, the four causes are essentially ways of thinking and speaking about the world rather than attributes of things in themselves.

What are we to make of interpretations that suggest that αἴτια are strictly explanatory? There is, of course, good reason to think that the four αἴτια do have explanatory power, and that this is one of the primary reasons Aristotle is interested in them. They are introduced in both Physics II.3 and II.7 (Ph. II.3, 194b19–20 and II.7, 198a15–16) as answers to the question “Why?”, and we may suppose that once we have cited all four αἴτια we have fully answered that question. 

Aristotle clearly thinks that explanatory power is one of their defining characteristics. But the interpreters cited above argue that that is all that the four αἴτια are meant to do, whereas

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45 Wieland, “Problem of Teleology,” 147.
46 On the importance of completeness in citing αἴτια, see Ph. II.7, 198a22–24. However, it is clear that not all events or objects possess all four αἴτια (see, for example, Metaph. III.2, 996a18–b26; the objects of mathematics lack a final cause); nor is it necessarily the case that it will belong to one science to study all four αἴτια, if they are present.
Aristotle thinks that αἴτια also point to real facts about the world, facts which are in some sense responsible for the actual presence of effects. In fact, if they do not do so, it is not clear how they could be explanatory for Aristotle. Consider the numerous instances in which Aristotle asserts that to know a thing is to grasp its αἴτια (APo. I.2, 71b9–12 and II.11, 94a20–21; Ph. II.3, 194b18–20; Metaph. I.3, 983a25–26). If these passages are to be truly meaningful, αἴτια cannot be mere explanations, that is, ways that we speak about the reasons for change. For this would render these passages uninformative. We will have Aristotle saying that to know a thing is to have a way of speaking that indicates that we know it. This is at best unhelpful and at worst tautological. Hence, although it seems right to emphasize that αἴτια are explanatory, I suggest that they must be more than explanatory. For Aristotle, an explanation itself is a way of speaking that reflects our knowledge of real causes.

The primary texts in which Aristotle discusses αἴτια are Physics II.3 and Posterior Analytics II.2. In the former text, Aristotle first identifies the αἴτια with the “why” and then with the principles of natural objects.

Knowledge is the object of our inquiry, and men do not think they know a thing till they have grasped the ‘why’ [τὸ διὰ τί] of it (which is to grasp its primary cause [τὴν πρῶτην αἰτίαν]). So clearly we too must do this as regards both coming to be and passing away and every kind of natural change, in order that, knowing their principles [τὰς ἀρχὰς], we may try to refer these principles to each of our problems. (Ph. II.3, 194b18–24)

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47 Mure makes a similar point in his response to Hocutt’s paper, although his emphasis is on Aristotle’s logic. See Mure, “Cause and Because in Aristotle,” 356–57: “Aristotle’s theory of causation is primarily ontological and not an application of syllogistic, just as his whole treatment in Met. 1 of what came to be called ‘the laws of thought’ indicates that he sees them as primarily laws of Being.”
To know the “why” of something is to know its primary cause, and to know this is to know its principles. In fact, as Aristotle states in *Metaphysics* V.1, all causes are principles (*Metaph. V.1, 1013a17*), and the passage leading up to it provides six definitions of ἀρχή (*Metaph. V.1, 1012b21–1013a16*):

1. the actual starting point of a thing (e.g. of a road)
2. the point from which it makes most sense to start, even if that is not the starting point of the thing itself
3. an immanent part, which is the first part of an object to come into existence (e.g. the foundation of the house is built first)
4. an external source of an object’s existence (e.g. the parents of the child)
5. the source of choice that originates a change (e.g. magistrates)
6. the first source of knowledge (e.g. hypotheses are the first source of knowledge in demonstrations)

Immediately after these definitions, Aristotle asserts that causes “are spoken of in an equal number of senses; for all causes are origins” (*Metaph. V.1, 1013a16–17*). He then observes that what all six definitions have in common is that they describe “the first point from which a thing either is or comes to be or is known; but of these some are immanent in the thing and others are outside” (*Metaph. V.1, 1013a18–19*).

Causes and principles, then, are the origins of being, of becoming, and of knowledge. In the passages at *Physics* II.3 and *Metaphysics* V.1, there is no clear division between principles and causes as facts about the world (immanent or external parts of things) and principles and causes as explanatory (i.e. as principles of knowledge). Aristotle includes both the epistemic and ontological aspects under the same heading. He points to real facts in the world (the beginning of the road, the foundation of the house, the parents of the child, etc.); and he also points to explanations (e.g. the hypotheses of the demonstration). Both groups count as principles and
causes, and there is no sign in either Physics II.3 or Metaphysics I.5 that Aristotle considers ἵτια to be explanatory but not causal.

After mentioning the “why” and identifying ἵτια as principles, both Physics II.3 and Metaphysics V.2 go on to distinguish the four causes and give examples of each. Both texts give many concrete examples as well as explanatory features of demonstrations or arguments. For example, bronze and silver (Ph. II.3, 194b25; Metaph. V.2, 1013a25), a man or a father (Ph. II.3, 195b30; Metaph. 1013a30), and so on, are all concrete objects, while a ratio or number, or the parts of a definition (Ph. II.3, 194b29; Metaph. V.2, 1013a29) are parts of demonstrations. Again, we find a mixture of external facts and explanatory devices with no explicit distinction between them.

Further, Posterior Analytics II.2 offers more explicit evidence that Aristotle considers ἵτια to be both causes and explanations. Here Aristotle discusses the search for the middle term, which he correlates with the formal cause, and which is the goal of scientific investigation.

For in all these cases it is evident that what it is [τὸ τί ἐστι] and why it is [διὰ τί ἐστίν] are the same. What is an eclipse? Privation of light from the moon by the earth’s screening. Why is there an eclipse? Or Why is the moon eclipsed? Because the light leaves it when the earth screens it . . . . But if we were on the moon we would seek neither if it [the eclipse] comes about nor why, but it would be clear at the same time. (APo. II.2, 90a14–27)

If “what it is” and “why it is” are the same, and if the search for the ἵτιον is the search for something “perceptible,” then it seems that the ἵτιον, at least in this case, represents something substantial and tangible. Aristotle’s observation that if we were on the moon, both the what and the why of the eclipse would be simultaneously clear, is telling. On the one hand, this observation emphasizes the explanatory function of ἵτια. To grasp the ἵτια is to see the
“what it is” from a new perspective (to grasp not just the fact but the reasoned fact). In this sense, the interpreters who emphasize ἴτια as explanation are right—sometimes to grasp ἴτια is not to grasp a new fact about the world, but to grasp the same fact in a different way, which of course yields a new way of speaking about the fact. But we must not lose sight of the idea that it is still a fact that is to be grasped, not a mental construct. The earth screening the moon is a specific event, not just an alternative way of talking about the phenomenon of an eclipse. Again, this is why Aristotle gives plentiful examples of distinct and real objects as ἴτια: bronze and silver, relations and numbers, men, fathers, health, etc. (Ph. II.3, 194b23–35). Bronze and circularity are explanatory where bowls are concerned, but they are also facts, real features of the world.

In fact, for Aristotle, not knowing the real facts about a thing necessarily means not really knowing its ἴτια. As David Balme observes, for Aristotle “asking what causes a thing demands the same answer as asking what the thing really is.”48 This is precisely what Aristotle says in the passage from Posterior Analytics quoted above. In the eclipse example, not knowing what the thing is means not really knowing why it has occurred, even if we know that it has occurred. We can imagine (a child perhaps) being able to apply the label “eclipse” to an event without knowing exactly what the event is—not understanding that it involves a relationship between the moon, sun, and earth. This ignorance would represent a failure to grasp an important and real aspect of the event, not just a failure to explain. Someone who cannot explain what causes an eclipse also does not really know what an eclipse is. They may be able to describe some phenomenon (such as a darkening of the sky), and they may rightly apply the label “eclipse” to that phenomenon.

But only if they can describe the eclipse in full (as a screening of the moon by the earth) can they be said to cite its cause and to understand what the event really is.

All of this evidence, from *Physics* II.3, *Metaphysics* V.1–2, and *Posterior Analytics* II.2, points in the direction of *αἰτία* as both causes and explanations. *Αἰτία* are treated in those texts as facts about the world that, when included in a description, tell us both what things are and why they are. Aristotle does not seem to draw the sort of distinction that modern writers would like between explanations and causes. Rather, what appears to make *αἰτία* explanatory is precisely the fact that they point to real facts about the world.

Moreover, as Cynthia Freeland⁴⁹ and Monte Ransom Johnson⁵⁰ have both noted, not all of the things that Aristotle cites as *αἰτία* are equally explanatory. After distinguishing the four *αἰτία* in *Physics* II.3, Aristotle proceeds to list what are generally called incidental or accidental causes (*Ph.* II.3, 195a28–b 3). Hence, in one sense Polycleitus is the *αἰτία* of the statue, in another sense Polycleitus-the-sculptor, and in another Polycleitus-the-pale (*Ph.* II.3, 195a34–b 1). All three formulations point to an *αἰτία*, but not all three are equally explanatory, because not all three point to the most relevant fact. Thus, we must seek the most precise, proximate cause (*Ph.* II.3, 195b22–25). If some *αἰτία* in fact fails to explain, then it is clear, that *αἰτία* cannot simply mean “explanation.” Since this is the case, the views expressed by Hocutt, Annas, and others, seem to be inaccurate.

Wieland’s neo-Kantian interpretation, however, demands further comment. First, his contention that the four causes are four ways of stating the same thing seems on the face of it

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⁴⁹ Freeland, “Accidental Causes and Real Explanations,” 54.
inaccurate. On the contrary, the various αἰτία seem to be distinct for Aristotle. They do not seem to be four manners of pointing to the same thing. Bronze is not merely one manner of explaining a bowl, while circularity is another manner of explaining it, but rather each points to a different and real feature of the bowl, and Aristotle often emphasizes that citing multiple causes is necessary for a full account (de An. 403b7–8, Ph. II.2, 194a21–26; PA I.1, 639b12–14, 640a33–640b1). Further, although three of the four causes are sometimes one in natural objects, as Aristotle himself notes (Ph. II.7, 198a24–25), this is indeed a convergence of three distinct causes in one being. The father of the child provides both the form and the final cause and also instigates the motion. Aristotle clearly sees this convergence as special and worth remarking on, a fact which highlights the real distinctness of the causes in the world. And since the various causes are distinct, it seems that Wieland’s contention that the αἰτία are reflective concepts cannot be quite accurate, although his point that the αἰτία are not causes in the modern sense is well taken. Well taken too is the point that the causes do frequently converge in nature—that the same natural object (e.g. a soul) often constitutes the formal, final, and efficient cause, so that for at least three of the αἰτία, pointing to the αἰτία appear to be different ways of pointing to the same substance. But this convergence does not always obtain in nature (e.g. there are some natural processes that have no final cause, such as rainfall, eclipses, etc.). Moreover, Aristotle frequently applies the four causes to τέχνη, in which the four causes really are separate entities. Because the four causes so often point to distinct objects in or features of the natural or human worlds, it goes too far to say that the αἰτία are always simply different modes of speaking or thinking.
Of course, a neo-Kantian might not be impressed with the observation that the four causes seem to point to distinct objects, since he will probably argue that our judgments about each of those objects is differently regulated by the concept of causation. That is, he will still assert that the difference lies not in the world, but in the mind. Against this view, one might offer responses like those of Johnson and Julius Moravcsik, which I will now outline.

Moravcsik and Johnson both acknowledge that Aristotle does in fact link the concepts of cause and explanation, as Frede urged, and as *Physics* II.3 and II.7 suggest. They argue, however, that this link is probably due to Aristotle’s view that there is good reason for linking explanation and cause, and that the four αἰτία, although clearly not straightforward, productive causes in the modern sense, nevertheless all point to distinct features of the world. Moravcsik’s interpretation of Aristotle’s theory, which he dubs “entitative explanatory theory,” is perhaps the most clearly articulated. He treats αἰτία as explanatory, but not only in a linguistic or epistemological way. Αἰτία “are indeed, elements of reality, or roles played in some context by elements of reality. And thus the relationships introduced are ontological relationships; and not relations between the world and elements of language, or some given state of human understanding.”

Johnson argues that “as if” conceptions of αἰτία—both the conception that views αἰτία as merely explanatory and also the neo-Kantian conception—fail because there simply is

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52 Moravcsik, “Aristotle on Adequate Explanations,” 7. Similar views are articulated by the same author in “Philosophic Background of Aristotle’s Aitia” and “Aitia as Generative Factor in Aristotle’s Philosophy.”
not enough textual evidence to support the idea that Aristotle even saw causation versus explanation as a dilemma, let alone took a clear stand on it.

Perhaps the phrase ‘causal explanation’ captures what Aristotle means. The situation is substantially similar to the status of Aristotle’s categories: Aristotle never says if they are supposed to be about words, thoughts, or things. . . . [W]e have no strong grounds for choosing any one over the others, and that is likely because Aristotle himself does not see a forced choice, even if his commentators do.  

This, I think, is the most that can be said against the neo-Kantian conception. Whatever the merits of this view from a modern perspective—a perspective that demands an answer to the question of whether causes are in the world or in the mind, whether they are constitutive or regulative—we have no evidence that Aristotle himself specifically asked such questions, and so it is unlikely that we would find a definitive answer in his writings. In a way, Wieland himself seems to acknowledge that Aristotle is silent on the issue. “We shall be disappointed if we look for anything more in Aristotle’s analysis than the proof that we are allowed to use, for natural processes, the conceptual apparatus of goal and purpose . . . there is nothing to teleology over and above this.” Although Wieland is probably right that Aristotle never explicitly rejects nor argues for a non-Kantian view, it seems to me that to conclude from this that Aristotle is therefore committed to some sort of Kantian view (that there is “nothing to teleology” over and above a “conceptual apparatus”) is to commit the fallacy of arguing from ignorance. We cannot draw any conclusion about how Aristotle would answer a question he does not ask based on the fact that he offers no answer.

If αἰτία are for Aristotle explanations that point to real facts in the world, then the four-fold distinction that they represent is both epistemic and ontological. To cite the matter, the form,

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51 Johnson, Aristotle on Teleology, 41.
54 Wieland, “The Problem of Teleology,” 155. Italics are in the original text.
the efficient cause, and the goal, is to offer four distinct elements of an explanation—usually by pointing to four distinct objects or aspects of states of affairs. More precisely, there are four distinct ways of knowing because there are, where α珽iα are concerned, four distinct ways of being. This feature of Aristotle’s theory—that it is both epistemic and metaphysical—is well illustrated by Physics II, in which he simultaneously investigates the reality of nature and also tells us something about how that investigation should proceed. Physics II clearly treats α珽iα as facts and features of the natural world. But it is also clear that Aristotle intends this passage as a discussion of how the natural philosopher should go about his work. And the two discussions are related, because the natural philosopher must go about his work of explaining by seeking the appropriate facts.

“Of things that exist, some exist by nature, some from other α珽iα” (Ph. II.1, 192b9). An α珽iαν is here described as a source of existence. But it is clearly a source of explanation as well. A little farther on, Aristotle observes, “This then is one account of nature [Ἅν ἄν θρόπον οὗτος ἦ φύσις λέγεται], namely [as material cause]. Another account [ἄλλον δὲ θρόπον] is that nature is the shape or form . . .” (Ph. II.1, 193a28–30). Α珽iα appear in Physics II as both sources of existence and as accounts or modes of explanation, and the whole chapter represents an interweaving of natural philosophy itself and its methodology. Physics I.1 is both a discussion of natural philosophy and also a discussion of how to do natural philosophy. It is because α珽iα are real facts about the world that they can be objects of philosophical and scientific investigation. But they are also explanations, and knowing how to go about finding them means possessing a good scientific method.
An interpretation of \( ārτια \) that views them strictly as explanations or as reflective concepts should therefore be rejected, first because of the many texts in which Aristotle points to definite facts and objects as \( ārτια \); second, because of his failure to draw a sharp distinction between explanation and cause in any of these texts; and finally because of the passages where he asserts that some causes (e.g. accidental causes) are not always explanatory. All of these passages argue for considering \( ārτια \) as both explanations and causes.

In the end, all four \( ārτια \) are perhaps best thought of as cause-explanations, since for Aristotle they clearly perform both roles. I shall continue to render \( ārτιον \) as “cause,” agreeing with Johnson that this “will serve well to underscore Aristotle’s belief in the real existence of his modes of explanation in facts and states of affairs.”\(^5\)

But their explanatory power should not be downplayed. We seek the causes because we want to know about things, and it is only in grasping the causes that we can know them.

The causal-explanatory status of \( ārτια \) thus explains to some extent why they are somewhat obscure to us. Because \( ārτια \) have both an epistemic and an ontic role to play in natural philosophy, they are in a sense doubly distant from us. Knowing that a certain feature of the world is in fact the case does not yet constitute knowing an \( ārτιον \)—we must both know that the feature is real and also know that its being real is explanatory.\(^6\) Thus, knowing the \( ārτιον \) really means knowing two things simultaneously—knowing that a fact holds and recognizing the

\(^5\) Johnson, *Aristotle on Teleology*, 41.

\(^6\) Aristotle attributes the explanatory character of \( ārτιον \) to the necessary connection between the \( ārτιον \) and the object. “We think we understand a thing *simpliciter* (and not in the sophistic fashion accidentally) whenever we think we are aware both that the \( ārτιον \) because of which the object is is its \( ārτιον \), and that it is not possible for this to be otherwise” (*APo.* I.2, 71b9–11).
significance of its holding. To know an \( \alpha \tau \iota \omicron \) is to possess particular knowledge about the world while at the same time grasping the relevance of the knowledge we have. This two-dimensional knowing is not something that we can possess immediately. Frequently we stumble upon facts whose explanatory significance we do not see. This perhaps explains Aristotle’s assertion that like other principles of reality, \( \alpha \tau \iota \alpha \) are better known in themselves, but initially less known to us. In the beginning of this introduction, I appealed to the phenomenological distinction between pieces and moments. It is useful to do so again here. In natural objects, we saw that three of the four \( \alpha \tau \iota \alpha \) are usually moments rather than pieces of the soul. Moreover, in an argument of natural philosophy, the soul itself appears as a moment of the natural object. Ontically, \( \alpha \tau \iota \alpha \) are not usually independent parts of natural objects. That ontic status of \( \alpha \tau \iota \alpha \) is also reflected in their epistemic status. They are not found in isolation, but are rather disclosed through an investigation of the object that attends to particular aspects of it—its organization and functionality, its motion and change, its direction and goal. And when we discover \( \alpha \tau \iota \alpha \), they can be considered in two moments—as objective moments of the natural object, and as explanatory features of our theories about nature. There is no choice in Aristotle between the things that cause and the things that explain, between objects and events as causes and objects and events as explanations. These are different aspects of the same things.

In the rest of this dissertation, I will address the difficulty that we encounter when trying to isolate and grasp a particular \( \alpha \tau \iota \omicron \)—the final cause. The final cause presents its own particular difficulties, both ontological and epistemic. Just what sort of thing is a final cause, and
why is it explanatory? To which facts must we point when we point to final cause, and why will pointing to such facts help us to understand nature better than if we had not done so?

Before addressing such questions, however, I will narrow the field of enquiry by making a distinction between immanent and universal teleology. Then, in chapter 1, I offer an illustration of how the questions above have been asked in contemporary Aristotle scholarship, in particular in the context of the debate over teleology and mechanism. This illustration will not only show how we encounter problems about final cause but will help to point in the direction of a solution.

III.2 Immanent and Universal Teleology

One traditional issue concerning final cause in Aristotle is the tension between immanent and universal teleology, both of which find grounds for support in the corpus. For as Michael Boylan\(^{57}\) has noted, we find in Aristotle two seemingly distinct ways of referring to φύσις: first as an over-arching principle that guides and unifies the natural world as a whole; and second, as the individual natures of organic entities, which define and guide their existences by acting as principles of motion and rest. In the first case, Aristotle sometimes speaks of nature as a singular, centralized force at work in the physical world which does nothing in vain, acts rationally, compensates, distributes, and so on.\(^{58}\) In the second case, he also describes nature as a principle of motion or rest in bodies that have sources of motion in themselves (Ph. II.1, 192b13–14), implying that nature is not so much an overarching principle as a principle immanent in

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\(^{57}\) Boylan, “Place of Nature in Aristotle’s Teleology,” 126. Boylan mentions many texts in this context, including passages in which Aristotle states that nature does nothing in vain (PA 658a9) and acts rationally (GA 731a24, 739b20). See also Boylan, Method and Practice in Aristotle’s Biology, 89–91.

\(^{58}\) Boylan, Method and Practice in Aristotle’s Biology, 90.
individual natural objects or in species. The question arises how these two views fit together, and whether they will fit together neatly or will require some sort of reconciliation.

The first thing to note is that final cause in Aristotle should not in general be construed as a purpose—a goal intended by some external conscious agent, but rather as an end—a state of perfection that arises from natural factors inborn in the object. This state of perfection requires neither that the object itself be conscious nor that there be any external conscious agent that acts upon it. Thus, whatever universal teleology there is in nature for Aristotle, this teleology does not for him necessarily imply either pan-consciousness or a world soul (although it may not exclude these views either). Also, Aristotle’s cosmology does not include a creator whose purposes are borne out in natural objects, although his teleology may indeed be compatible with theologies that view the ends of nature as the purposes of God. Aristotle’s cosmology does, however, include an intelligent deity that is a cause for the cosmos, and it is to this deity—the prime mover—that we should look for further help in understanding his universal teleology.

There is sufficient evidence in the corpus to show that Aristotle held some form of cosmic teleology and that he wanted to link that cosmic teleology to the immanent teleology of individual natural objects such as plants and animals. The first part of that claim probably requires little comment—the Metaphysics explicitly describes the prime mover as a cosmic final cause that initiates circular motion by being an object of love (Metaph. XII.7, 1072b1 ff.). The second part of that claim—that the prime mover’s status as cosmic final cause has specific implications for individual natural objects—is more controversial. However, there is textual evidence to support the idea that Aristotle believes that cosmic and immanent teleology are

related. First, in his discussion of the prime mover in the *Metaphysics*, Aristotle asks how the good exists in the cosmos—is the good something separate, or does it exist in individual objects? He responds:

> Probably in both ways, as an army does. For the good is found both in the order and in the leader, and more in the latter; for he does not depend on the order but it depends on him. And all things are ordered together somehow, but not all alike,—both fishes and fowls and plants; and the world is not such that one thing has nothing to do with another, but they are connected. For all are ordered together to an end. (*Metaph.* XII.10, 1075a11–17)

The “for” (γὰρ) in the last line implies the following argument: The natural world as a whole is ordered to a single end. But things ordered to the same end must be ordered to one another. Therefore, natural objects are ordered to one another. Thus Aristotle argues that an over-arching teleology implies a unified teleology at the level of natural objects.

A somewhat different consideration appears in the *Physics* II.4. Here Aristotle is arguing against the idea that chance could explain all natural phenomena. He notes that some of his predecessors believed that while plants and animals are governed by “nature or mind or something of the kind” (*Ph.* II.4, 196a30), the motions of the heavens are, by contrast, due to chance. This strikes Aristotle as absurd. If the parts are governed by teleology, how could the whole not be? So the street seems to run two ways for Aristotle—if there is an over-arching final cause, then he thinks it will have implications for natural objects; likewise, the immanent teleology in natural objects implies that there should be a teleology of the whole.

Further evidence that over-arching and immanent teleology are related comes from *De Motu Animalium*. Here Aristotle begins his discussion of animal movement by placing it in the context of the motion of the universe:

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Now we have already determined . . . that the origin of other motions is that which moves itself, and that the origin of this is the immovable, and that the prime mover must of necessity be immovable. And we must grasp this not only generally in theory, but also by reference to individuals in the world of sense; for with these in view we seek general theories, and with these we believe that general theories ought to harmonize. (MA 1, 698a10–15)

Here, in a work on animal life, we find Aristotle making explicit reference to the prime mover and asserting that our understanding of animal movement must harmonize with our more general theories about motion in the cosmos. Now, since the prime mover is a final cause for the cosmos, we might reasonably conclude that the teleology of animal life will have to harmonize with cosmic teleology. The discussion that follows, however (MA 1, 698b7 ff.), does not explicitly refer to a final cause per se. Rather, it focuses on the prime mover as the stationary being that must necessarily lie at the edge of the cosmos, since any system of motion will require a stationary point against which motion can occur. Aristotle then reaffirms that the prime mover is a necessary prerequisite for animal motion (MA 4, 699b7). But here the primary point seems to be to provide grounds for an argument by analogy that the animal will have to contain within itself a stationary point against which the other parts move (MA 4, 699b8–11). There is no further elucidation of the problem of how over-arching teleology impacts individual natural objects.

Discussion of the teleological relationships among natural objects is notably missing from the biological works, where Aristotle consistently searches for and finds the τέλη of individual natural objects and their organs without appealing to their relationships to other natural objects. There is a brief mention of a relationship of final cause between species at Parts of Animals IV.13, 696b28–32, but this is the only passage of its kind in the biological works. However, a famous passage in the Politics offers some insight into the ordered relationships among natural objects.
We may infer that, after the birth of animals, plants exist for their sake, and that the other animals exist for the sake of man, the tame for use and food, the wild, if not all, at least the greater part of them, for food, and for the provision of clothing and various instruments. Now if nature makes nothing incomplete, and nothing in vain, the inference must be that she has made all animals for the sake of man. And so, from one point of view, the art of war is a natural art of acquisition, for the art of acquisition includes hunting, an art which we ought to practice against wild beasts, and against men who, though intended by nature to be governed, will not submit; for war of such a kind is naturally just. (Pol. I.8, 1256b15–25)

Here Aristotle paints a picture of a natural teleology that extends from plants to humans and implies various teleological relationships, both biological and political, among them. The ultimate goal here is to show that the biological order justifies a certain political order, namely the rule of certain humans over others. There is no appeal in this passage to the prime mover, but there is an appeal to nature as an over-arching principle that “makes nothing incomplete, and nothing in vain,” and the conclusion is clearly that this over-arching principle implies a definite teleological order among natural objects. Unfortunately, as I noted above, it is an order that is not made use of in the biological works, and so it is not clear what relationship this ordering has to the immanent teleology of individual natural objects.

How are all these texts to be pieced together? How is the over-arching teleology of the prime mover to be related to immanent teleology and transformed into a unified whole? The passages above show that Aristotle did think that the project of a unified teleology is possible. Although much scholarship on Aristotle’s teleology simply remains silent on the issue of universal or unified teleology, some recent writers have tried to piece together a coherent picture. Charles Kahn, for example, has related the prime mover directly to the lives of natural objects. 61 Joseph Owens argues for a unified teleology in which the natures of individual objects

61 Kahn, “The Place of the Prime Mover,” 186.
themselves imitate the divine.⁶² David Sedley has argued for an anthropocentric unified natural teleology.⁶³ On the other hand, scholars such as Johnson, Wieland, Nussbaum and Marjorie Grene either reject a unified natural teleology entirely or have simply chosen to emphasize Aristotle’s immanent teleology instead.⁶⁴

The latter position—focusing on the immanent teleology without much comment on the universal teleology—is perhaps the norm in contemporary scholarship on Aristotle. The motivation for this exclusion is probably multi-faceted and may include a desire to avoid theology and metaphysics or the hope of making Aristotle more friendly to a contemporary, physicalist view of nature. I have shown, through examples of texts, that excluding universal teleology is not ultimately a reasonable option if we are really interested in what Aristotle thinks. He clearly endorses an over-arching teleology and makes at least some attempt at relating the prime mover to individual natural objects. That said, however, it is not clear to me that he himself completed this project of relating the prime mover to natural objects, and the project will certainly not be completed in this dissertation.

Instead, I will begin my investigation of final cause with immanent teleology, and with the medium-sized natural objects of our experience. This is a good place to start because in doing so we will begin, as Aristotle counsels us to do, with things that are clearer and more familiar to us. For that reason, this dissertation will focus on the immanent final causes of natural objects such as plants and animals. I will be concerned with describing and modeling the final causes of

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⁶² Owens, “Teleology of Nature in Aristotle.”
⁶³ Sedley, “Is Aristotle’s Teleology Anthropocentric?”
individual natural objects. Since these final causes are that for the sake of which change and motion occur, we might hope that this investigation will provide some help to future considerations of universal teleology, which seeks to trace those changes and motions to a single ultimate source. But within this dissertation I will limit myself to discussion of immanent teleology.

**IV. Outline of the Dissertation**

So far we have focused on the obscurity of final cause and have discussed some basic issues in Aristotelian teleology. We have seen that ἀιτία are best thought of as both causes and explanations for Aristotle, and that although there is surely a connection between his universal and immanent teleology, we need not settle the issue of this connection before embarking on an investigation of immanent teleology. We have also begun to see, from both a historical and a natural perspective, why final cause is somewhat obscure to us. This is significant, because it is the obscurity of final cause that will demand of us (as it did of Aristotle) that we find a model for final cause.

Chapter 1 develops the theme of obscurity further by presenting the current debate around mechanism and teleology, using it as an illustration of our confusion about final cause. I conclude that this confusion largely centers on the convergence of final, formal, and efficient cause, and urge that understanding this convergence is key to our understanding of Aristotle’s teleology.

In chapter 2, I examine the relationship among formal, final, and efficient cause. I suggest that the concept of ἔνεργεια, an activity that is also a capacity or set of capacities for further
activity, expresses Aristotle’s conception of the relationship among these three causes. I suggest that final cause cannot be understood in the context in which it actually occurs in nature without understanding ἐνέργεια, which must be carefully distinguished from διάθεσις.

Chapter 3 explores contemporary theories of teleology—particularly, functionalist interpretations—and argues that they have influenced Aristotle scholarship. I argue that contemporary teleology does not capture Aristotle’s view, and that functionalism is an inaccurate interpretation of his theory. Because functionalists are unwilling to make certain ontological commitments, their conception of natural form remains at the level of διάθεσις and lacks any real conception of Aristotelian ἐνέργεια. For the functionalist, a functional state can never be a final cause in the way that Aristotle envisioned, because such a state does not represent a distinct set of capacities for further activity.

Thus, the first three chapters isolate the source of the obscurity of final cause, examine that source closely, and show why contemporary treatments have failed to elucidate it. In chapters 4 and 5, I offer my own treatment of the problem.

In chapter 4, I introduce the concept of modeling and propose that a modeling technique will be appropriate for understanding Aristotle’s teleology. I explore one traditional model for teleology, used by Aristotle himself—the artifact model. I argue that Aristotle has good reasons for using this model and that it is, in spite of several criticisms, an effective model. However, I acknowledge that it has a few serious limitations. Artifacts have forms only at the level of διάθεσις; they do not have ἐνέργειαι properly speaking. Artifacts, qua artifacts, have no inborn source of change, no inborn efficient cause, and no capacity for further activity. Thus, artifacts
lack inborn final causes; their final causes must always be determined by external agents. In these respects, artifacts fail to reflect the teleology found in natural objects.

In chapter 5, I examine Aristotle’s moral theory and argue that he paints a picture of the moral life that reflects the teleology found in nature in important ways. In particular, I argue that the teleological orientation of the moral life highlights the concepts of ἐνέργεια and ἐνελέχεια that are so important for understanding natural teleology rightly, and that in that one respect the moral life provides a better model for natural objects than artifacts do. After considering the benefits and drawbacks of both the moral life and artifact models, I propose the moral life as a supplementary model for natural teleology. Chapter 6 acknowledges the limitations of the moral-life model and addresses possible objections.
Chapter One
The Debate over Teleology and Mechanism

I begin my examination of Aristotle’s natural teleology by way of an example drawn from the current literature on Aristotle’s theory of natural causation. Currently, a major source of dispute concerning Aristotle’s views on final cause centers around the issue of mechanism: Is there a theory of mechanism in Aristotle, and if so, is it compatible with his teleology?

The primary purpose of exploring this debate is not to solve it, but to highlight what I think is the main difficulty presented by final cause in general—namely, the precise relationship among the four causes in Aristotle’s natural philosophy. In particular, the relationship among the formal, final, and efficient causes is the primary source of the obscurity of final cause, as the example of the teleology/mechanism debate shall show. It is this relationship of causes that the model I propose in chapter 5 is meant to clarify. Hence, the following discussion of mechanism and teleology—especially as they are treated by Aristotle in Physics II.8–9 and Parts of Animals I.1—will provide a way into the central problem presented by final cause.

I. What is “Mechanism”?  
If we are to use the debate over the compatibility of mechanism and teleology in Aristotle to illustrate the obscurity of final cause, we must first clarify the meaning of the word, “mechanism.” Although the literature on that debate is extensive, it is not always clear what scholars mean by the word “mechanism.” I shall briefly outline three ways in which the word has been used—first, in the modern period; second, in contemporary discussions of philosophy of science; and third in the current debate among scholars of Aristotle.
I.1 Mechanism in Modernity

Modern mechanistic theories of causation date at least to the sixteenth century. Early modern mechanistic theories of explanation appeal only to matter and its spatial motions. This view of mechanism can be found in broad outline in early modern philosophers such as Hobbes,\(^6^5\) Descartes\(^6^6\) and Locke.\(^6^7\)

In such texts, three features of note present themselves. First, the early modern view of mechanism frequently makes definite ontological commitments: only matter (conceived as property-less extension) and its motions are considered to be actually present or occurring.\(^6^8\) Second, the early modern view of mechanism is committed to causal determinism. Causes bring about their effects with both necessity and sufficiency. Third, as F.F. Centore has shown,\(^6^9\) in spite of their commitment to causal determinism, many mechanists of this modern age, from Boyle to Newton, still found a way to countenance teleology by appealing to God as a divine

\(^{6^5}\) See Hobbes’s criticism of Aristotle and his Scholastic successors on the role of form in perception. The latter urge that perception is reception of form, while Hobbes holds that perceptions are caused only by an “external body, or object, which presseth the organ proper to each sense . . . which pressure . . . continued inward to the brain and heart, causeth there a resistance” and which perceptions are therefore not “any thing else but divers motions; (for motion produceth nothing but motion.)” (Leviathan, Pt. 1, Ch. 1, Sec. 4) Hobbes effectively removes form from the picture and appeals only to matter and motion.

\(^{6^6}\) See, for example, the fifth part of the Discourse on the Method, in which Descartes seeks to show that living bodies are elaborate machines, which act “through the disposition of their organs” (AT VI 57) and the motions of which are “derived from the potentiality of matter” (AT VI 59). His explanation of the heart’s functioning (AT VI 47–55) also appeals only to matter and its motions.

\(^{6^7}\) Locke’s conception of primary qualities include only matter and motion. See Locke, An Essay Concerning Human Understanding, II.8.9.

\(^{6^8}\) There are important exceptions to the idea that early modern mechanists were ontologically committed to mechanism. As Dennis DesChene has shown, some mechanists, such as Giovanni Alfonso Borelli and Charles Perrault, used mechanistic explanations without espousing a strictly mechanistic ontology. See Des Chenes, “Mechanisms of Life in the 17th Century.” And Garland Allen has also convincingly argued that there has been a historical distinction between mechanism as a method of explanation and mechanism as a metaphysical position. See Allen, “Mechanism, Vitalism, and Organicism.”

\(^{6^9}\) Centore, “Mechanism, Teleology, and 17th Century English Science.”
craftsman. Thus, in many cases, early modern mechanism viewed material reductionism and causal determinism as compatible with a kind of non-immanent teleology.

That this is not the view of Aristotle should be clear—not because he has no non-immanent teleology, but because he does clearly have an immanent one. Nonetheless, one might still ask whether he allows for some natural mechanical events in the modern sense, so long as they occurred alongside an immanent teleology and were clearly distinguished from it. We will evaluate this possibility shortly.

I.2 Mechanism in Contemporary Philosophy of Science

In contrast to the early modern view, contemporary philosophy of science has developed several different, more sophisticated conceptions of mechanism. It has not always been clear just which conception was meant by various writers, and the literature in philosophy of science is full of undefined usage of words such as “mechanism,” “mechanistic,” and “mechanical.” Significant work has been done to address this problem in recent years, and two important rival versions of mechanism have emerged—the complex-systems approach of Stuart Glennan and the entities/activities approach of Peter Machamer, Lindley Darden, and Carl Craver.

Glennan’s view of mechanism initially arose as a response to the theories of Peter Railton and Wesley Salmon. Railton was disturbed by Hempel’s inductive-statistical model of

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70 Nagel identifies several meanings for “mechanism.” See Nagel, Structure of Science, 172–73. More recently, Craver and Darden have suggested that mechanism has had at least nine distinct meanings in the course of the history of philosophy, not all of which are shared by contemporary philosophers of science. See Craver and Darden, “Introduction,” 234–37.
71 Skipper and Millstein, “Thinking about Evolutionary Mechanisms,” 327.
72 Glennan’s approach was first outlined in “Mechanisms and the Nature of Causation” and later refined in “Rethinking Mechanistic Explanation.” My discussion takes the latter paper as expressing his mature view.
73 MDC’s approach can be found in “Thinking about Mechanisms.”
explanation, which suggested that scientific explanations explain by showing that the
explanandum was highly probable, or likely to be expected, given the explanans. Railton worried
that we frequently want explanations for unpredictable and improbable events, and that
Hempel’s model would not be able to offer such explanations. Railton suggested that an
emphasis on the role of mechanisms in explanation could address this difficulty. However, he
left the concept of mechanism largely undefined, suggesting only that it involves a “more or less
complete filling-in of the links in the causal chains.” That is, a mechanistic account leaves no
gaps, but proceeds smoothly from one explanatory event or object to the next. Salmon sought to
remedy Railton’s vagueness by appealing to the notion of a “causal nexus,” an intersecting web
of causal interactions. This nexus, however, is a nexus of events, not objects.

Glennan responded to Railton’s and Salmon’s work by suggesting that mechanistic
explanations ought to refer to complex systems (i.e. objects), rather than events or processes:

A mechanism for a behavior is a complex system that produces that behavior by the
interaction of a number of parts, where the interactions between the parts can be
characterized by direct, invariant, change-relating generalizations.

Thus, Glennan retains Salmon’s interactionism but focuses on objects—“systems consisting of
stable arrangements of parts”—instead of processes. Further, Glennan’s interactions are
described by reference to “direct, invariant, change-relating generalizations,” rather than to
exchanges of conserved quantities; this enables him to explain how individual interactions can be

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74 Railton, “A Deductive–Nomological Model of Probabilistic Explanation,” 748. Quoted by Glennan in
“Rethinking Mechanistic Explanation,” 343.
75 Salmon, Scientific Explanation and the Causal Structure of the World, 19.
76 Glennan, “Rethinking Mechanistic Explanation,” 344. Note that the reference to “direct, invariant,
change–relating generalizations” replaced an original (1996) reference to “direct causal laws.” (Glennan,
“Mechanisms and the Nature of Causation,” 52).
77 Glennan, “Rethinking Mechanistic Explanation,” 345.
tokens of the same type without being susceptible to identical micro-physical descriptions, an explaination which he thinks Salmon’s theory cannot handle.\textsuperscript{78} Glennan’s theory of mechanism, which states that mechanical explanations explain by describing complex systems of objects, has become one of two main rival theories of mechanism.

The second theory is that of Machamer, Darden, and Craver (MDC). MDC’s account differs importantly from Glennan’s by emphasizing a dualist ontology. In their view, mechanism involves both entities and activities:

Mechanisms are entities and activities organized such that they are productive of regular changes from start of set-up to finish or termination conditions.\textsuperscript{79}

In MDC’s view, Glennan, by focusing on objects, has left out “the productive nature of activities,”\textsuperscript{80} which are to figure alongside of objects, or entities, in mechanical explanations. Neither substantivalist nor process ontologies adequately capture what scientists actually do in the course of developing scientific explanations, especially in neurobiology or molecular biology, and each misses some category of thing (either entity or activity) that most scientists would countenance. In short, MDC defend both entities and activities as ontically and epistemically necessary aspects of mechanical explanation.

From this brief account, we can see that contemporary philosophy of science has developed a more sophisticated notion of mechanism than that of the early moderns. First, the early modern ontology has been expanded to include electro-chemical, energetic, and electro-

\textsuperscript{78} Ibid., 346.
\textsuperscript{79} MDC, “Thinking about Mechanisms,” 3.
\textsuperscript{80} Ibid., 4.
magnetic entities and processes.\textsuperscript{81} Moreover, contemporary mechanists, unlike their early-modern counterparts, need not be reductionists. On the contrary, they often emphasize that living organisms have complex higher-level structures that must be taken into account if a description is to be at all useful to the scientist. However, they do tend to emphasize that reductionism is undesirable for epistemic rather than ontological reasons.\textsuperscript{82} Further, unlike early modern conceptions of mechanism, contemporary theories need not imply causal determinism; they can include the stochastic causes often found in biology and quantum mechanics. Finally, there is also some room for teleology in contemporary mechanism, at least in the realm of biology, although it is an immanent teleology that does not usually depend on theological commitments.\textsuperscript{83}

Recent work on mechanism may hold some promise for Aristotle scholarship. In particular, MDC’s view, which emphasizes that entities engage in activities because they possess appropriate properties,\textsuperscript{84} could perhaps be made to correlate, in a very rough way, to Aristotle’s notions of material, formal, and efficient cause. The matter/form composite could be viewed as an entity; relevant formal characteristics might feature as properties; and the engagement in activities would make the composite an efficient cause. Also tantalizing is MCD’s emphasis on regularity: “Mechanisms are regular in that they work always or for the most part in the same

\textsuperscript{81} Ibid., 13: “Nested hierarchical descriptions of mechanisms typically \textit{bottom out} in lowest level mechanisms. These are the components that are accepted as relatively fundamental or taken to be unproblematic for the purposes of a given scientist, research group, or field. Bottoming out is relative . . . .” And, at 23: “Because we have introduced the notion of relative bottoming out, we do not address issues about ultimate ontology . . . . Higher–level entities and activities are . . . . essential to the intelligibility of those at lower levels, just as much as those at lower levels are essential for understanding those at higher levels.”

\textsuperscript{82} See, for example, ibid., 23.

\textsuperscript{83} Discussion of contemporary issues in teleology has been reserved for chapter 3.

\textsuperscript{84} MDC, “Thinking about Mechanisms,” 3: “Activities usually require that entities have specific types of properties.”
way under the same conditions.” And yet, these regularities are not thought to explain things in and of themselves—it is the productive activities that do the explaining. This seems in line with Aristotle’s view that it is regularities that require explaining and not the other way around (Ph. 198b 32–199a 8). Of course, Aristotle’s explanation of regularity invokes final cause, while MCD show no sign of countenancing any such thing. They do countenance functions as a type of activity, but these functions seem to be determined largely by the normative assessments of the scientist, rather than by the reality of their role in mechanisms. As I emphasized in the introduction, Aristotle views ἀρτία (including final causes and the functions that serve them) as both explanatory and causal.

I.3 Mechanism in the Literature on Aristotle’s Natural Philosophy

It is unclear whether recent views about mechanism could be applied happily to Aristotle, although they seem to show more promise than the earlier modern concept of mechanism as blind efficiency acting on inert matter. But how is mechanism defined in the debate over mechanism and teleology that appears in the current literature on Aristotle?

Unfortunately, in the literature that attempts to evaluate whether or not Aristotle has a real theory of natural mechanism, it is often not clear just what view of mechanism is intended—whether modern, contemporary, or something in between. Most writers on the mechanism issue in Aristotle appear to hold a tenuous notion of mechanism that is vaguely early modern, although perhaps some are aware of recent work.

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85 Ibid., 3.
86 Ibid., 21.
87 Ibid., 6: “To see an activity as a function is to see it as a component in some mechanism, to see it in a context that is taken to be important, vital, or otherwise significant.”
I say that the idea of mechanism appears in the literature as primarily early modern, because it hovers around three concepts:

1. *The limitation of causality to the material and efficient causes.* In part, what is meant by “mechanism” is a certain physicalist assumption—that only material entities, their properties (generally conceived as supervenient), and the laws that govern these entities and properties play a role in the natural world. Although it would be impossible to formulate a single definition of physicalism to indicate precisely which entities, properties, and laws are to be included, it is easy enough to see what the definition excludes. Specifically, physicalism excludes substantial forms and final causes. Although entities may possess global properties or goals, such properties merely supervene on the underlying physical structure and are ontologically posterior to that structure. Hence, although forms and goals may be explanatorily significant for mechanists, such entities do not provide any actual cause over and above the efficient and material causes to which the early modern mechanists pointed. Thus, mechanism may also include:

2. *Reductionism:* Mechanism seems to imply that causes are ultimately reducible to the material and efficient, regardless of the explanatory value of the formal and final. Hence at least some of the debate over mechanism in Aristotle seems to be a debate over whether the presence

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88 For some sources that construe mechanism in this way, see Engelmann, “The Mechanistic and the Aristotelian Orientations,” 187: “[S]cientific methodology in the mechanistic tradition seeks to reduce entities to their smallest particles in order to determine how properties are produced through the interaction of such particles”; Matthen, “The Four Causes in Aristotle’s Embryology,” 159 where the author argues that the problem is one of “justifying the application of formal and final causes to the embryology”; Charles refers to teleological explanation as being “in addition to material and efficient causation”; see Charles, “Aristotle on Hypothetical Necessity,” 1. Such mechanistic explanations are often referred to as “material explanations” or “material account”; e.g. Gotthelf, “Understanding Aristotle’s Teleology,” 75: “The use of teleological explanation is sanctioned by the absence of such a material level account . . . .”; Balme refers to the “workings of the material when they are distinguished from the purposeful movements of Physis”; see Balme, “Greek Science and Mechanism,” 130; and Matthen, “The Four Causes in Aristotle’s Embryology,” 5.
of mechanism would necessitate the reduction of formal and final causes to the material and efficient. Various options are offered: perhaps the former are fully reducible to the latter; perhaps they are reducible ontologically, but are still explanatorily necessary; perhaps some phenomena are reducible while others are not; or perhaps teleology in Aristotle hinges on a concept that is fundamentally irreducible to mechanism, such as form or substance.\textsuperscript{89}

3. \textit{Back-loaded causation}.\textsuperscript{90} Mechanism seems to imply that prior material causes are sufficient to bring about their future effects, and that they bring about those effects with necessity. If the cause exists, the effect must come about, and every effect can be traced back to a prior cause or causes sufficient and necessary to bring it about. There is much debate over whether Aristotle thinks that the chains of events brought about by material and efficient cause must be governed by some goal, and if not, whether teleology would then be incompatible with mechanism or become unnecessary in the face of it. That is, if Aristotle includes the non-teleological in his conception of nature, why does his philosophy of nature require final causes? Again, there are several options: perhaps he only needs final causes for explanatory purposes; perhaps he needs them to explain the presence of a particular feature of the world, such as the

\textsuperscript{89} For a clear analysis of these possibilities, see Gotthelf, “Understanding Aristotle’s Teleology,” 75–78. Perhaps no one thinks teleology is completely reducible to mechanism for Aristotle. The debate rather seems to focus on the issue of just how irreducible it is and why. Gotthelf, Charlton and Broadie all appear to take the position of strong irreducibility; Wieland, Nussbaum and Sorabji take the view that teleology has explanatory power if not ontological reality; and Charles and Cooper seem to appeal to some limited or circumscribed teleology in nature.

\textsuperscript{90} The following sources focus on antecedent causes and whether or not they are sufficient to bring about natural ends: Gotthelf, “Understanding Aristotle’s Teleology,” esp. 76; Balme, “Greek Science and Mechanism,” 130: “A. denies that there is any necessity by which one event compels the next to happen . . . Ananke does not govern sequences: there is no transseunt causality inherent in the material”; Charles’s emphasis on processes, end–states, and “causal stories” also implies a concern with back-loaded causality; see Charles, “Aristotle on Hypothetical Necessity,” 38; and it is this back-loaded causality that Cooper refers to as “material necessity” and which he distinguishes from hypothetical necessity; see Cooper, “Hypothetical Necessity and Natural Teleology,” 255.
good; perhaps he needs them to set the goal for hypothetical necessity, which in turn determines what material is needed and instigates the chain of events that constitutes material necessity.

Although not everyone who has participated in the debate about mechanism in Aristotle will agree that mechanism includes all three of these ideas—physicalism, reductionism, and back-loaded causality—these are the three features that continually crop up in the literature, and the debate generally seems to center around these issues, which were largely shared by modern philosophers of science. We do not, for example, find in the literature on mechanism in Aristotle sophisticated discussions about the relationships between entities and processes, or about how mechanism might be used to understand complex physical events such as chemical or energetic interactions. The fact that Aristotle did not know about the latter phenomena is beside the point—the growth of an animal or plant is a complex event as well. But contemporary philosophers of science have expanded their concept of mechanism in an attempt to handle such events. The current literature on Aristotle seems largely unaware of this expansion. On the other hand, if we can find something like a concept of mechanism in Aristotle, then we should surely take it as we find it—even if it turns out to be something along the lines of the modern view.

In any case, given the vagueness with which mechanism is defined in the literature on Aristotle, and given the three primary issues involved, I find it easier to define mechanism negatively in this context than to try to assign a meaning to the word that all scholars could agree on. What the word “mechanism” primarily signifies in the debate on mechanism is the non-teleological.91

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91 Bradie and Miller seem to construe the question in this way as well. See Bradie and Miller, “Teleology and Natural Necessity in Aristotle,” 133.
This negative definition makes an appearance in all three of the points we just enumerated. First, the non-teleological appears in the absence of formal and final causes; or second, in the view that these causes are not to be accepted except as explanatory (points 1 and 2). Third, the non-teleological shows up as a form of causation that is back-loaded, when prior events cause future events with necessity, and no final cause is explanatorily required (point 3). In this way, mechanism appears in the debate as the absence of teleology.

Hence, the real question of the debate is not, “Is there a modern notion of mechanism in Aristotle?” or “Is there a contemporary notion of mechanism in Aristotle?” (although in general the conception of mechanism in the recent literature on Aristotle appears closer to the modern conception than to the contemporary one.) The real question is, “Is there a type of completely non-teleological causality in Aristotle? And if so, is it compatible with everything that he says about teleology? Can the two types of causation co-exist happily in Aristotle’s philosophy?”

I shall henceforth take “mechanism” to denote the non-teleological generally—a type of causality that makes no use of final or formal causes, but appeals only to the material and the efficient.\textsuperscript{92} It is therefore a type of causality which is fully determined by prior events—it is not forward looking, because it has no final causes to look forward to. For clarity, I shall dispense with the word “mechanism” in the rest of this chapter and simply refer to “non-teleological” events and causes.

\textsuperscript{92} I emphasize again that we need not make any assumptions about precisely what will count as material and efficient causes. There is certainly no need to limit them to the pushes and pulls of lifeless matter envisioned by 17\textsuperscript{th}-century philosophers of nature. There is little reason to think that Aristotle’s conception of matter and its motions was similar to that of Descartes or Hobbes, and if we do discover a kind of non-teleological cause or mechanism in Aristotle, exactly which entities and activities are to be included may be left quite open.
II. Debate: Is Non-Teleological Causation Present in Aristotle’s Account of Nature?

We have said that the primary question involved in the current debate is whether non-teleological causation exists in Aristotle’s philosophy of nature, and if so, whether it is compatible with everything that he says about teleology. There have been two main approaches to this problem, depending on the strength we attach to the idea of compatibility.

II.1 Soft Compatibilism

On the one hand, “compatible” may signify that both teleological and non-teleological explanations can be usefully offered for the same event, even though only one explanation cites real causes. We may call this view “soft” compatibilism. It is equivalent to what Allan Gotthelf calls the “pragmatic view,” which he ascribes to Wieland, Nussbaum, and Sorabji.93

This type of compatibilist theory was already implied in the discussion about αἰτία in the introduction of this dissertation. The soft compatibilist takes αἰτία to be of explanatory value only. Thus for both Wieland and Nussbaum, teleology itself is only “as if.”94 As such, it can stand alongside a non-teleological explanation without contradiction because its purpose is not to point to a genuine cause that may prove to be an alternative to (and mutually exclusive with) non-teleological causes; rather, the point of teleology is to provide an alternative explanation.

93 Gotthelf, “Understanding Aristotle’s Teleology,” 76. It is questionable whether Wieland’s view really falls into this category, since his interpretation of cause is part of a larger neo–Kantian framework. For Wieland, cause is not “merely explanatory” in the way that it seems to be for Nussbaum or Sorabji. Rather, for Wieland cause is among the reflective concepts of the understanding—the concepts that have epistemic, if not ontic, priority, since they are a pre-condition for intellectual knowledge. Thus, to say that causes are only “as if” for Wieland is not to say that they are a mere shorthand, story, or μόδος that we have conventionally or even falsely interpreted into the world—they are concepts whose presence is necessary if we are to approach the world rationally at all.

94 Wieland, “Problem of Teleology,” 141.
The teleological explanation might be considered stronger than the non-teleological one, because it works at the formal or structural level. Or, conversely, it might be considered more limited in its usefulness than the non-teleological explanation. W. D. Ross, for instance, seems to see the two types of explanation as compatible and notes that teleology enabled Aristotle to make some important discoveries in the natural world. But Ross also thinks that teleology must ultimately be replaced by non-teleological explanation and laments that, in Aristotle, teleology sometimes “diverts attention from the genuine mechanical causation. . . .” In either case, the soft compatibilist sees teleology as explanatorily—but only explanatorily—compatible with other non-teleological causation.

Our earlier discussion of Aristotle’s general view of as both explanatory and causal (in the broad sense of pointing to real features of the world) should suffice to show why the soft compatibilist theory cannot be the whole story. Aristotle certainly does take the formal and final causes—the most obvious components of teleology—to be of explanatory value, but he also thinks that by enumerating these causes he is pointing to real features of the world. Although these features are not what contemporary philosophers would describe as causes, they are more than merely explanatory for Aristotle. As Gotthelf argues, the trouble with this view is that it is ultimately consistent with reductionism and fails to acknowledge what Aristotle takes to be real and irreducible features of the world. In particular, it fails to distinguish between chance events and those that happen in a distinction that Aristotle takes to be real and would certainly not wish to lose.  

95 This is Nussbaum’s point. See Nussbaum, Aristotle’s “De Motu Animalium,” 90–93.  
96 Ross, Aristotle’s “Physics,” 128.  
II.2 Hard Compatibilism

Alternatively, we may take compatibility to indicate that teleological and non-teleological accounts provide distinct facts about the world and thus work cooperatively. In this view, both are necessary and genuine modes of causality and explanation. We might call this view hard compatibilism. This type of compatibilism takes a more realist approach to teleology and argues that both final causes and non-teleological causes can operate simultaneously.

Boylan takes a hard compatibilist approach to Aristotle’s philosophy of nature. According to Boylan, the key to hard compatibility is seeing the four causes as coming together to create a two-fold structure, a coherent system located within a unified natural object itself.\(^9^8\) This is the system that Wallace has termed the “inner dimension” of nature.\(^9^9\) Once we see that nature possesses this inner dimension and that it is within that dimension that causality is to be found, we can see how teleological and non-teleological causation work together in the natural world. Each is an aspect of the causal dimension of natural objects. Taken alone, neither can explain natural change, but taken together they reveal the inner structure and workings of natural objects, in which natural forms act as goals toward which efficient causes strive by working upon the material available.

Boylan describes the inner structure of natural objects as two-fold. On the one hand, we have material and efficient cause working together in a way that Boylan calls “quasi-mechanical.”\(^1^0^0\) Matter and efficient cause, estranged from form and final cause, appear to work mechanically in the sense outlined above: they involve only matter and its motions, and the

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\(^9^9\) See Wallace, Modeling of Nature, 22–27. It is not clear, however, that Wallace would divide the causes in the way that Boylan does.
\(^1^0^0\) Boylan, Method and Practice, 88.
starting-point of the process determines a sequence of events that unfolds in a necessary chain toward an outcome that is in no sense a goal. Form and final cause, on the other hand, represent teleology for Boylan. They specify the end result to which the mechanical chain of events will lead. For Boylan, teleology does the initial work of setting the goal and choosing the correct starting point. After that, non-teleological causation takes care of the rest. In this way, teleological and non-teleological causation have distinct roles for Boylan. Their work is quite different and, in a sense, independent, yet they complement one another.  

Grene takes a similar approach when she discusses both hypothetical necessity and a sort of simple necessity in Aristotle, the “this after this” more commonly associated with mechanism (Ph. II.7, 198b6: “that from this that will necessarily result”). But Grene argues that the latter is primarily associated with matter and is subordinated to hypothetical necessity, which invokes the form. While the simple necessity of material and efficient causes determines the color of the eye, it is the final cause—sight—that institutes the hypothetical necessity that there be an eye at all. Thus, although both forms of explanation point to genuine causes and are compatible, teleology is to be emphasized over non-teleological necessity. “Necessity run wild is unintelligible. Necessity harnessed to nature’s ends is what the biologist is constantly seeking to understand.”  

Although Grene and Boylan countenance some simple non-teleological necessity  

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101 I am reminded of Descartes’s description of the origin of the world in the fifth part of the Discourse on Method (AT VI 41–46). God has simply to set matter in motion and impose some laws on it, and the rest takes care of itself. Although we are presumably to suppose that God has some definite goal in mind and chooses laws of motion accordingly, the result is a universe that is primarily mechanical. Teleology is still present, but it clearly takes a back seat. Boylan’s description of the relationship among the causes is strikingly similar. Final cause specifies the end and therefore determines what matter and initial motion will be needed, but after that, the goal ceases in a way to be a goal—it is just what necessarily falls out of the chain of events.  


103 Ibid., 140.
in nature, in the end they take the relationship of hypothetical necessity to final cause to be the ground for hard compatibility. Both hypothetical necessity and final cause are present in nature—but the former is always “harnessed” by the latter.

But is this view a viable reading of Aristotle? Hard compatibilism envisions a kind of mechanism composed of purely material and efficient causes harnessed to final causes by hypothetical necessity. For example, the τέλος of the eye is seeing; if the eye is to see it must have a certain structure and be composed of a certain sort of material; thus, certain events will have to be set in motion. These events themselves are the result of efficient causes. On the face of it, this account seems reasonable enough—teleological and non-teleological causation thus described do not seem incompatible. But the account seems to me ultimately wrong-headed. In order to see why, we shall have to make a close reading of some texts from the Physics and Parts of Animals. But a few preliminary concerns can be mentioned now.

First, according to hard compatibilism, the initial specification of the material and efficient causes is made in accordance with some goal. Then, if the material and efficient causes are conceived as truly non-teleological—that is, considered as functioning separately from form and final cause—they will lead necessarily to the goal or τέλος, without any further need for a final cause, so that the final cause is only necessary to set things up, as it were. But this does not seem to be the way that Aristotle conceives of nature. On the contrary, he seems to see form, essence, definition, and end as constantly present and active in natural objects. They are, after all, what the philosopher of science is primarily concerned with. If hard compatibilism were true, we would expect Aristotle to say that the scientist should be primarily concerned with matter and efficient cause, but in fact he says that the scientist must give due attention to all four causes, and
in many cases he emphasizes the need to examine form and final cause (see especially *Ph.* II.1–2 and *PA* I.1, especially 639a33–640b4). Therefore, the idea that Aristotle regards form and goal as necessary only for setting up material and efficient cause is untenable.

Second, if hard compatibilism is correct, then efficient and material causality are strongly separated from form and end. If that is the case, then efficient and material causes should themselves be the effects only of prior material and efficient causes—that is, we should see two distinct chains of explanation operating side by side in nature and explaining the same events. But this would make teleology causally redundant. Although such an account makes teleology compatible with non-teleological explanation, it runs the risk of making teleological explanation itself unnecessary, except on the merely explanatory grounds raised by Sorabji and Nussbaum. In other words, if taken to its logical conclusion, the hard compatibilist theory ultimately reduces to soft compatibilism, and therefore presents the same problem, by implying a reductionism that Aristotle would not endorse.

The third and most serious difficulty with the hard compatibilist position arises from its view of necessity and the relationship between necessity and teleology—a view which I think is not borne out by Aristotle’s texts. As we have seen, both Boylan and Grene conceive of efficient and material cause as working separately from form and final cause. They also identify efficient and material cause with necessity.

As I observed in my second point above, if the hard compatibilist separation among causes is to be taken seriously, then we will require two non-overlapping chains of causal explanations—one teleological and one not. And the non-teleological one will provide the real causal explanation by appealing to necessity, while the teleological one will be explanatoryly
helpful but will not point to real causes because it will not point to anything both necessary and sufficient to bring about an effect. This description of causation goes against not only Aristotle’s concept of nature, but also contradicts his views on the priority of cause and necessity and their relationships to method in philosophy of nature and science.

Aristotle tells us that cause is among the primary and preeminent objects of science (Ph. I.1 184a10–15). This being the case, we may expect that whichever type of explanation he considers genuinely causal will be the explanation he focuses upon most in his writings on nature. Further, we will shortly see that 1) Aristotle does think that some natural objects and events come about without an end or goal, and 2) he sometimes refers to such things as necessary. If hard compatibilism were correct, we would expect Aristotle to focus his philosophy of nature primarily on such things—since they count as the non-teleological and genuine causes that hard compatibilism emphasizes. But Aristotle does not focus, either in the Physics or in the other works on natural philosophy, on such things. On the contrary, he consistently focuses on natures, forms, and ends and emphasizes the need for scientific explanations that appeal to them, implying that he takes them to be genuine causes.

Moreover, although Aristotle does identify non-teleological events and objects with a kind of necessity (Ph. II.8, 198b18–20), he identifies matter, not with necessity, but with accident (Metaph. VI.2, 1027a11). Thus, the hard compatibilist’s emphasis on the material and efficient causes because of their relationship with necessity is incompatible with Aristotle’s treatment of that concept in nature. The necessity he primarily focuses on in nature is not chains of non-teleological events operating through the necessity of back-loaded causation. Rather, he

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104 For example, rainfall is produced for no end, and by necessity (Ph. II.8, 198b16–19).
emphasizes hypothetical necessity—the conditional necessity stipulated by natural forms and ends. For these reasons, Aristotle’s own method in philosophy of nature does not lend credence to the hard compatibilist view that teleological explanation is merely explanatory without pointing to genuine causes. Rather, Aristotle’s emphasis on teleological explanation is consistent with his view that nature, somewhat like ethics, is both goal-oriented and concerned with things that could have been otherwise.

Hard compatibilists attribute some events to material and efficient cause acting in tandem, separately from form and final cause. There is some credence to this view, given that Aristotle does appear to recognize both teleological and non-teleological events. In what follows, I adjust the hard compatibilist view by exploring why Aristotle thinks teleology is real and how he thinks it might be compatible with non-teleological causation. I shall conclude that the solution to the compatibility debate lies in a better conception of how final cause is related to the other causes, especially to form and efficient cause.

III. Teleological and Non-teleological Causation in Aristotle

The hard compatibilist reading treats material and efficient cause as acting separately from, but cooperatively with, final and formal cause. In this way, hard compatibilism is meant to allow for teleology in nature, while ensuring that the goals stipulated by teleology are achieved in a non-teleological way. Is this a defensible reading of Aristotle?

The core texts for Aristotle’s natural teleology and its relation to non-teleological causation are Physics II.8–9 and Parts of Animals I.1, and a close reading of both of these texts will help us to decide whether or not non-teleological causes exist in Aristotle and if so, whether
or not they are compatible with teleology. My answer is two-fold: First, at some levels of observation in nature, Aristotle does discuss non-teleological objects and events, so that we can identify two co-existing chains of causes, one of which appeals to material and efficient cause, and the other to form and end. Second, we must qualify this observation by emphasizing that even in such cases teleology is still present at less proximate levels of matter and form, so that the two chains of causes do eventually converge. In the end, teleological and non-teleological causation are not separate for Aristotle except with regard to particular natural objects or events, viewed from a particular vantage. Natural objects on the whole behave teleologically, and that is why Aristotle’s natural philosophy revolves around form and end.

III.1 The Non-teleological

First, it is clear that Aristotle does not regard every natural event as occurring oô ἕνεκα. There is ample evidence that he recognizes the existence of processes and events that have no τέλος. Rainfall (Ph. II.8, 198b17–19; Meteor. I.9) and other types of meteorological phenomena, from shooting stars (Meteor. I.4) to dew and frost (Meteor. I.10), are explained non-teleologically.\footnote{But on the debate concerning rainfall in particular, section III.3, esp. n. 54, below.} Death, too, is such a phenomenon: it is not the natural goal of life, but is rather due to a process of cooling (Juv. 23 (17), 478b31). Nature is, of course, full of such events. Tumbling rocks lead to a landslide. High winds knock down trees. Bacterial infection causes the death of an animal. These events do not occur oô ἕνεκα. Thus, on the face of it, Aristotle appears to countenance a kind of non-teleological causation. In all such processes, Aristotle points primarily to the proximate matter and its motions in order to explain the phenomenon (e.g. to the cooling process.
that results in death or the freezing of vapor that results in frost). So at the outset we must admit that Aristotle appears to include some non-teleological events in his understanding of nature.

III.2 The Relationship Between Teleological and Non-teleological Causation

If Aristotle includes such events, how does he think they are related to the teleological causation that occurs in nature? At times, he clearly contrasts non-teleological events with teleological ones and suggests that they work together. In particular, he asserts their compatibility in *Parts of Animals* I.1, following the introductory question about methodology. After raising the question as to the appropriate method to use in the study of nature, Aristotle suggests that the selection of a correct method will be partly determined by our attitude toward causation in nature. His discussion here centers on two types of causation.

> Furthermore, the causes concerned in natural generation are, as we see, more than one. There is the cause for the sake of which, and the cause whence the beginning of motion comes. (*PA* I.1, 639b11–13)

Given Aristotle’s identification of the causes with nature itself in the *Physics*, the methodological importance of the causes is not surprising. What is different from the *Physics* discussion in *Parts of Animals* is that in the latter we find two causes instead of four.

As we have already seen, Boylan suggests that the four-fold distinction of causes in *Physics* II.4–8 can be reconciled with the two-fold distinction in *Parts of Animals* I.1 by acknowledging that there is a certain grouping of the four causes in Aristotle’s biology.106 This grouping, Boylan contends, consists of material and efficient causes on the one hand and formal and final cause on the other. Citing the formal and final causes, Boylan argues, constitutes

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teleological explanation. To cite these causes is to cite the form that determines the change whose cause we are seeking and to cite that form in such a way that makes it clear that the form is able to act as a cause precisely because it is itself the end at which the change aims.

On the other hand, the material and efficient causes act together to form an explanation based on the hypothetical necessity discussed in *Physics* II.9. Boylan cites *Physics* II.9, 200a15:

“Necessity is in the matter while that-for-the-sake-of-which is in the definition [ἐν τῷ λόγῳ].” ¹⁰⁷ And matter, for Aristotle, even at the level of the elements, already contains in itself a source of motion. Thus fire tends upward, while the heavy tends toward the center. ¹⁰⁸ “For Aristotle did not think of matter only in terms of its passive, structural properties, but included its associated motions. This creates a kind of quasi-mechanical explanation of how events come-to-be.” ¹⁰⁹ By grouping the causes in this manner, the two accounts of causality in the *Physics* and in the *Parts of Animals* are seen to be compatible.

Let us tentatively take Boylan’s suggestion and agree that there is some grouping of the four causes in *Parts of Animals* and that what Aristotle means by the cause “for the sake of which” is the combination of form and final cause, while what he means by the cause “whence the beginning of motion comes” is ultimately a combination of material and efficient cause.

Aristotle then asks a methodological question about the priority of these two types of causes, and answers by asserting

Plainly, however, that cause is the first which we call that for the sake of which. For this is the account [λόγος] of the thing, and the account forms the starting-point, alike in the works of art and in works of nature. For the doctor and the builder define health or house,

¹⁰⁸ I shall later argue that the motion of the elements is in fact due to their form, not their matter. See pp. 90–95 below.
either by the intellect or by perception, and then proceed to give the accounts [τὸν λόγον] and the causes of each of the things they do and of why they should do it thus. Now in the works of nature the good and that for the sake of which is still more dominant than in works of art, nor is necessity [τὸ δ’ ἔξ ἀνάγκη] a factor with the same significance in them all; though almost all writers try to refer their accounts to this, failing to distinguish the several ways in which necessity [τὸ ἀναγκαῖον] is spoken of. For there is absolute necessity, manifested in eternal phenomena; and there is hypothetical necessity, manifested in everything that is generated as in everything that is produced by art, be it a house or what it may. For if a house or other such final object is to be realized, it is necessary that first this and then that shall be produced and set in motion, and so on in continuous succession, until the end is reached, for the sake of which each prior thing is produced and exists. So also is it with the productions of nature. The mode of necessity, however, and the mode of demonstration [ὁ τρόπος τῆς ἀποδείξεως καὶ τῆς ἀνάγκης] are different in natural science from what they are in the theoretical sciences (we have spoken of this elsewhere). For in the latter the starting-point is that which is; in the former that which is to be. For since health, or a man, is of such and such a character, it is necessary for this or that to exist or be produced; it is not the case that, since this or that exists or has been produced that of necessity exists or will exist. Nor is it possible to trace back the necessity of demonstrations of this sort to a starting-point, of which you can say that, since this exists, that exists. (PA I.1, 639b14–640a9)

There are three significant steps in this passage. First, Aristotle asserts the priority of teleological over non-teleological causation in nature and backs up this assertion with an analogy to craft. The second important step is to relate the priority of teleology to Aristotle’s own conception of necessity, which he distinguishes from that of his predecessors. The latter, he tells us, failed to give teleological accounts of nature because they misunderstood the nature of necessity. Specifically, they overlooked hypothetical necessity. Here Aristotle makes the same move that he makes in Physics II.8–9—having established that teleology plays a primary role in natural phenomena, he proceeds to develop this claim further by explaining that teleological accounts are primarily a matter of exposing the hypothetical necessity at work in nature.

The third step in the passage quoted above is perhaps the most significant, because it illuminates Aristotle’s view of the relationship between teleological and non-teleological
causation in a way that is, I think, less clear in the *Physics*. In this step, Aristotle explains the *method* by which the natural sciences must proceed given the priority of teleology and the place of hypothetical necessity. The method must be to state goals and ends first and then, once the teleological context has been established, to explain why processes occur as they do. This method is exactly the opposite of the demonstration used in the theoretical sciences, which are determined by their starting points rather than goals and proceed by straightforward chains of inferences toward results that are at the outset open ended. The results of the processes of nature are not for the most part open ended. Although natural events could have happened otherwise (since conditions may fail to be met, and since external violence or compulsion may befall), natural events do have definite goals, and the means to them are limited. The job of the natural scientist is to recognize the goals at which nature aims and to explain the processes of nature as means to those goals.

Again, there is textual support for thinking Aristotle countenanced such non-teleological events and attributed them to material and efficient causes.\(^{110}\) Again, such events seem to be equivalent to what is normally meant by “mechanism” or “material necessity” in the literature on Aristotle, because they appeal only to the physicalist’s material and efficient, back-loaded causes. It is now clear from *Parts of Animals* I that Aristotle believes such events are the necessary concomitants of other, goal-directed processes and that they therefore exist side-by-side with teleological causation. Hence, we might conclude that some kind of compatibilism is a reasonable solution to the debate.

\(^{110}\) See section III.1 above.
However, before we can safely draw this conclusion, we must show why Aristotle thinks teleology is necessary at all. That is, if he does include some non-teleological causation in nature, why isn’t this explanation sufficient to explain natural phenomena?

III.3 Why Is Natural Teleology Necessary?

One possible answer is that we need teleology to account for individual natural events. This is the answer given by both Gotthelf and David Charles, although each uses a very different tactic. Charles asserts that teleology is irreducible to non-teleological causes. This is because, for any individual natural event, although an account of the material and efficient causes will suffice to explain the effect itself, no such account can explain the nature of the effect as a goal. In Charles’s view, “talk of goals” is not reducible to non-teleological explanation for two reasons: First, such talk must select particular properties of the end state and particular states of development as significant, and non-teleological explanations cannot account for their significance. Third, teleology must describe a route from starting conditions to ends as “appropriate for achieving that goal” and non-teleological explanation does not explain that appropriateness. Essentially, Charles is saying that teleological and non-teleological explanations are irreducible to one other, because they do not seek to explain the same phenomena. Non-teleological explanation seeks simply to explain how an effect comes about, while teleological explanation seeks to explain why, given certain goals, which are “taken as

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111 Charles, “Aristotle on Hypothetical Necessity,” 5: “There is no reason to accept that Aristotle thought that it was irrational to believe that a complete physical account of the relevant kind could be given: i.e. an account stated in independent physical terms of conditions sufficient for the occurrence of an organism...”
112 Ibid., 38–39.
113 Ibid., 39.
primitives,” other processes occur to bring them about.\textsuperscript{114} Charles concludes that teleological explanation can never be reduced to non-teleological explanation because the latter must remain silent on goals in general.

Gotthelf agrees that teleology is necessary to explain individual natural events, but he takes a very different route from that of Charles. Gotthelf subscribes to a view he calls “strong irreducibility,” and which he also attributes to William Charlton, Sarah Broadie, Marc Cohen, and in one case to John Cooper.\textsuperscript{115} This is the view that material causation alone does not account for natural processes, and that forms and ends play real causal roles in natural objects and events. Gotthelf defends this view by pointing especially to Aristotle’s account of the generation of living beings, in which an “irreducible potential for form” is actualized.\textsuperscript{116} Gotthelf argues that the generation of living things, as described in \textit{Generation of Animals} cannot be attributed to material causation, but can only be accounted for by the fact that semen bears a distinct and irreducible potential for form of a given species. Hence, in Gotthelf’s view, like Charles’s, teleology is necessary to account for individual natural events.

An alternative answer is that Aristotle believes teleology is necessary to account, not for specific events, but for the \textit{regularities} found in nature. Mohan Matthen suggests this view in direct response to Charles and Gotthelf.

Let us then distinguish between two quite different questions. 1) Would a particular series of heatings and coolings have culminated in a baby had it not been for the additional agency of form? 2) Could that particular series have occurred \textit{normally} (or even ever) without being caused by form? Gotthelf and Charles seem to think that it is question 1 that is crucial. I disagree: it is question 2. Form is required in order to ensure that a

\textsuperscript{114} Ibid., 43.
\textsuperscript{115} Gotthelf, “Understanding Aristotle’s Teleology,” 75, n. 14.
certain series normally occurs, not in order to ensure that the series, given that it occurs, culminates in a baby.\footnote{Matthen, “The Four Causes in Aristotle’s Embryology,” 179.}

As Matthen suggests, the concern with regularity represents not just a different \emph{answer} to the compatibility debate, but a different way of framing the \emph{question} that lies at the heart of that debate. One way to frame the question is to ask whether Aristotle thinks that a given natural process can lead to a given natural end by means of material and efficient causes alone, or whether he thinks forms and final causes are necessary components in that process. Charles and Gotthelf both seem to be addressing that particular question, and both find (different) reasons to think that Aristotle requires forms and final causes in order to explain given individual natural processes. But the alternative formulation of the question is to ask whether—even if a given natural process could lead non-teleologically to a given natural end—such a process could do so regularly without the presence of formal and final causes. Matthen frames the question in the latter way and primarily uses texts on embryology to support his claim that this is the real question. But a well-known passage in \emph{Physics} II.8 offers support for this way of framing the question as well.

For teeth and all other natural things either invariably or for the most part come about in a given way; but of not one of the results of chance or spontaneity is this true. We do not ascribe to chance or mere coincidence the frequency of rain in winter, but frequent rain in summer we do; nor heat in summer but only if we have it in winter. If then, it is agreed that things are either the result of coincidence or for the sake of something, and these cannot be the result of coincidence or spontaneity, it follows that they must be for the sake of something; and that such things are all due to nature even the champions of the theory which is before us would agree. Therefore action for an end is present in things which come to be and are by nature. (\textit{Ph.} II.8, 198b32–199a8)

This passage has been the subject of some debate, but I think it is right to observe that Aristotle does not here choose to argue against the idea that things like rainfall cannot be caused by non-
teleological (i.e. chance or spontaneous) causes. On the contrary, he does seem to attribute rain in summer to just such a cause. So this passage supports Matthen’s suggestion that the question is not whether a given process (in this case meteorological) cannot cause a given end (in this case rainfall) in a non-teleological way. The question is whether or not it can lead to such an end with regularity. Aristotle seems willing to chalk up frequent rainfall in the summer to chance, but not frequent winter rainfall, which is regular.\(^\text{118}\) It is the presence of regularity in nature that indicates the existence of teleology.

Cooper, who emphasizes that in Aristotle both nature and the species that live within it are eternal, sees the passage at 198b32–199a8 as a fairly straightforward argument for the reality of teleology.\(^\text{119}\) If natural kinds are eternal and do not change over time, then the fact that they are so well suited to their environment requires explanation, and material causation cannot supply such an explanation (since natural kinds have not evolved, but have always been as they are).\(^\text{120}\) But the only alternative to material causation is teleology; therefore, teleology seems to be necessary to account for the fact that natural objects are so well adapted. One might object, of course, that this adaptation could be a remarkable coincidence, not susceptible to either material or teleological explanation. But, as Aristotle points out, coincidences are precisely those things that do not happen with regularity. If only a few animals or plants were well adapted, we might chalk it up to coincidence, but that all are so from eternity cannot be coincidental. Cooper thus

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\(^{118}\) Note that there is debate as to whether either summer or winter rainfall is teleological according to Aristotle. The position I take here—that, at the very least, winter rainfall is teleological—is the more or less traditional view, shared by Cooper, Furley, Code, and others, and the passage at 198b32–199a8 seems to bear it out. See Cooper, “Hypothetical Necessity and Natural Teleology,” 247; Furley, “What Kind of Cause,” 76; Code, “The Priority of Final Causes,” 129–31; and Sedley, “Is Aristotle’s Teleology Anthropocentric?” 181–87. Note, however, that Cooper, Furley, and Sedley take all rainfall to be teleological for Aristotle. For an alternative view, see Johnson, Aristotle on Teleology, 151–58.

\(^{119}\) Cooper, “Hypothetical Necessity and Natural Teleology,” 250.

\(^{120}\) Berryman emphasizes this point as well. See Berryman, “Teleology without Tears,” 361, n. 38.
argues that Aristotle’s argument at 198b32–199a8 is sound, given his belief in the eternality of natural kinds.

However, as Alan Code has pointed out, if Aristotle is to rebut the Empedoclean position successfully, he cannot reasonably do so by assuming a premise that his opponent would disagree with. Clearly an Empedoclean does not think species to be eternal—as the discussion of the formation of teeth in the passage immediately preceding the one just quoted shows. The view Aristotle is arguing against here is this:

Wherever then all the parts came about just what they would have been if they had come to be for an end, such things survived, being organized spontaneously in a fitting way; whereas those which grew otherwise perished and continue to perish, as Empedocles says his ‘man-faced oxprogeny’ did. (Ph. II.8, 198b29–31)

The Empedoclean view against which Aristotle is arguing views species as coming into being and passing away. The species of man-faced oxprogeny could not survive, and so no longer exists. Other species, better suited to survival, remain. Now, as Code suggests, if Aristotle’s goal is to refute the Empedoclean idea that species come into existence spontaneously or otherwise non-teleologically, then he cannot really do so simply by insisting that they do not come into existence at all but are instead eternal. Simply to contradict the Empedoclean view of species is not to disprove it. Rather, Aristotle must show why such a view of species is absurd. Code concludes that the argument here in Physics II.8 is meant to show that the Empedoclean view is absurd, not because species are eternal, nor because teeth, rainfall, or the man-faced ox could be caused non-teleologically, but because the regularities of nature cannot be attributed to spontaneity or to material and efficient causes alone. The facts that human teeth normally grow in such a way that the front ones are sharp and the back ones are flat, that frequent rainfall

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normally happens in the winter, that animals normally give birth, not to random monstrosities but to offspring of the same form as their own—it is such regularities that the Empedoclean account does not explain, since each occurrence would have to be by chance, and the probability of such regularity as we actually find in nature would be very slim. Thus, although Code rejects Cooper’s use of the eternality of species as a premise in Aristotle’s argument against the Empedoclean doctrine, both Cooper and Code focus on regularity as the feature in nature which points toward teleology.

What are we to make of the passage at Physics II.8? We have seen that there are a variety of interpretations: Perhaps Aristotle is arguing that the existence of individual phenomena proves teleology; perhaps he is arguing that it is the regularity of nature that proves it. Or perhaps, as Irwin has argued, there is after all no rigorous proof here, but only a series of strong suggestions that ultimately fail by not rising above the level of dialectic.122

I think that there is a proof here, and that it is a good one. I also think that it is based primarily on the concept of regularity. However, in order to understand Aristotle’s proof properly, we must see it in the context of the whole chapter. In particular, the proof appears in the context of a discussion about the organs of living bodies, and in the wider context of setting up Aristotle’s discussion of hypothetical necessity, which is at work in these bodies, and which is explained more fully in Physics II.9.

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III.4 Aristotle’s Proof of Natural Teleology

*Physics* II.8 follows immediately upon a discussion of the four causes. At the end of II.7 Aristotle narrows his attention, focusing on the two principles that cause motion. The first is the efficient cause (*Ph.* II.7, 198a33–35). The second is form, which, unlike the efficient cause, “causes movement, not being itself moved” and is “the end or that for the sake of which” (*Ph.* II.7, 198b2–3). He concludes that

We must explain the ‘why’ in all the senses of the term, namely, that from this that will necessarily result (‘from this’ either without qualification or for the most part); that this must be so if that is to be so (as the conclusion presupposes the premisses); that this was the essence of the thing; and because it is better thus (not without qualification, but with reference to the substance in each case). (*Ph.* II.7, 198b5–9)

This is essentially a restatement of the four causes in the context of teleology and necessity. The efficient cause is identified with necessity—“that from this that will necessarily result” (*ὅτι ἐκ τοῦδε ἀνάγκη τόδε*). The material cause is described as that which is required by the goal—“this must be so if that is to be so.” The form is identified with the essence, and the final cause with what is better with respect to the substance in question. The emphasis on form as final cause at the end of II.7 demands a new description of the four causes, in light of teleology. This description is carried out further in II.9, in the discussion of hypothetical necessity and is restated clearly at the end of II.9, at 200a32–b7. But before this discussion of hypothetical necessity and the role of the four causes in that necessity can take place, Aristotle must show that “nature belongs to the class of causes which act for the sake of something” (*Ph.* II.8, 198b10). This is the stated goal of the intervening passage—II.8. Only after Aristotle has provided this initial proof can he move on to discuss “the necessary and its place in nature” (*Ph.* II.8, 198b11), which
he does in II.9. So the purpose of II.8 is to defend teleology and to pave the way for a discussion of the role that Aristotle thinks necessity plays in nature.

In this context, an ἀπορία immediately comes to light: “Why should not nature work, not for the sake of something, nor because it is better so, but just as the sky rains, not in order to make the corn grow, but of necessity [ἐξ ἀνάγκης]?” (Ph. II.8, 17–19). Aristotle then provides a brief non-teleological account of rainfall and urges that the rain is not for the sake of either growing or ruining crops. He then continues his line of questioning:

Why then should it not be the same with the parts [τὰ μέρη] in nature, e.g. that our teeth should come up of necessity—the front teeth sharp, fitted for tearing, the molars broad and useful for grinding down the food—since they did not arise for this end, but it was merely a coincident result; and so with all the other parts in which we suppose that there is a purpose? (Ph. II.8, 198b24–29)

It is important to notice that the focus of the ἀπορία is not broad natural phenomena such as rainfall, but rather what Aristotle calls τὰ μέρη ἐν τῷ φύσει—the parts in nature. The Loeb edition glosses this as “natural organs” and the example of teeth gives credence to this interpretation. Aristotle is particularly concerned with defending teleology in the context of living organisms and their parts. The alternative explanation he offers, which he suggests came from Empedocles, is meant to explain body parts in a non-teleological way (Ph. II.8, 198b32–199a8; quoted on p. 73 above).

We have then, two rival views of why organs are as they are—either they exist for the sake of the survival and flourishing of the natural organism—that is, “because it is better thus . . . with reference to the substance” (Ph. II.7, 198b8–9)—or they exist, as in the Empedoclean account, because an animal chanced to be born with organs suitable for its survival. Aristotle
immediately asserts that the Empedoclean account is impossible, and his argument against it
does seem to hinge, as Cooper, Code, and Matthen all point out, on regularity.

For teeth and all other natural things \([\pi\alpha\nu\tau\alpha \tau\alpha \varphi\sigma\varepsilon\iota]\) either invariably or for the most
part come about in a given way; but of not one of the results of chance or spontaneity is
this true. \(Ph. \ II.8, \ 198b35–199a1)\).

The Empedoclean position suggests that natural parts come to be the way they are by chance; but
chance things are not regular, while the parts in nature are. Aristotle then offers a dichotomy:

If then, it is agreed that things are either the result of coincidence or for the sake of
something, and these cannot be the result of coincidence or spontaneity, it follows that
they must be for the sake of something . . . . \(Ph. \ II.8, \ 199a3–6)\).

The strictness of the dichotomy between chance and teleology has been debated.\(^{123}\) Can Aristotle
really mean that there are only two options for natural processes and objects—chance or
teleology? Doesn’t this go against the many passages (such as the one that immediately precedes,
concerning rainfall) in which he appears to give non-teleological, but non-coincidental accounts
of natural phenomena? Rainfall and death can hardly be said to be random occurrences, yet they
do not come about for the sake of anything.

In order for the dichotomy to make sense, it is important to keep it in context—in
particular in the context of \(\tau\alpha \mu\epsilon\rho\eta \varepsilon\nu \tau\iota\varphi\sigma\varepsilon\iota\). The \(\dot{\alpha}p\sigma\rho\iota\alpha\) originally set out at the
beginning of II.8 was the question of why the parts in nature should not come to be in the way
that successful or ruined crops come to be—by chance. That the rainfall itself does not come
about by chance, but by a kind of non-teleological necessity, does not necessarily disturb the

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\(^{123}\) Johnson, for instance, rejects the dichotomy: “Aristotle does not here or anywhere else, commit
himself to the crazy idea that everything that comes about non–spontaneously comes about for the sake of
something.” Johnson, \textit{Aristotle on Teleology}, 151. On the other hand, Cooper, for instance, takes the
dichotomy more seriously: “Where something occurs that in fact works to the advantage of someone and
something, there are only two choices . . . .” Cooper, “Hypothetical Necessity and Natural Teleology,”
251.
dichotomy Aristotle sets forth here. The rainfall happens by necessity, but the outcome—the ruin of crops—is an accident, because it was not for this end that the rain fell. Likewise, death, insofar as it is the cooling of a body, is a necessary feature of living objects. But the result—the end of the living matter/form composite, is in a sense accidental—death is not the goal or end of that composite substance, but is something that befalls it in a way that is accidental to its nature.

Again, Aristotle is asking a very specific question here—one concerning the organs of natural bodies. Organs fit into the context of natural bodies in such a way as to provide, almost invariably, for their survival and flourishing. That they do so is what requires an account. Is fittingness the accidental result of a non-teleological process, as death is the result of cooling and ruined crops are the result of rain? Or is the fittingness of organs teleological—is it the final cause of the processes of growth that leads up to it? Seen in this light, the dichotomy between coincidence and teleology makes sense. Aristotle is not ruling out the role of non-teleological necessity. Rather, he is asking whether the existence of fitting organs is the result of that necessity, and therefore counts as a chance result—chance with respect to the natural object to which the parts belong.

In *Physics* II.5, Aristotle’s discussion of chance focused on the idea that chance is an accidental cause—it is a coincidental result that is the sort of thing that *might* have been brought about for the sake of something, but in fact was not. For instance, the man who collects the money does so because he arrives at the right place at the right time, though it was not his intention to do this (*Ph. II.5, 197a16–20*). Now there is a reason why the man wishes to collect the money (simply because it is owed to him, or he has bills to pay, or so on), and there is a reason why he happens to be where he is (he has gone to see a spectacle). But the fact that these
two trains of teleological events have *coincided*—that is the chance event. It has not occurred for the sake of anything.

So, in II.8, when Aristotle asks if flat molars can come about by chance, he is asking whether they are the fortuitous result of a chain of causes that is unrelated to the fittingness of those organs. It has sometimes been assumed that the dichotomy here between chance and teleology excludes other kinds of causality—in particular, the non-teleological necessity Aristotle uses to explain phenomena such as death and rainfall. But this dichotomy does not exclude such necessity. On the contrary, chance events have chains of causes leading up to them, and these may very well be teleological events even though the coincidence of the chains is an accident. The rainfall example illustrates this very clearly. Rain itself is not an accident—it arises by a kind of necessity that has to do with the nature of water and its capacity to become vapor (*Meteor*. 1.9). Likewise the crops were not planted arbitrarily, but with a view to an end. But that the rain happens to ruin the crops—that is an accident. So when Aristotle asserts that we have two options with respect to the parts in nature—chance and teleology—he is not ruling out the existence of non-teleological necessity. He is asking whether the results of teleological necessity are always accidental with respect to the natural substances to which the parts belong. He clearly answers in the negative—fitting parts are not the chance results of non-teleological events. Rather, they are the ends or goals of those events.

The passage that immediately follows this assertion (*Ph*. II.8, 199a9–20) might be taken to be a second, separate argument in favor of teleology. But I think it is better seen as a further

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124 Cooper, Sedley, and Furley, for example, argue that all rainfall, regardless of the season, must occur teleologically for Aristotle. See Cooper, “Aristotle on Natural Teleology,” 217–18; Furley, “What Kind of Cause,” 76; and Sedley, “Is Aristotle’s Teleology Anthropocentric?” 181–87.
elaboration of the argument that precedes it. Aristotle has suggested two options—either fitting organs are the chance results of non-teleological processes, or those processes occur for the sake of those results. He wants to argue for the latter. His argument is two-fold: First, the regular occurrence of processes is a sign of teleology. Second, the regularity of the processes themselves is a sign of teleology.

First, Aristotle points out that, even if Empedocles is correct, and particular traits are passed on because of survival value, the latter still has no account of how those traits are passed on with regularity.

Moreover, among the seeds, [if Empedocles is correct, then] anything must come to be at random. But the person who asserts this entirely does away with nature and what exists by nature. For those things are natural which, by a continuous movement originated from an internal principle, arrive at some end: the same end is not reached from every principle; nor any chance end, but always the tendency in each is towards the same end, if there is no impediment. (*Ph. II.8*, 199b14–18)

Natural objects have an inborn principle of motion and rest, and this is displayed in part by their tendency to produce offspring that are formally like themselves, rather than random offspring. Now, if traits that confer survival value are passed on, we must explain how any trait is passed on at all. But that process is regular—“the tendency in each is towards the same end, if there is no impediment”—and this regularity suggests that the end is not an accidental final state, but a goal.

Aristotle’s second argument in favor of teleology looks more deeply at the regularity of the processes themselves. Not only do natural objects exhibit tendencies for certain processes, but the processes tend to unfold in a regular order. For example, Aristotle discusses the processes of growth that generate natural organs at *Ph. II.8*, 199a9–20.
Further, where there is an end, all the proceeding steps are for the sake of that. Now surely as in action, so in nature; and as in nature, so it is in action, if nothing interferes. Now action is for the sake of an end; therefore the nature of things also is so. Thus if a house, e.g., had been a thing made by nature, it would have been made in the same way as it is now by art; and if things made by nature were made not only by nature but also by art, they would come to be in the same way as by nature. The one, then, is for the sake of the other; and generally art in some cases completes what nature cannot bring to a finish, and in others imitates nature. If, therefore, artificial products are for the sake of an end, so clearly also are natural products. The relation of the later to the earlier items is the same in both. (Ph. II.8, 199a9–20)

Here Aristotle points out that the processes of growth in nature are strikingly similar to the processes at work in ποίησις, processes which unarguably occur for an end. Thus, Jean De Groot has argued that in this passage, Aristotle takes the ordered succession of events as a sign of the presence of teleology.125 We might expect the man-faced oxprogeny to come about any old way—there would be no need for orderly growth, since the parts of such an animal are not suited by nature to the whole. But real natural objects do not come to be any old way. Even simpler organisms, such as a plants, display an orderly progression in their growth. First the seed cracks open and roots begin to emerge; as the roots grow long, a few leaves appear, just as many as can be supported and nourished by the developing root system; soon, chlorophyll production begins, and growth speeds up; more leaves are produced and the stalk hardens, providing greater support; finally flowers and then fruit appear, the seed is fertilized, and the cycle continues to the next generation. Each step along the way is well ordered. Each step must be completed before the next can arrive. And the whole orderly chain is oriented toward the goal of the survival and flourishing of the plant and its reproduction.

Aristotle likens this ordered succession to the succession of steps we find in the crafts. One does not build a table in any haphazard fashion. In order to achieve the goal properly, steps

must be taken in the right order—for example, one does not fasten the legs until the surface has been planed. The fact that in nature, steps occur in an orderly and almost unvarying way argues against the results of these successions being chance results. But, if we accept the dichotomy between chance and teleology that Aristotle set up at 199a3–6, then if the results of orderly successions are not by chance, they must be final causes.

Aristotle’s argument for the existence of teleology in natural parts in II.8 thus has two steps. First, he argues that we have a choice—either parts come to be as chance results of processes that are teleologically caused (where the τέλος is something other than the parts in question), or they are final causes of the events that bring them about. Once we see that the events that result in the existence of natural parts are orderly successions much like the ones we find in the crafts, we are forced to admit that it is unlikely that they come about by chance. What occurs by chance does not occur always or for the most part. One does not meet someone who owes one money during every excursion to the marketplace. Nor does the rain ruin the crops every time it falls. But the growth of plants and animals occurs in the same way each time and yields the same results, unless external circumstances intervene. Thus, Aristotle is justified in concluding that the parts in nature are governed by final causes that direct an order and appropriateness of parts which material and efficient causes alone cannot explain.

III.5 Hypothetical Necessity and the Role of Form in Natural Processes

Once Aristotle has shown that teleology is at work in nature, he still must clarify what sort of necessity he thinks exists there. We have already seen that he does not rule out a kind of non-teleological necessity, such as that which causes rainfall. However, now that he has established
the existence of teleology in nature, Aristotle needs to clarify the role of necessity in the context of teleology. Hence, the arguments for teleology in Physics II.8 are immediately followed by a discussion of hypothetical necessity in II.9. This discussion will lead us to the concept of form and the indirect role that it plays, even in non-teleological causation.

The necessity found in nature is hypothetical, not simple. Even material causes are subordinate to ends (Ph. II.9, 200a5–9), which, we remember, are to be understood as forms (Ph. II.9, 199a31). With respect to hypothetical necessity, this “necessity is in the matter, while that for the sake of which is in the definition” (Ph. II.9, 200a14). That is, some definite matter is necessary for the end aimed at. Aristotle again uses a craft analogy: Building a house requires taking certain actions in a certain order, and this order is determined by the end aimed at, because the goal presupposes that certain things be in place. Nature, too, acts in a consistent, orderly fashion because its goals also presuppose certain conditions. In particular, suitable matter is necessary for the form to be realized, and hence at the end of II.9 Aristotle asserts that “the necessary in nature, then, is plainly what we call by the name of matter, and the changes in it” (Ph. II.9, 200a30–32).

Analysis of Physics II.8–9 showed that Aristotle thinks teleology is necessary to explain the regular production of natural parts; non-teleological causation is still needed to explain some broader phenomena, such as rainfall; the two forms of causation are basically compatible; and

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126 It is worth noting that Aristotle locates both necessity and accident in the matter (Metaph. VI.2, 1027a11). The sort of non–hypothetical necessity that Aristotle attributes to matter in nature is also responsible for the sorts of accidents he finds there. Material necessity makes the rain fall, and by accident it destroys the crops. Again, this is perhaps why Aristotle does not make such necessity or the causes involved in it the primary focus of natural philosophy or science—because there is no science of accidental being (Metaph. XI.8, 1064b17). The “genuine” causal account for which Ross, for example, longs would not be a scientific account for Aristotle (Ross, Aristotle’s “Physics,” 128).
the sort of teleology Aristotle envisions at work in nature requires hypothetical necessity. This appears to me to be Aristotle’s general theory of necessity and teleology as developed in the *Physics*. While it does contain some concept of non-teleological causation, it clearly subordinates this causation to teleology.

Hypothetical necessity also points toward the fact that form plays an indirect role even in non-teleological causation. The two chains of causes that the hard compatibilist envisions are separate, and not so separate after all. This is because the material and efficient causes as they are found in Aristotle are not equivalent to the material and efficient causes cited by the modern mechanist. Specifically, Aristotle’s material and efficient causes are not entirely stripped of form as we said they must be in a purely non-teleological explanation. This means that, even when in our analysis, we group them under the heading of necessity, in reality there is never a complete isolation of these two causes from form. Indeed, what we will find in Aristotle’s philosophy of nature is that cause at every level is governed by form.

Let us begin with the efficient cause. This is the first source of change or rest: the person deliberating causing his or her action, the father causing the child, and the producer causing the production, the seed the cause of the plant’s growth, a raid the cause of a war (*Ph. II.3, 194b30–31 and 195a21, II.7, 198a19–20*). In the discussion of teleology above, I noted that the causes can sometimes be divided into two groups, with efficient and material cause comprising necessity, and formal and final cause making up teleology. But Aristotle also indicates that another grouping is at work in nature. In natural objects, the formal, final and efficient causes often converge (*Ph. II.7, 198a24–25*). Aristotle seems to be thinking particularly of the case of generation, in which the form of the father works to produce another being of the same form.
However, the same nesting of causes can be seen in natural growth and in animal behavior. The natural form acts as an efficient cause by determining the living being’s powers and functionality. At higher levels of action, imagining and thinking animals sense and recall forms, which then determine their appetites of desire or aversion. In short, we find that at every level form drives efficient cause. Efficient cause is neither a pure “conatus,” nor is it part of a chain of strictly efficient causes. Rather, efficient cause is always part of a whole system of causality ultimately governed by form through hypothetical necessity.

A similar point may be made concerning the material cause, for although it does not converge with the other causes as efficient cause does, it too is tied indissolubly to form. First, let us note that the material cause is not always material in the sense of being tangible. It is rather the thing out of which change comes and which remains after the change has occurred, providing identity through change. Examples come not only from the physical world (the bronze of the bowl), but also from language (the letters of the syllables) and logic (the premises of the conclusion) (Ph. II.3, 195a16–19). Thus, in Metaphysics VIII, it is the potentiality of matter that Aristotle emphasizes; indeed, he defines matter in terms of its potentiality: “by matter I mean that which, not being a ‘this’ actually, is potentially a ‘this’. . . .” (Metaph. VIII.1, 1042a27–28). Form on the other hand is actuality, and so form and matter always stand in this reciprocal relationship. This relationship, however, is a relative one and this becomes all-important for Aristotle, who is interested in citing the proximate causes in each case (Metaph. VIII.4, 1044b1–3). For example, although at one level, the elements are the matter of bones or sinews, at another level the bones and sinews themselves are the matter of the body, and at an even higher level the body stands in the relationship of matter to the soul. In a discussion about a broken arm, it may
be appropriate to treat the bone as matter; in a discussion of a dog’s digestion of bones, it will be more appropriate to treat of the elements of which the bones themselves are made. In general, matter and form are not absolute designations. Instead, they are to be designated differently at different levels—they are relative to the question at hand. Further, matter as pure potential is never accessible to human perception—what we take as matter in each case is already to some extent formed by hypothetical necessity and thus possesses a nature beyond being simply a substrate. Although in theory we can get down to the level of prime matter, we never experience this level in our studies of nature. This is no doubt why Aristotle’s discussion of prime matter occurs in the *Metaphysics* rather than in the *Physics*.

There is no level of nature that is directly accessible to the natural philosopher at which form is not at work. In Jonathan Lear’s words, the order found in the natural world is “an expression of form *all the way down.*”127 At every level of the physical world, form is present, and is thus never reducible to or explicable in terms of matter. Form is not merely a structure or organization that emerges from and is determined by matter existing at lower levels. Rather, form is always present and is not an epiphenomenon that arises from the matter. On the contrary, form and its role as an end is the condition upon which hypothetical necessity is founded. This is why form is nature in the primary sense. It is the actuality of a thing, what makes the matter to be a ‘this,’ rather than mere potential. In the natural world, form has ontological priority.

If form goes all the way down, then in the broad sense, there can be no purely non-teleological causation in Aristotle—causation in which neither form nor final cause figures at some point. At every level, causation is driven by the form that exists at that level. There is never

a material cause acting on its own in the way envisioned by modern mechanists. Matter is always formed, always already acting as a ‘this,’ never as a mere substrate.

This is not to say that teleology is active at every level—at some levels and or some processes, non-teleological explanation is sufficient. Again, death and certain meteorological phenomena fall into this category for Aristotle. Death does not occur for an end, nor is it itself a τέλος. Rather, it is due to the materials present in living bodies. However, these materials, when reduced to their elemental components will still possess a reduced teleology. Although animals die due to an apparently non-teleological process of cooling, it is also true to say that this cooling itself occurs because of the still lower-level activities of elements such as earth and water—and these elements are behaving according to their natures, directed toward their τέλη, albeit in a reduced sense. Moreover, the cooling occurs in the context of a natural object that has a definite form and end, and although its natural form is not that of a corpse, nor its end death. But it is on account of the requirements of that body’s nature and end that it took shape in certain matter and engaged in certain motions, as a byproduct of which it is now the sort of body that cools and dies. Death and rainfall are not ends, yet they are not unrelated to ends. Even when a

128 Although the elements do not derive their motion from themselves in the way that plants or animals do, they do possess principles of motion that constitute distinct potentials for simple natural locomotions toward or away from the center. (See Ph. VIII.4, 254b32–255b30 and Cael. I.2, 269a8–18.) Moreover, the elements possess distinct natural potentials for generation and destruction, and Aristotle clearly attributes these tendencies to their forms (in particular, to the qualities of hot, cold, dry, and wet). (On the qualities of the elements and their generation out of one another, see Gen. et Corr. II.3, 330a32–330b5 and II.4.) However, the teleology of the elements is much reduced, since their ἀρχαί for motion are only ἀρχαί for suffering motion, rather than for causing it. Thus, we cannot say that their motion is really “derived from themselves [ὑπὸ τίνος οὐκέτι φαινόν]: this is a characteristic of life and peculiar to living things.” (Ph. VIII.4, 255a7) Rather, we should say that elements possess distinct potentials for motion, potentials which are naturally realized unless something prevents them. (Ph. VIII.4, 255a24–b30)
given level appears to have no teleological explanation, we can always look deeper and find a lower level in which teleology is active.

This is an important claim, though one well-attested in Aristotle. In Phys II.2, for example, he describes different levels of matter in terms of the different craftsmen responsible for making the rudder of a ship.

The arts, therefore, which govern the matter and have knowledge are two, namely the art which uses the product and the art which directs the production of it. That is why the using art also is in a sense directive; but it differs in that it knows the form, whereas the art which is directive as being concerned with production knows the matter. For the helmsman knows and prescribes what sort of form a helm should have, the other from what wood it should be made and by means of what operations. In the products of art, however, we make the material with a view to the function, whereas in the products of nature the matter is there all along. (Ph. II.2 194a36–b8)

From the point of view of the helmsman, the rudder itself is part of the matter of the ship—a part that must fit into the whole in a particular way if the ship is to have the appropriate form and functionality. If the rudder is to fit properly, it must have a certain form, and this is the job of the helmsman to prescribe this form. For the craftsman who makes the rudder, the form is a given—something received from the helmsman—while the choice of the matter out of which the rudder is made is part of the craftsman’s art. In the relationship between the two crafts of steering ships and making rudders, we see the layers of form and matter—the form of the ship and the rudder as matter for that form; the form of the rudder as fitting into the form of the ship, and the wood as matter for that form. Thus, Aristotle illustrates that something (e.g. a rudder) can be both form and matter at different levels.

If form plays such a thorough-going role in all of the operations of nature, and Aristotle identifies final and formal causes, this implies that final causes, too, go “all the way down.” In drawing this conclusion, I take the side of Balme, who argues that the by-products of the
interactions of matter (e.g., the color of the eye) are governed by hypothetical necessity, not true non-teleological causation.

If hair can only be developed out of skin, then the appearance of inessential attributes which come from the skin is just as necessary, if the development is to take place at all, as the presence of the skin itself. There are therefore no properties which are not purposeful, and no phenomena which are not directly or remotely due to Physis. All are hypothetically necessary, from the Bia inflicted on the elements up to those unintended by-products which may even impede the movement of Physis.\textsuperscript{129}

Balme conceives of no reason to admit anything other than hypothetical necessity into the realm of nature, since even accidental events are necessary concomitants or outcomes of other events which are ordered to an end. Cooper, on the other hand, argues that to limit natural necessity to the hypothetical is to deny “all material necessities of a Democritean sort, things that happen because the materials present simply interact by their natures to cause them.”\textsuperscript{130} Cooper’s objection is that if we do not admit any simple necessity, we will not be able to interpret effectively Aristotle’s contrast between necessity and teleology in the biological works. But I think that this problem is solved by the more complete understanding of material necessity that we outlined above. Specifically, by appealing to the relativity of matter and form, we can see that what appears to us as material necessity at one level can be interpreted as teleological at a lower level. Take, for example, the case of the eye. The τέλος of seeing hypothetically necessitates that some appropriate organ exist. The formation of this organ is due most obviously to material and efficient causes and the color of the eye is indeed accidental and by necessity. But this necessity does not amount to completely non-teleological causation, since the material and efficient causes at work in the formation of the eye are themselves governed by form—not the

\textsuperscript{129} Balme, “Greek Science and Mechanism,” 136.
\textsuperscript{130} Cooper, “Aristotle on Natural Teleology,” 210, n. 8.
form of the eye, but the form of tissue, blood, pigment, and so on that go into making the eye.

Relative to the eye and its τέλος, the color is accidental and comes about as a necessary concomitant, but relative to the natures of the constituent parts, the color comes about through a process governed by form and played out through hypothetical necessity.

Thus, an interpretation such as Balme’s or mine, which admits of no strict absolute necessity in the sublunary realm, can still admit that “one and the same train of events is due both to the automatic workings of physics and to directiveness.”\(^{131}\) However, the “automatic workings” never quite amount to mechanism in the early modern sense, since form and finality are at work on every level. “You cannot meaningfully ask what would happen in Aristotle’s system if finality were removed, any more than you can ask what would happen to chemical elements if their properties were removed. That would be to ask what would nature be without nature.”\(^{132}\) In the hypothetical necessity that harnesses the four causes together, form and end always have priority.

III.6 The Value of the Debate over Compatibilism

Our examination of the compatibilism debate has led us to conclude that the identification of form and final cause means that non-teleological causation—in the sense of efficient and material causes separated from form and final causes—cannot be compatible with teleology for Aristotle. If form exists at every level of materials contributing to a natural object, then so does final cause. Hence, although events at one level may be explicable merely in terms of the matter

\(^{131}\) Balme, “Aristotle’s Use of the Teleological Explanation,” 5.

\(^{132}\) Ibid., 21.
(and its motions) that is the proximate substrate for that level, nevertheless, that very matter, when viewed on its own level, will be seen to have a form—and a final cause—of its own.

The purpose of section II was to show that at least one main puzzle concerning final cause can perhaps be solved by more careful attention to the concept of form. Although I have by no means settled the compatibilism debate definitively, I hope I have shown why attention to form will be necessary to solve it. The importance of form illustrates what I think is a general truth about the obscurity of final cause: that it is largely due to the latter’s relationship to form and efficient cause, in particular the way that efficient cause works in a manner prescribed by the form and toward the final cause, which is the actualization of that form. As the debate over compatibility shows, much of our misunderstanding about final cause can be attributed to the failure to see final cause in the context of the other causes. Again, one of the general puzzles about αἱρέσεις focused on the issue of whether they are real features of the world or simply means of explanation. I concluded that they are both for Aristotle. In many cases αἱρέσεις pick out individual and separate objects in the world. Sometimes, however, they pick out separate features of the same object. Such is frequently the case in the natural world, where formal, efficient and final causes so often converge in one object. The failure to recognize this coincidence—the failure to see the actual causal structure that exists in nature as Aristotle sees it—leads to misunderstandings such as the debate over compatibility. The debate asks, “Are there purely non-teleological causes in Aristotle?” Ultimately, as we have seen, the answer is “no.” As we have also seen, the way to the answer is through a better understanding of how the causes are related to one another. The compatibility debate begins by treating the four causes as if they could exist in isolation in nature. It then proceeds to ask if some of those causes can operate
effectively in that isolation. Yet for Aristotle there is no isolation of the causes. If form exists at every level, then the causes are always bound up with one another.

Where did this inclination to isolate the causes arise? Historically, there are probably many answers to this, some of which involve early modern conceptions of matter. However, one partial answer can be given by pointing to a particular model, always popular for understanding Aristotle’s conception of causality—the artifact model. Later in this dissertation I will discuss the artifact model at length and show how it has led to a tendency to view the causes in isolation.

However, before moving on to this project, I want to investigate Aristotle’s causality—and especially his teleological notions—more fully. Before discussing the relationships among the final, formal, and efficient causes in more detail, we must say more about the final cause itself.

IV. Final Cause As Τὸ Οὗ ἔνεκα

So far we have had the opportunity merely to introduce final cause, but more must be said before we can understand its relationship to the other causes. The English phrase “final cause” perhaps derives from the commentaries of Alexander of Aphrodisias, Philoponus, and Simplicius, all of whom use the phrase τὸ τέλικον αἴτιον to refer to Aristotle’s cause for the sake of which.133 Aristotle himself never uses such a locution, but refers instead to the οὗ ἔνεκα (that for the sake of which) or τέλος (end). He sometimes combines the two phrases (e.g., Ph. II.3, 194b32–33 and GA I.1, 715a4–5). Although, for the sake of simplicity, we shall continue to refer to the cause for the sake of which as the final cause, it is important to note that misunderstandings can

133 For a more in-depth discussion of τὸ τέλικον αἴτιον, see Johnson, Aristotle on Teleology, 42–44.
arise from the use of this phrase. First, the final cause is not always final temporally, nor does everything that is temporally final count as a final cause. In living creatures, for example, the final cause is the living form, which they fully actualize for a fairly brief period of maturity, after which they decline and die. Death, on the other hand, is certainly their last state but is not their final cause (Ph. II.2, 194a30–33). So “final” must not be construed too literally.

The phrase that Aristotle favors in referring to the final cause is ὣ ἐνεκα. ἐνεκα is a preposition meaning “for the sake of” or “in order to” and is roughly synonymous with χάριν, which Aristotle sometimes uses in its stead (e.g. PA I.1, 642a32 and GA 717a21). The locution τὸ ὣ ἐνεκα basically reifies the preposition: “the [thing, i.e. cause] for the sake of which.” In English this is inelegant, but unfortunately the English phrase “final cause” lacks a certain ambiguity that is present in the phrase “that for the sake of which,” an ambiguity that Aristotle uses to distinguish between two different types of final cause. I shall make use of this distinction to develop a very basic sense of what constitutes a final cause in nature.

The distinction occurs in five different passages.¹³⁴ At de Anima II.4, 415b2–3, he writes, τὸ δ’ ὣ ἐνεκα διττόν, τὸ μὲν ὣ, τὸ δὲ ὃ: “That for the sake of which is two-fold: that (for the sake) of which and that (for the sake) for which.” Some things act as final causes by being aims, ends, or goals; these are designated by giving ὣ ἐνεκα a genitive object. Other things are final causes by way of being beneficiaries; these are designated with the dative object. The phrase “for the sake of which” in English includes this ambiguity, while “final cause” does not. In the passage in which the lines just quoted occur, Aristotle suggests that the divine is a

¹³⁴ Ph. II.2, 194a35–6; de An. II.4, 415b2–3, 415b20–21; Metaph. XII.7, 1072b1–3; EE VII.15, 1249b15. For an extended analysis of these passages, see Johnson, Aristotle on Teleology, 64–80.
goal of living things, which try to imitate it, primarily through reproduction (*de An.* II.4, 415a28–b8). The divine, however, does not benefit from this imitation—it is a cause for the sake of which, not for the sake for which.

Other passages clarify Aristotle’s distinction between end and beneficiary. The passage at *de Anima* II.4, 415b20–21 and *Physics* II.2, 194a26–b2 are of particular interest because they too explain how the distinction applies to natural objects. In the first passage, Aristotle has been discussing in what sense the soul is a cause of the living thing. He has stated that it is the cause in three senses: as efficient, final, and formal cause (*de An.* II.4, 415b9–12). He then discusses the soul as final cause:

> It is manifest that the soul is also the final cause. For nature, like thought, always does whatever it does for the sake of something, which something is its end (*τέλος*). To that something corresponds in the case of animals the soul and in this it follows the order of nature; all natural bodies are organs (*ἀργα* of the soul. This is true of those that enter into the constitution of plants as well as of those which enter into that of animals. This shows that that for the sake of which they are is soul. That for the sake of which has two senses, viz. the end to achieve which (*τὸ τε οὖ*), and the being in whose interest (*καὶ τὸ ὁ*), anything is or is done. (*de Anima* II.4, 415b15–21)

In which sense is the soul a final cause? Is it the aim or the beneficiary of the body and its organs? The answer is perhaps both. As Johnson has noted, the answer is not clear in the passage itself, but Philoponus offers a helpful interpretation.\(^{135}\) Philoponus suggests that the soul is the aim of the body’s functioning, while the organism as a whole (the body-soul composite) is the beneficiary.\(^{136}\) In this case, the soul is both aim and beneficiary (since it enters into the compound). As Johnson observes, however, “only individual souls, not souls taken generically as kinds or forms, can be beneficiaries. This is for the same reason that the other divine, eternal, and


unchangeable things cannot be beneficiaries: they do not and cannot change . . . “137

Nevertheless, the forms of plants and animals, “taken generically” (i.e. as species), are also final causes by way of being aims. Thus Simplicius points out that the soul itself has a further aim: “life” and “the perfect life,”138 in which it instantiates the eternal form of the species.

How does this apply to humans? Clearly, what Aristotle says of animal souls will apply to human souls as well. The human soul is the aim and co-beneficiary (insofar as it is part of the body-soul compound) of the body’s functioning. The soul further aims at the eternal human form, achieving it in the only way it can, through reproduction. However, a passage in the *Physics* adds another dimension to our understanding of final cause in human life.

For the arts make their material (some simply make it, others make it serviceable), and we use everything as if it was there for our sake. (We also are in a sense an end. ‘That for the sake of which’ may be taken in two ways, as we said in our work *On Philosophy.*) *(Physics II.2, 194a34–b1)*

The two ways to which Aristotle refers here are presumably those we have been discussing—the end as aim and as beneficiary. In which way are we in a sense an end? The passage that follows suggests that we are ends as beneficiaries of the arts, while the products of art are ends as aims of art.

The arts, therefore, which govern the matter and have knowledge are two, namely the art which uses the product and the art which directs the production of it. That is why the using art is also in a sense directive; but it differs in that it knows the form, whereas the art which is directive as being concerned with production knows the matter. For the helmsman knows and prescribes what sort of form a helm should have, the other from what wood it should be made and by means of what operations. *(Physics II.2, 194b1–7)*

137 Johnson, *Aristotle on Teleology*, 76.
138 Simplicius, *In De An.*, 112.2.
This distinction between two types of τέχνη corresponds to the two types of final cause. The man who uses the helm is benefited by that use, and so he knows what form the helm must take in order to be useful to him. But the man who makes the helm is not immediately directed toward benefiting either himself or the helmsman. Rather, he aims at instantiating the form in some matter. Indeed, since he takes over the form from the helmsman, the helm maker is primarily concerned with the matter and the operations and tools he will use on it. His aim is the completed helm, but because the helm in turn benefits the helmsman, the latter must prescribe what form it will have. The passage at 194a34–b7 illustrates an important feature of teleology in human life. Through τέχνη we make ourselves final causes as beneficiaries, by directing nature toward our aims.

One of the most interesting aspects of the passages from the de Anima and the Physics is that they reveal the complex way in which teleology works in the relationship between human beings and nature. In nature, plant and animal bodies are the instruments of souls. Souls are the ends at which those bodies and their functions aim, and plants and animals, as soul-body compounds, are the beneficiaries of bodily functioning. In addition, some animals make use of other natural bodies as material for their own ends, as birds build nests or beavers dams. Humans go further in this use of natural materials—our productions are more elaborate, more planned, and more susceptible of improvement and novelty. In human production, the ends are two-fold, and two different arts correspond to them. One is the art of production, whose aim is a product, a product whose matter is derived from natural objects, but whose form is the result of human imagination. The second art is that of using such products. We ourselves are the beneficiaries of that art, and it is the expert in that art of use who prescribes what forms the productive art shall
aim at. Thus, human art, τέχνη—which we will discuss at some length in chapter 4—represents an extension of natural teleology into the human realm. The two senses of the phrase οὗ ἔνεκα—as aim and as beneficiary—allows us to describe this extension accurately.

In addition to the term οὗ ἔνεκα, Aristotle frequently refers to the final cause as a τέλος. We have seen that the final cause is not always a final temporal state. What, then, is the meaning of τέλος? Although τέλος can refer simply to an end, in the sense of a final state (and it was typically used, for example, in reference to death, as in τὸ τέλος βίου), the word has the further connotation of fullness or completion. Τέλος ἔχειν, for example, means to have achieved maturity, to be grown up; and ἄνδρος τέλος refers to manhood.\(^\text{139}\) It is this sense of completeness that Aristotle emphasizes in his discussions of the final cause as a good.

Further, the final cause is an end, and that sort of end which is not for the sake of something else, but for whose sake everything else is; so that if there is to be a last term of this sort, the process will not be infinite; but if there is no such term there will be no final cause. But those who maintain the infinite series destroy the good without knowing it. Yet no one would try to do anything if he were not going to come to a limit (πέρας). Nor would there be reason (νοῦς) in the world; the reasonable man, at least, always acts for a purpose; and this is a limit, for the end is a limit. (Metaph. II.2, 994b9–16)

Connections between ends, completeness, and the good are made in the Nicomachean Ethics as well:

If, then, there is some end of the things we do, which we desire for its own sake (everything else being desired for the sake of this), and if we do not choose everything for the sake of something else (for at that rate the process would go on to infinity, so that our desire would be empty and vain), clearly this must be the good and the chief good. (EN I.2, 1094a18–22)

\(^{139}\) LSJ, s.v. τέλος.
Since there are evidently more than one end, and we choose some of these (e.g. wealth, flutes, and in general instruments) for the sake of something else, clearly not all ends are complete ends; but the chief good is evidently something complete. (EN I.7, 1097a25–28)

The question of what Aristotle means by the use of language such as good, best, noble, etc. with respect to the final cause (especially as the final cause appears in nature) is a heated one. It will not be settled here. However, we can note that one key aspect of his meaning is indicated by his choice of the word τέλος, which signifies the completion, fulfillment, or perfection of something. Final causes in general are the things for the sake of which other things happen, are done, or exist. But if this is to be the case, there must be at least one final cause that is for the sake of itself, or else there will be an infinite regress. Aristotle’s objection to the infinite regress in this case is not a logical one; rather, he objects that the infinite regress would destroy the good. Clearly, he identifies the good with a τέλος and with completion or perfection.

The identification of ends with goods is further reflected in the many passages in which Aristotle asserts that the final cause is a good (e.g. Ph. II.2, 194a32–33 and II.3, 195a23–26). This certainly accords with his statement that some final causes are beneficiaries—that is, those to whom some good is done. If the final cause in the sense of beneficiary is the one to whom good is done, then presumably the final cause in the sense of aim will be the good done him. If we further limit the beneficiary to an individual or a natural kind, we see that at least one uncontentious interpretation of “good” is possible: the survival and health of the individual.

For a living being, the full realization of its form represents its maturity, health, and continued

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140 For a sound outline of the problem and a lengthy list of pertinent literature, see Bedau, “Where Is the Good in Teleology?,” esp. 781, n. 1.
141 Johnson takes this route; see Johnson, Aristotle on Teleology, 90–93.
142 Balme, Charleston, Johnson and Lennox all interpret Aristotle’s use of “good” with respect to final cause in this way. See Balme, “Teleology and Necessity”; Charleston, “Aristotle and the Harmonia Theory”; Johnson, Aristotle on Teleology, 93; and Lennox, “Teleology.”
survival. Ill health and death represent a failure to achieve the form. This observation makes the
notion of final cause as good more accessible, and it will help us to understand better the
relationships among the formal, final, and efficient causes.

Chapter 2 focused on the meaning of natural form in Aristotle and on the relationship
between formal, efficient, and final causes necessary for understanding natural form. We will use
the concepts of ἐνέργεια and ἐντελέχεια as a means of understanding them better. Once we see
how these concepts can be used to articulate the way in which the causes relate to each other in
nature, we will be prepared to evaluate various possible schemes for interpreting Aristotle’s
teleology. In chapter 3, we will look at contemporary teleology; in chapter 4, the artifact model.
Finally, in chapter 5, I will present my own scheme for understanding Aristotle’s teleology—a
model based on his conception of the moral life.
Chapter Two

The Convergence of Formal, Efficient, and Final Cause

In chapter 1, I used the debate over mechanism to illustrate the need to understand better the relationships among the four causes. If we are to understand why mechanism does, in a sense, exist for Aristotle, while nevertheless there are no purely non-teleological causes in nature for him, we will have to understand more about how the causes are related to one another.

We will explain their relation by focusing initially on form in the context of the causes. If we trace εἴδος through the corpus, beginning with its most basic usages, we will see why the form of a thing can both be a source of motion (an efficient cause) and an end (a final cause). I shall argue that the key to grasping the connections among the three causes will ultimately be to understand form as ἐνέργεια or ἐντελέχεια, for it is in these concepts that we see form in its most robust sense, as something able to play the roles of efficient and final cause.

Understanding form as ἐνέργεια will help us to argue against functionalism as a genuine teleology in chapter 3 and to point out the shortcomings of the artifact model in chapter 4. Both functionalism and the artifact model treat form as a διάθεσις instead of an ἐνέργεια and thus miss the causal convergence that is such an important part of Aristotle’s teleology. Part of the goal of this chapter is to distinguish between διάθεσις and ἐνέργεια in order to show that the convergence among the formal, final, and efficient causes occurs at the level of ἐνέργεια. As we will see in chapters 3 and 4, this leads to problems for both functionalism and the artifact model, because in these accounts form remains at the level of διάθεσις. Although there are διαθέσεις in nature, the forms of plants and animals are not simply διαθέσεις, they are ἐνεργείαι, and any model or theory that fails to account for this status will thus miss how form issues in efficient
and final, as well as formal causality. In chapter 5, I will try to propose a model that does not have this short-coming.

I. Form and Final Cause

We have seen that the debate over mechanism demands a more thorough account of final cause and its relation to form and efficient cause. We begin here by considering the relation between form and final cause. \( \varepsilon \tilde{\delta} \sigma \varsigma \) is undoubtedly one of the most important principles in Aristotle’s philosophy. It not only represents his departure from Plato’s metaphysics, but also plays vital roles in his physics, biology, and psychology. In recent decades, much scholarship on Aristotle focused on the physical and biological roots of his metaphysics.\(^{143}\) However, more recent scholarship has suggested that, on the contrary, many of the principles that underlie his physical works are in fact primarily metaphysical.\(^{144}\) I want to suggest that the latter position is correct with respect to the concept of form, and that although important passages concerning \( \varepsilon \tilde{\delta} \sigma \varsigma \) are to be found in the \textit{Physics}, \textit{de Anima}, and the biological works, Aristotle’s basic conception of \( \varepsilon \tilde{\delta} \sigma \varsigma \) relies on an important metaphysical principle—the distinction between actuality and

\(^{143}\) This view of Aristotle can be found as early as D’Arcy Thompson’s 1910 translation of \textit{Historia Animalium} and is perhaps most famously expressed in Grene’s \textit{Portrait of Aristotle}. The thesis can also be found in Gotthelf, “Aristotle’s Conception of Final Causality”; Bradie and Miller, “Teleology and Natural Necessity”; Charles, “Aristotle on Hypothetical Necessity”; and, although it is not always explicitly stated, its influence can easily be found elsewhere in the literature (e.g. in Cooper, “Aristotle on Natural Teleology,” in which the author argues that the basis of Aristotle’s teleology is the natural fact that species are eternal).

\(^{144}\) In the early 1960s, David Balme began to urge that Grene and others had gotten things backwards (see Balme, “\textit{Genos} and \textit{Eidos} in Aristotle’s Biology” and “Aristotle’s Use of the Teleological Explanation”), and the trend he began has continued and grown into the present. See for example, Mirus, “Metaphysical Roots of Aristotle’s Teleology”; Cameron, “Ontology of Aristotle’s Final Cause”; and Furley, “What Kind of Cause.” In the latter article, the author does not argue explicitly for metaphysical foundations in teleology, but does assert—in his own words, “heretically”—that final cause in Aristotle is tied to metaphysical notions of good and form.
potentiality—without which it is impossible to understand how \( \varepsilon \tilde{\delta}o\varsigma \) operates in nature. That said, the various metaphysical roles played by form are so vast and so controversial, that it would be impossible to do justice to them here. My own approach will be to focus on the role of form in natural philosophy, without however neglecting at least some of the metaphysical implications of form. In particular, I will emphasize that form is, for Aristotle, \( \dot{\varepsilon} \nu\acute{\varepsilon}ρ\gamma\varepsilon\iota\alpha \) and \( \dot{\varepsilon} \nu\tau\epsilon\lambda\acute{\varepsilon}\chi\varepsilon\iota\alpha \) and that to miss that point is to fail to grasp what form really accomplishes in his natural philosophy. However, I will avoid getting into the other metaphysical aspects of form—in particular form as substance and essence. Another dissertation could be written on how neglect of those two metaphysical concepts and their relationship to form has also had an unfortunate effect on our understanding of Aristotle’s natural philosophy. But doing so is not part of my project here and will not be necessary in order to make the points I wish to make—namely, that both functionalism (chapter 3) and the artifact model (chapter 4) fail, in different ways, to capture what Aristotle means by final cause.

My method here will be to examine various usages of the term \( \varepsilon \tilde{\delta}o\varsigma \) as it is found in the logical, physical, and metaphysical treatises. Although we must remember that for Aristotle these three fields are not radically separate, it is helpful to observe that \( \varepsilon \tilde{\delta}o\varsigma \) admits of varying shades or strengths of meaning. In particular, we can see how in some texts \( \varepsilon \tilde{\delta}o\varsigma \) signifies little more than accidental being, in others the specification of a definition, and in others some kind of actuality. Tracing \( \varepsilon \tilde{\delta}o\varsigma \) through these usages will help us to develop a full spectrum of meanings for form, from the weaker to the stronger. We will see that the strongest meanings of form, found in the concepts \( \dot{\varepsilon} \nu\acute{\varepsilon}ρ\gamma\varepsilon\iota\alpha \) and \( \dot{\varepsilon} \nu\tau\epsilon\lambda\acute{\varepsilon}\chi\varepsilon\iota\alpha \), imply the convergence of form with
final and efficient cause, and we will see that it is form in this strong sense that Aristotle believes applies to natural objects like plants and animals. Finally, in later chapters, we will see how a failure to see that natural forms are forms in this strong sense distorts our understanding of teleology.

I.1 The Weaker Senses of ἔ̱ἶδος: Form as Accidental Being and as the Being Specified by a Definition

Aristotle uses the term ἔ̱ἶδος in a variety of ways. Bonitz\(^\text{145}\) isolates four primary uses: first, to indicate the physical shape of an object (in this sense, ἔ̱ἶδος is interchangeable with μορφή); second, as a synonym for “type” or “sort” (just as we might say, “Spaghetti is one form of pasta.”); third, in reference to the Platonic Forms; and fourth, as a technical term designating an ἀρχή of nature that is one of the four αἴτια and that is the essence of a natural object. We are ultimately concerned with the fourth usage (form in the “strong” sense). However, taking the first and second usages into account helps us to see how the stronger sense of form is built upon the more basic senses. On the one hand, Aristotle sometimes uses form to indicate accidental being. At other times, he clearly uses form to indicate more substantial aspects of an object. In this section, I briefly discuss his use of ἔ̱ἶδος in the first sense, as a term that designates the aspects of an object that can change even as its underlying being remains the same.

In the Physics Aristotle introduces form as a principle of change and as one of the two main loci for nature, along with matter. We will explore this more fully below.\(^\text{146}\) For now, it is enough to observe that in his discussion of change in Physics I.7, he isolates three principles: the

\(^{145}\) See Bonitz, Index Aristotelicus, s.v. ἔ̱ἶδος.
\(^{146}\) See pp. 115–121 below.
presence of form, the absence of form, and the underlying substrate that receives and loses the form. This description of change is expressed over and over in the corpus (e.g., at GC I.3, 318b17; Metaph. VIII.5, 1044b33; X.4, 1055b13; XII.2, 1069b34; and XII.3, 1070b11 and 18). Change, for Aristotle, involves the presence and absence of form. What was pale becomes tan; what was uneducated becomes educated. As a principle of change, form is anything that can inhere in a substrate, including purely accidental being. Adjectives such as “musical” (Ph. I.7, 190b27), “white” (Metaph. IX.7, 1049a35), and “hot” (Metaph. XII.3, 1070b11), all of which are accidental, express such forms. Indeed, in these texts it makes no difference whether the attribute is accidental, proper, or essential.¹⁴⁷ Thus we see that Aristotle sometimes uses the term ἐἶδος to refer to attributes of any sort, even those which are accidental to a particular substance.¹⁴⁸

However, although this is a good starting point—it is how form might enter philosophical discourse—it is only the very beginning of a sufficient account of Aristotelian form. In one sense, any attribute, including one that is accidental in the sense that it may or may not inhere in the substance, seems to count as a form in this weak sense. In a stronger sense, form is the being specified in a definition. For Plato’s Socrates, the search for definitions led ultimately to the Forms, and many passages in the corpus make it clear that Aristotle, too, considers form to be integral to definition. Such forms still fall into a category predicative of substance, rather than

¹⁴⁷ Musicality and whiteness, for example, are explicitly treated as accidental (Metaph. V.7, 1017a10 and VI.2, 1026b35).
¹⁴⁸ Note, however, that even attributes such as “musical” or “white” are non-accidental insofar as their inherence in the substance is dependent on the nature of that substance. It is either essential, or at least proper, for man to have both aural perception and intellect, so that he is essentially the sort of being capable of being musical or not. Likewise, it is part of man’s nature that his body be constituted in such a way that his skin reacts to sunlight. In this way, even accidental qualities represent a spectrum of traits naturally capable of inhering in a substance.
being substances themselves. Yet because definitions are meant to indicate the key attributes of an object—those attributes that make it this sort of object, and not another—definitions point in the direction of substance. Examining some of the passages that discuss form in relation to definition will help us to find a bridge to stronger, more substantial, senses of form.

In the initial introduction of the concept of form as one of the loci for nature, Aristotle describes form as that “which is specified in the definition of the thing [κατὰ τὸν λόγον]” (Ph. II.1, 193a31). Here, form is not accidental, but is the being specified in the definition of an object—that is, the secondary substance of the Categories. A few lines later, Aristotle defends the idea that form is more the nature than matter is by asserting that “What is potentially flesh or bone has not yet its own nature, and does not exist by nature, until it receives the form specified in the definition, which we name in defining what flesh or bone is” (Ph. II.1, 193b5-10). This passage links form with nature and actuality as well as definition. Aristotle argues that when an object lacks what is specified in the definition, it has its nature only potentially. The being

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149 See Categories 2 and 5. For example: “The species in which things primarily called substances are, are called secondary substances, as also are the genera of these species. For example, the individual man belongs in a species, man, and animal is a genus of the species . . . [I]f something is said of a subject both its name and its definition are necessarily predicated of the subject. For example, man is said of a subject, the individual man, and the name is of course predicated . . ., and also the definition of man will be predicated of the individual man . . . .” (Cat. 5, 2a15–24) Forms, such as “man” are treated here as secondary substances, which are predicated of primary substances (matter-form composites), such as individual men.

150 I will describe in section I.1 below a logical progression from form as it is treated in the organon—as a logical concept subject to analysis within the categories—toward the more robust sense of natural form found in the Physics. It is not clear that this represents either the progression of Aristotle’s own thought, nor his ideas about how we normally come to know form. On the contrary, it seems that we initially know natural forms as parts of composites and, in a confused way, as secondary substances. Only later would we conduct the logical analysis that would distinguish between essential and accidental qualities. That would be consistent with Aristotle’s remarks about knowing wholes prior to parts at Ph. I.1 and of experience, science, and the knowledge of universals at Metaph. I.1. I organize this discussion differently in order to outline the roles that form plays in Aristotle’s philosophy, from the more simple to the more complex.
specified in the definition represents a more technical sense of εἶδος than the one discussed above, since it will not include accidental features, such as “white” or “hot,” nor proper accidents such as “risible” is of man, or “having angles equal to two right angles” is of triangles. Instead, here we find the form that constitutes the nature of the object. Since it is the nature of the object that exhibits causes, it is such features that we must attend to.\footnote{We must be careful not to confuse Aristotle’s assertion that attributes have essences, in a way analogous to substances, with the idea that certain features pertain to the essence of the object. In \textit{Topics} I.8 and \textit{Metaphysics} VII.1 and 5, Aristotle discusses attributes as signifying τι ἐστι and τὸ τί ἦν ἐίναι. In \textit{Metaphysics} VII.5, he makes it clear that this is a case of πρὸς ἐν equivocation: “[T]he ‘what’ belongs simply to substance, but in a limited sense to the other categories. For even of quality we might ask what it is, so that a quality also is a ‘what’ . . . .” (\textit{Metaph.} VII.5, 1030a22–25). The point here is that being red is something essentially different from being white. However, this does not imply that redness or whiteness are necessarily part of the essence of the substance of which they are predicated.}

Definitions, then, specify natures by specifying forms. Although Aristotle often debates whether the definitions of certain things ought to include matter, he is always clear that for any definition to be a proper definition, it must specify the form (\textit{de An.} I.1, 403b2 ff.; \textit{Metaph.} VII.10, 1035a21 and b32). He further tells us that the key to giving a true definition, one that expresses the form, is to give the differentia (\textit{Metaph.} VIII.2, 1043a20-21). A differentia demarcates a portion of a genus and thus provides a boundary within which the term being defined is to be found, as well as the attributes found within that boundary. It is no surprise, then, that the term εἶδος is often found in context with terms designating boundaries and limits (\textit{Cael.} IV.3, 310b15; IV.4, 312a12; \textit{GC} II.8, 335a16; and \textit{Metaph.} II.2, 994b16 and XI.11, 1067b9).

Moreover, these boundaries must be set in a definite way. If then a differentia of a differentia be taken at each step, one differentia—the last—will be the form and the substance; but if we divide according to accidental qualities, e.g. if we were to divide that which is endowed with feet into the white and the black, there will be as many differentiae as there are processes of division. Therefore it is plain that the
A differentia delimits a species, at once setting it apart extensionally from the rest of the genus and also giving it unity by drawing an intensional boundary. In the passage just quoted, it is that unity that is in question. Not just any attribute shows the unity of a species; some attributes are accidental to their subject and fail to designate the substance of the thing. Unlike form as mere attribution, form as that which is specified in the definition must set intensional boundaries—in particular, it must throw out accidental attributes. What is left will be what is given in the definition, the formula that expresses the essence, form, and substance. In this sense, boundary-drawing has both additive and subtractive effects. The boundary not only excludes accidents, it also defines the object intensionally. As Mirus observes, “The primary significance of actuality as limit is not the exclusion of other ways of being, but the positive and definite character of what truly is.” This is why the form specified in the definition gets at the nature and essence—it not only explains what the object is not, but what it is as a substance.

Form as substance may still appear logically as a kind of predication: “What is still weather? Absence of motion in a large extent of air” (*Metaph.* VIII.2, 1043a22–23). In fact, when we move from form as accidental being to the form specified in a definition, we make a metaphysical shift toward substance that is not entirely captured by our grammar. At 1038a26, Aristotle states that the last differentia is both form and substance. In a definition, the attributes that appear to be predicated of a substance in fact indicate the substance itself—the “is” of definition is the “is” of substance, not of attribution: “Air is the matter, and absence of motion is the actuality and substance” (*Metaph.* VIII.2, 1043a24). As Aristotle explains in *Metaphysics*

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V.7, one sense of “being” or “is” is accidental, and another is being according to a thing’s own nature. In the latter sense, there are as many sorts of being as there are categories, and one sense is substance: “[S]ome predicates indicate what the subject is, others its quality, others quantity, others relation, others activity or passivity, others its place, others its time . . . .” (Metaph. V.7, 1017a25–26). Essential characteristics, described in the definition, show what the subject or substance is: “The essence, the formula of which is a definition, is also called the substance of each thing” (Metaph. V.8, 1017b22).

The essence, which counts as the substance of the object, is, Aristotle tells us, the form and the actuality of that object. In fact, we have already seen him use “actuality” (ἐνέργεια) in reference to the essence specified by the definition (Metaph. VIII.2, 1043a24). In the case of natural objects, this essence, substance, form, and actuality is also their nature:

Nature is the substance of natural objects . . . . Hence as regards the things that are or come to be by nature, though that from which they naturally come to be or are is already present, we say they have not their nature yet, unless they have their form or shape. That which comprises both of these exists by nature, e.g. the animals and their parts; and nature is both the first matter . . . and the form or substance, which is the end of the process of becoming. (Metaph. V.4, 1015a1–11)

Here we see nature, substance, actuality, and form drawn together in the account of natural change. A natural object is only actual—only has its full nature—when it possesses its form, because nature is both matter and form, but the form is responsible for actualizing the matter. This further allows us to see form as an end, a concept we will turn to shortly.153 Before we can do so, we must discuss nature and its relationship to form and efficient cause at greater length.

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153 See section I.3 below.
In this section we have discussed two senses in which Aristotle uses εἶδος: first, to designate any features inhering in an object, including accidental ones; and second, to designate the being specified in the definition of an object. The latter usage indicates a more robust sense of form, since it designates the essence, substance, and nature of the object. This use of form in definitions gives our investigation a clearer direction—we must investigate form as the substance and essence of natural objects.

I.2 Form, Nature, and Efficient Cause

If the forms of natural objects go beyond mere attribution and actually define their natures, then we must say more about the relationship between form and nature. In fact, for Aristotle form is nature in the primary sense, and as we will see, form as nature is responsible for the frequent convergence between formal and efficient cause in natural objects.

In the Physics, form is introduced primarily as a principle of change. Aristotle begins Physics II.2 with a discussion of nature as an internal principle of change, and indeed change occupies his thinking throughout that work.

Of things that exist, some exist by nature, some from other causes. By nature the animals and their parts exist, and the plants and the simple bodies (earth, fire, air, water)—for we say that these and the like exist by nature.

All the things mentioned plainly differ from things which are not constituted by nature. For each of them has within itself a principle of motion and of stationariness (in respect of place, or of growth and decrease, or by way of alteration). On the other hand, a bed and a coat and anything else of that sort, qua receiving these designations—i.e. in so far as they are products of art—have no innate impulse to change. (Ph. II.1, 192b8–19)

In the definition of φύσις in Metaphysics V.4, Aristotle also focuses on change:
From what has been said, then, it is plain that nature in the primary and strict sense is the substance of things which have in themselves, as such, a source [$\dot{\alpha}r\chi\dot{h}i\nu$] of movement; for the matter is called the nature because it is qualified to receive this, and processes of becoming and growing are called nature because they are movements proceeding from this. And nature in this sense is the source of the movement of natural objects, being present in them somehow, either potentially or actually. (Metaphysics V.4, 1015a13–19)

We derive several insights into Aristotle’s view of nature from these passages. First, Aristotle’s understanding of nature rests on a distinction between artifacts and natural bodies and presupposes that we have observed this distinction and will not contest it. It is a matter of observation that natural bodies distinguish themselves by inherent tendencies for various types of change, tendencies that are lacking in products of art. Second, Aristotle considers nature an $\dot{\alpha}r\chi\dot{h}i$—that is, a principle, source, origin, or beginning. Of $\dot{\alpha}r\chi\alpha'i$, Aristotle writes in the Metaphysics:

It is common, then, to all to be the first point from which a thing either is or comes to be or is known; but of these some are immanent in the thing [$\varepsilon\nu\nu\pi\acute{\alpha}r\chi\omega\sigma\alpha'\iota$] and others are outside. Therefore the nature of a thing is an origin [$\dot{\alpha}r\chi\dot{h}i$]. . . . (Metaph. V.1, 1013a17–20)

$\dot{\alpha}r\chi\alpha'i$ in general are principles of either being, becoming, knowledge, or movement, and they can reside within or without the things that exist, become, know, or move. Nature counts as an $\dot{\alpha}r\chi\dot{h}$ because it is a principle of movement contained within the mover itself. But in what does this principle consist? In the lines preceeding those quoted above, Aristotle notes, “Causes are spoken of in an equal number of senses [as $\dot{\alpha}r\chi\alpha'i$]; for all causes are origins” (Metaph. V.1, 1013a16). Since nature is a principle of movement and rest, and principles are spoken of in as many way as causes, each of the four causes is, in a sense, the nature of an object. However,
Aristotle will argue that the formal cause has more reason to be called the nature than the other causes.

First, both form and matter are introduced as possible loci for nature. Some of Aristotle’s predecessors, for example Empedocles, had identified pairs of contraries as the foundational principles of reality and as explanatory of change, but Aristotle realizes that something more is needed—a substrate in which the contrary qualities or forms can inhere—and he improves upon the work of his predecessors by using the matter/form distinction in this context. In Physics II, it quickly becomes apparent that the matter/form distinction not only grounds the possibility of contrariety and change, but that in doing so, it is also the starting point for natural philosophy. Because it provides the conceptual framework needed to explain change, the matter/form distinction provides the first ἀρχαί (matter and form) necessary for the study of nature, and Aristotle begins his own account of natural philosophy in Physics II by first identifying nature itself with matter and form. Indeed, both matter and form have some claim to be considered nature in their own right, matter because it is a substrate, form because it is an actuality.

Some identify the nature or substance of a natural object with that immediate constituent of it which taken by itself is without arrangement, e.g. the wood is the nature of the bed, and the bronze the nature of the statue. As an indication of this Antiphon points out that if you planted a bed and the rotting wood acquired the power of sending up a shoot, it would not be a bed that would come up, but wood which shows that the arrangement in accordance with the rules of the art is merely an accidental attribute, whereas the substance is the other, which, further, persists continuously through the process. (Ph. II.1, 193a9–17)

The unarranged, unformed material of an object seems to have some claim to the status of nature, since it is what the thing is at its most basic and reduced level, since it persists through change, and since, as Antiphon’s example shows, it plays a key role in generation. However, the example of Antiphon in fact serves to lead us away from equating nature with matter alone. For the rotting
wood of the bed would not produce unformed wood—but rather a tree. Form, then, is clearly key to generation, one of the types of change whose source is nature, as pre-Socratics such as Empedocles and Anaxagoras well understood. Matter provides a means to account for why every change does not entail absolute destruction and creation. But Aristotle emphasizes that form, not matter, provides for the change itself, and thus has more claim to be called the nature. If the rotting wood of the bed were to grow, its motions would produce a tree, showing that the natural and original form of the material has a power that the artificial, imposed form lacks. But note that the natural form drives this change precisely because it has remained a final cause for the object. However unlikely such a turn of events might be, it would be the tree—not the bed—that would propose itself as a goal toward which the object might naturally move. This also means that natural form acts as an efficient cause, because it is the persisting form of the tree—not any feature of the bed or the wood itself—that drives the change toward the goal.

Before explicating this relationship further, it will be helpful to provide a more realistic example. To this end, we might consider the differences between plant and animal embryogenesis. As Aristotle observes in the *de Anima*, the difference between plant and animal forms or souls is that while both have powers of nutrition and reproduction, only animals have powers of sensation, appetite, and (in most cases) locomotion (*de An.* II.2, 413a31–b4). We can see these formal differences reflected in even the early stages of embryogenesis, the process that begins with the fertilization of a seed or egg and ends with readiness for maturing into an adult member of its species. In plants, that process generally ends in dormancy—germination must occur for further maturation—while in animals, embryogenesis is continuous with the birth of

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154 For Empedocles’s account of change, see KRS 348–9. On Anaxagoras, see *Physics* I.4, 187a23 ff. or KRS 485.
the infant. Such differences in development can be understood in terms of the differing forms of plants and animals. Since it is the nature of plants to be immobile and thus endure the risk that their seeds may fall on unsuitable ground or during seasons unsuitable to growth, a fertilized seed must be able to lie dormant but still fertile for some period of time if the species is to continue. If plants required that the maturation process begin immediately upon embryogenesis, far fewer plants would be capable of reproducing. Fittingly, plant embryogenesis consists of several distinct stages during which basic morphology is established, primary tissue types are distinguished, a nutrition storage organ is produced, and chemical, morphological, or physiological characteristics develop that cause the seed to become dormant. These phases of activity and the order in which they occur are geared toward the production of a seed with particular requirements—that it be able to withstand a period of non-germination that may include low temperatures and lack of water and nutrients, and that it be capable of breaking out of that period when environmental conditions are favorable. Thus, the embryogenesis of plants as a process of change is distinctly oriented toward the nature of plant life and its requirements. For Aristotle, this would be an example of form driving change.

A few plants, such as certain species of mangrove and water trumpet are viviparous—seeds germinate while still attached to the parent plant. These do not undergo the dormant stage described above. (See Goebel, *Organography of Plants*, 255–57.) However, in general, plants share basic formal characteristics that animals do not, characteristics that make dormancy an appropriate stage in their development. Of course, there are formal differences among particular species that require slightly different processes of embryogenesis. Thus, the viviparous plants are among the tropical and water plants, whose seeds are generated in an environment suitable for immediate germination and maturation. The contrast I draw here between plant and animal embryogenesis is meant to illustrate the role of form in driving change. I do not mean to imply that Aristotle knew these botanical and zoological facts, only that if he had known them he might easily have used them to support his claim that form drives change. Aristotle’s own account of animal embryogenesis makes clear use of the convergence of form, efficient cause, and end—all of which he locates in the male parent. However, we should not be distracted by the inaccuracies of Aristotle’s biology, since the principles represented by the causes can indeed be found in nature.
In animals, by contrast, the process of embryogenesis is continuous with birth. Again, the process consists of several distinct stages that occur in a definite order, from implantation, through continuous development of the central nervous system and organs, to the fetal stage that occurs in viviparous animals. Because animals have the formal features of sensation, appetite, and (in most cases) locomotion, they have greater control over their survival and that of their young. Thus, they do not face the difficulties that plants, with their more limited formal characteristics, face with regard to the availability of water and nutrients. These differences in form—the capacity for sensation, appetite, and locomotion, or its absence—are reflected in the process that brings plants and animals into existence. In plant embryogenesis we see preparation for a period of dormancy, while in animal embryogenesis we do not. These differences are more clearly attributable to their respective forms than to their matter. Thus, an Aristotelian philosophy of nature would cite such processes as examples of form acting as efficient cause and driving change within a natural substance.

I.3 The Convergence of Formal and Final Cause Through Efficient Cause

As the embryogenesis example shows, form drives natural changes by specifying the natural object’s abilities and therefore specifying the manner in which change must occur. But in order for change to be instigated at all, the form must also act as a final cause. Were the mature plant

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156 This is perhaps hard to prove strictly. However, one might entertain a thought experiment in which animal-shaped creatures capable of sensation, locomotion, etc. were made entirely of sap, bark, etc., while non-sentient and plant-shaped creatures were made of blood, bones, etc. No doubt their matter would not be ideally suited to their respective lives, but in any case, their form—most importantly the capacity or incapacity for locomotion—would still determine the most efficient process of embryogenesis. Because of their different capacities for locomotion, the wooden animal would derive no benefit from a period of dormancy, and the flesh-and-blood plant would be harmed by continuous development. It is not primarily matter, but form and its capacities that set the conditions for change, because it is the form that is to be realized in the mature animal—the matter is already present, so it has no further conditions to set.
or animal not a goal for the embryo, no process of change—of whatever sort—would be necessary at all. We must now develop the relationship among the causes more precisely.

In *Physics* II.3, Aristotle introduces causality as four-fold, building on the concepts of matter and form that were already introduced in *Physics* I.7 as the principles that explain change, and which were developed in *Physics* II.1–2 as fundamental concepts of nature. Then he reaffirms his definition of nature as a source of change by stating that αἰτία are primarily involved in changes.

For since this work is for the sake of knowing, but we think 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), it is clear that we too must do this about both coming into being and passing away and about every natural change, so that, once we know them, we may try to lead back to them each of the things we inquire about. (*Ph.* II.3, 194b17–23)

The four αἰτία, as outlined in both *Physics* II.3 and *Metaphysics* V.2, are primarily sought regarding changes, rather than states or beings.¹⁵⁷ These four αἰτία are the material, “that out of which a thing comes to be and which persists” (*Ph.* II.3, 194b24); the formal, “the definition of the essence” (*Ph.* II.3, 194b28–29); the efficient, “the primary source of the change or rest” (*Ph.* II.3, 194b29–30); and the final, “in the sense of end or that for the sake of which a thing is done” (*Ph.* II.3, 194b II.3, 32–33).¹⁵⁸ Aristotle then describes modes of causation: particular or genus, proper or accidental, complex or simple, potential or actual. These concepts add layers of

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¹⁵⁷ This is not always the case, of course. One may inquire about the cause of health (a state) or of a bed (a being), but such questions turn out to be inquiries about change: “How did he come to be healthy?” or “Where did this bed come from?” In other words, inquiries about the causes of states and beings are normally inquiries about their generation. Even the cosmos as a whole has a cause for Aristotle only insofar as it undergoes change. As for the Prime Mover itself, it is probably nonsensical to ask what its cause might be, since it is entirely static and self-contained.

¹⁵⁸ The parallel passage at *Metaphysics* V.2, 1013a24–33, runs, “We call a cause (1) that from which (as immanent material) a thing comes into being . . . . (2) The form or pattern, i.e. the formula of the essence, and the parts which include this . . . and the parts of the formula. (3) That from which the change or the freedom from change first begins . . . . (4) The end, i.e. that for the sake of which a thing is . . . .”
precision, allowing us to home in on specific ἀτιά; they are not, however, distinct types of ἀτιά in their own right. Each of the four ἀτιά primarily explain changes: objects coming into being through generation or production, actions resulting from deliberation, and changes in state (such as health) arising through underlying processes.¹⁵⁹

In nature, we find that the efficient and final cause often converge with the form. The efficient cause is the instigator of change—either locomotion, alteration, or substantial change. Thus, “the man who has deliberated is a cause, and the father a cause of the child, and in general the maker a cause of the thing made and the change-producing of the changing” (Metaph. V.2, 1013a30–32). On the other hand, the final cause or end is that toward which the change tends: “that for the sake of which a thing is, e.g. health is the cause of walking” (Metaph. V.2, 1013a32). We saw in the example of embryogenesis how form and efficient cause can converge, so that through its capacities and functions, form drives change. In natural objects, this change is generally directed toward the preservation, flourishing, or reproduction of the animal. Although this means the preservation, etc. of a form/matter composite, it is the form that is key to the change itself, not the particular matter. Over the course of its life, an animal’s cells are gradually replaced. The offspring of an animal does not share the same matter as its parent. But the form of both the animal and its offspring are maintained. Thus, growth, locomotion, procreation, the functioning of internal organs and systems, and so on, have for their end the maintainance of form. Form is in this sense clearly a final cause for natural objects.

¹⁵⁹ Specific examples occur at Physics II.3, 194b16–195a2; II.7, 198a 14-35; and Metaphysics V.2, 1013a24–1013b3.
Aristotle’s position that formal, efficient, and final cause all converge is further bolstered by his introducing all four αἰτία as principles of nature, which is, in turn, the principle of movement inherent in natural objects. All four—and not the efficient cause alone—are principles that drive and explain change in the natural world. Again: “Causes are spoken of in an equal number of senses [as ἀρχαί]; for all causes are origins [ἀρχαί]” (Metaph. V.1, 1013a16–17).

Nature’s αἰτία are its principles and origins; αἰτία are, in a way, nature itself, and form is nature in a pre-eminient way. Efficient cause is, of course, most clearly an instigator of change. But when we compare causal accounts of natural objects to those of artifacts, one of the most glaring differences is that the former have their efficient and final causes within themselves, while the latter do not. The carpenter is the efficient cause of the table, and the use, beauty, or sale of the completed table is its final cause; but the efficient cause of the cat is within itself—its form and attendant capacities—and its final cause is the maintenance of that form. It is partly this convergence of formal, efficient, and final cause that lends natural forms their innate power and sets them apart from artifacts.

As chapter 1 argued, part of the opacity of final cause arises from the fact that it is inborn in natural objects. As we saw above, for Aristotle, nature itself is an internal principle. This internality is reflected in each of the four causes. The definition at Physics II.1, 192b14 clearly implies that efficient causes are frequently inborn (both plants and animals grow and mature from within). As Aristotle then proceeds to note, matter and form are even more clearly φόσις; they are inborn principles of change. The material cause is defined as that out of which a thing comes and which persists in the thing. The formal cause is likewise what is specified by the
definition of what it is to be something and is clearly part of the thing itself (Ph. II.1, 193a31).

But the inborn nature of final cause is, at first glance, puzzling.

Many final causes are external, and one has little trouble identifying them. The goals of conscious, intentional behavior, for example, generally lie outside of the animal that acts—food, shelter, and so on, are the external aims toward which the animal moves. In the realm of functions, as well, the final cause is in general outside of the organ that possesses the function. The function of the heart is to circulate the blood—not for the sake of the heart—but for the health of the animal. Both objects and beneficiaries are frequently external—the goal of the bird’s hunting is both the worm and the feeding of her children. Thus, the notion of final cause as inborn often produces confusion. Perhaps partly because of our reliance on the artifact model (of which more will be said in chapter 4), we tend to look for final causes—and, to some extent, efficient causes—outside of objects. Artifacts are, after all, produced by us for our purposes, and so we are their efficient and final causes. We are puzzled because we tend to look for a final cause external to the object. It may appear at first glance that only matter and form constitute the inner dimension of natural objects, while efficient and final causes are extrinsic. Ackrill expresses this confusion as follows:

Granted that we can explain the function of some part or activity by reference to the preservation of the whole animal, does it make sense to speak of the function of the animal as a whole? Does it and its life serve a purpose? . . . ‘What is a dog for?’ sounds odd, as odd as ‘What is a star for?’

But I suggest that this question is not odd, only a little misguided, and the confusion that Ackrill expresses can be cleared up by using language more precisely and focusing attention on the link between formal, final, and efficient cause.

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160 Ackrill, Aristotle the Philosopher, 44.
Wallace deals with the issue of causal convergence at some length and adopts a powers model to address the issue.\textsuperscript{161} As he argues, the final cause is contained in the very definition of nature.\textsuperscript{162} Since nature is a principle of motion and rest, and all motion is the actualization of a potential, both final and efficient cause are part of the definition of nature. The internal convergence of the causes is to be understood in this way: By virtue of their forms, natural bodies possess various powers—potentials for some end. These powers give them information about their environment and enable them to interact with this environment, and so it is on account of these powers that natural bodies can be agents.

[T]he natural form does not produce any activity directly; rather it does so through the powers that, ontologically speaking, are its proper accidents. The form acts, but only through the natural powers with which it is endowed, and it is in this way that agency can be attributed to it. And when it acts in this way, it acts for ends that are consonant with its nature, and so can also be seen as a final cause.\textsuperscript{163}

Form is the final cause for two reasons, and these reasons correspond to the first and second actuality.\textsuperscript{164} First, form represents the first actuality (i.e. the soul), by virtue of which the animal is a living being and has certain capacities, such as nutrition, sensation, appetite, locomotion, and imagination. Because form entails a distinct collection of capacities, form determines the species to which a natural object belongs (\textit{de An.} II.3, 414b32–35). Second, the form—through the further actualization of its powers or capacities—is able to act to maintain the animal in its actuality. In this sense form is active; efficient cause belongs to it, since it is the principle through which reproduction occurs (\textit{GA} II.1, 732a 5; \textit{Metaph.} XII.4, 1070b31). A natural object

\textsuperscript{162} Wallace, “Is Finality Included in Aristotle’s Definition of Nature?,” 69.
\textsuperscript{163} Ibid.
\textsuperscript{164} More will be said below about these two distinct roles that form plays as final cause. See pp. 139–45 below.
is a special type of matter-form composite—one whose form acts as an end or goal. When the
form stands as a goal, it is a final cause in the sense of the good for the object—it represents the
object’s health, survival, and participation in the eternal by means of reproduction. Therefore, the
soul of the object is first of all its natural form, giving it a distinct shape and set of functions and
powers. Second, the form stands as a final cause, the goal toward which change in the object
occurs. Third, the form, through its capacities, drives change toward the goal.

Thus, in *de Anima* II.4. Aristotle asserts the convergence of formal, final, and efficient
causes in the soul when he observes that the soul is “the source of movement, it is the end, it is
the essence of the whole living body” (*de An.*, II.4, 415b11). Note that each cause is part and
parcel of the animal itself. None of the four causes in this case is external. Aristotle’s treatment
of final cause in the biological works bears this out. Only in one instance (*PA* IV.13, 696b28–32)
does he suggest that final cause might lie outside of the animal or plant itself. In every other case,
organs and functions are found to be for the sake of the creature’s survival or well-being or for
the reproduction of its form.

When Aristotle emphasizes that natural forms act as final causes in nature, he refers to
them as actualities, essences, and substances. “By form I mean the essence [*τὸ τί ἐνέκινετο*] of
each thing and its primary substance” (*Metaph.* VII.7, 1032b2–3). The link between nature, form
as essence, and substance, is made clearly in *Metaphysics* V.4:

Nature is the substance of natural objects . . . . Hence as regards the things that are or
come to be by nature, though that from which they naturally come to be or are is already
present, we say they have not their nature yet, unless they have their form or shape . . . .
And from this sense of ‘nature’ every substance in general is in fact, by an extension of
meaning, called a ‘nature,’ because the nature of a thing is one kind of substance.
(*Metaph.* V.4, 1015a1–8)
In this passage, Aristotle appeals to metaphysical principles to explain natural objects and natural change. Natural objects are counted as substances on account of their forms. As nature and essence, form is the very being or substance of a natural object. Natural forms are goals of growth and behavior. All of the natural changes a plant or animal undergoes aim at maintenance of its form. We have now developed our understanding of form from accidental attributes, to the essence designated by a definition, to the principle in living bodies that represents their source of motion, their end, and their essence. In the latter, fully developed sense of form, we see Aristotle appealing to the concept of actuality. In the following section we explore actuality more fully.

**II. The Role of Form in Teleology**

We must show the place of actuality in Aristotle’s concepts of nature and form. Since his account of form in the robust sense is an account of nature, essence, and actuality, it is also more than an account of mere arrangement or structure. I will use the concepts of διάθεσις and ἐνέργεια to establish the distinction between form that is merely structural and form that is the nature and actuality of a natural object. This will also explain what it means for form to converge with final cause and will lay the groundwork for later chapters, in which we will see that both functionalism and the artifact model fall short of Aristotle’s account by treating form as merely structural. Thus the distinction between διάθεσις and ἐνέργεια will become important in my discussion of functionalism in chapter 3 and of the artifact model in chapter 4.
II.1 Actuality: Ἐνέργεια and Ἐντελέχεια

In order to articulate the idea that form and final cause are actuality, Aristotle coins two new words: Ἐνέργεια and Ἐντελέχεια. The former is usually translated as activity, or actuality; the latter is somewhat harder to translate succinctly, but might be rendered as “full, complete reality” and has the sense of completion, perfection, or fulfillment. Form is identified with both Ἐνέργεια and Ἐντελέχεια (e.g., de An. II.1, 412a10; II.1. 412b28–413a1; II.2, 414a16), and both terms are often translated “actuality,” with little distinction made between them. Indeed, it is not clear just how distinct the two terms are for Aristotle: “For the action [ἐργον] is the end [τέλος], and the actuality [ἐνέργεια] is the action [ἐργον]. Therefore even the word ‘actuality’ [ἐνέργεια] is derived from ‘action’ [ἐργον], and points to the fulfillment [συντείνει πρὸς τὸν ἐντελέχειαν]” (Metaph. IX.8, 1050a21–23). Both terms have in common an emphasis on the inborn nature of the things they specify. Ἐνέργεια is derived from ἐνεργάζομαι—to make or produce in something. Its root is ἐργον—work, job, action, or function. The etymology of Ἐντελέχεια is debated, but one reasonable suggestion is that it derives from ἐν τέλει ἔχειν—being in a condition of completion. In both cases, the prefix ἐν directs our attention toward the inner condition of the object. However, these words are at best evocative spatial metaphors. As we will see, Ἐνέργεια and Ἐντελέχεια do not exist in the

165 Johnson, Aristotle on Teleology, 85–86.
166 LSJ, s.v. Ἐντελέχεια.
167 On the overlap between the terms Ἐνέργεια and Ἐντελέχεια, see Johnson, Aristotle on Teleology, 86–87, esp. n. 41 and 46.
168 LSJ, s.v. ἐνεργάζομαι.
169 This is the view of Ross and others. See Johnson, Aristotle on Teleology, 88, n. 55.
natural object in the way that furniture occupies the interior of a room. In particular, they are not static, but are activities that originate in the nature of the object itself. It is this origination from the object’s nature that the ἐν emphasizes.

ἔνέργεια means something like “internally functioning” or perhaps “being at work.” Thus, it is translated as “activity” or “actuality” to emphasize that it points to something that is active, functioning, and present. Form is regularly identified by Aristotle with ἔνέργεια, or actuality, especially when conceived as the goal of natural objects (Ph. II.1, 193a31; de An. II.1, 412a10 and II.2, 414a14–17; Metaph. VIII.2, 1043a20 and a33; IX.8, 1050b2, and XII.5, 1071a9). Matter, on the other hand, is designated as δύναμις. In Metaphysics IX.6, Aristotle defines the two concepts with reference to each other and by example.

Actuality means the existence of the thing, not in the way which we express by ‘potentially’; we say that potentially, for instance, a statue of Hermes is in the block of wood and the half-line is in the whole, because it might be separated out, and even the man who is not studying we call a man of science, if he is capable of studying. Otherwise, actually. Our meaning can be seen in the particular cases by induction, and we must not seek a definition of everything but be content to grasp the analogy,—that as that which is building is to that which is capable of building, so is the waking to the sleeping, and that which is seeing to that which has its eyes shut but has sight, and that which is shaped out of the matter to the matter, and that which has been wrought to the unwrought. Let actuality be defined by one member of this antithesis, and the potential by the other. But all things are not said in the same sense to exist actually, but only by analogy—as A is in B or to B, C is in D or to D; for some are as movement [κίνησις] to potentiality, and others as substance to some sort of matter. (Metaph. IX.6, 1048a30–b9)

Aristotle offers several examples through which we are to understand ἔνέργεια and δύναμις: a statue, a geometrical line, a scientist, a builder, consciousness, sight, and objects shaped from some matter. These examples are sufficient to give a rough understanding of what is meant by

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170 Ibid., 88.
171 Sachs, Aristotle’s Physics, 244.
the two concepts. In general, the passage emphasizes that ἔνεργεια is active and present; it is the actual being or presence of something that was formerly only possible or latent. Aristotle urges us to accept this somewhat vague grasp of ἔνεργεια and not to press for a more precise definition. This is wise, since it turns out that the ἔνεργεια / δύναμις distinction applies to so many different things. To the list of examples above, we can add that form and soul are actuality, while matter and body are potentiality; that substance is a sort of actuality (Metaph. VIII.2, 1042b10–11); and that geometrical truths are discovered by actualization (Metaph. IX.9, 1051a21–22). In short, the ἔνεργεια is what the δύναμις might be, but isn’t yet. At the end of this passage, Aristotle explains that there are two senses in which this may be true: the δύναμις may have yet to be set in motion, or it may have yet to become a substance. The passage also suggests that some things are only called actual by analogy and that the two possibilities—motion and substance—are meant to explain this fact.

It is clear from Metaphysics IX.3 that motion is meant to be strictly identified with ἔνεργεια, while substance is only analogous. “The word ‘actuality’, which we connect with fulfillment [ἐντελέχεια], has, strictly speaking, been extended from movements to other things; for actuality in the strict sense is identified with movement [κίνησις]” (Metaph. IX.3, 1047a30–31). Further, although Metaphysics V offers no definition of ἔνεργεια, it does offer one for δύναμις, and this definition, too, suggests that the primary meaning of these concepts is concerned with motion.\(^\text{172}\) Finally, Metaphysics IX.1 states that potentiality and actuality “in the

\(^{172}\) See Metaphysics V.12, 1019a15 ff. “We call a capacity (1) a source of movement or change . . . in another thing or in the same thing qua other, and also the source of a thing’s being moved by another thing or by itself qua other.”
strictest sense” pertain to “the sphere of motion” (Metaph. IX.1, 1045b36-1046a1 and XI.3, 1047a31).

However, a second and analogous use of ἐνέργεια and δύναμις are prevalent in Aristotle’s writings and are especially pertinent for the topic at hand. In this case, ἐνέργεια and δύναμις are related “as substance to some sort of matter” (Metaph. IX.6, 1048b9). Aristotle generally distinguishes three kinds of substance: matter, form and the composite (de An., II.1, 412a6–9). He cannot here mean matter, since he is contrasting substance in this sense to matter. He must therefore mean either form or the composite, and considering what he says about the relationship between form and matter in Metaphysics VIII.3, I suggest that Aristotle is referring to substance as form. At the beginning of Metaphysics VIII.2, he writes that “it remains for us to say what is the substance, in the sense of actuality, of sensible things” (Metaph. VIII.2, 1042b10–11). The discussion that follows concludes that “that which is predicated of the matter is the actuality itself” (Metaph. VIII.2, 1043a5–6) and that formal qualities in general—even those belonging to categories such as time or position—are “analogous to substance” (Metaph. VIII.2, 1043a5). Here matter is clearly taken to be potential and form actual.

And so, in defining, those who define a house as stones, bricks, and timbers, are speaking of the potential house, for these are the matter; but those who define it as a covering for bodies or chattels, or add some other similar differentia, speak of the actuality; and those who combine both of these speak of the third kind of substance, which is composed of matter and form. (Metaph. VIII.2, 1043a14–19)

Because form limits matter, making it a compound substance, form is what gives an object its essence and makes it to be fully what it is, actualizing its potential. This is why Aristotle argues that substance is primary in the sense of form.
[F]or in the formula of each term the formula of its substance must be present. And we think we know each thing most fully, when we know what it is, e.g. what man is or what fire is, rather than when we know its quality, its quantity, or where it is; since we know each of these things also, only when we know what \( \tau i \ \dot{\epsilon} \sigma \tau i \) the quantity or the quality is. (Metaph. VII.1, 1028a35–b3)

This affirms what we already saw in section I.1—namely, that the definition is a formula of an essence—what it is to be that object—and is thus the object’s substance.\(^{173}\) Articulating the form in this sense gets at the being of the object in a more primary way than articulating other categories of being. The form specified in the definition gives the formula of the substance, and thus gives the actuality.

The form specified in the definition is the essence, substance, and actuality of the object. In some cases—a house for example—being actual might mean little more than possessing the appropriate structure, arrangement of parts, or functionality. A pile of wood and stones is a house when it has been arranged in such a way as to provide shelter. As we will see in the next chapter, some contemporary scholars seem to limit Aristotelian form to this combination of arrangement and functionality. But limiting form in this way, especially with regard to natural objects, would be a mistake. As we saw in section I.3, natural form is a principle of life, a source of motion, and an end, as well as the substance and essence of the object. This more robust sense of form, found in living things, means more than arrangement and function. Aristotle’s further account of form in this sense requires a more thorough examination of \( \dot{e}n\varepsilon\gamma\varepsilon\imath\alpha \), and in particular the contrast between \( \dot{e}n\varepsilon\gamma\varepsilon\imath\alpha \) and \( \delta\dot{i}a\theta\varepsilon\sigma\iota\zeta \), for both are types of \( \xi\imath\zeta \), yet they have important differences that should not be overlooked if we are to understand natural form correctly.

\(^{173}\) See Metaphysics V.8, 1017b21–22 on the senses in which “substance” is said: “The essence, the formula of which is a definition, is also called the substance of each thing.”
II.2 ‘Ἐξίς as Διάθεσις and Ἐνέργεια

‘Ἐξίς can admit of two distinct meanings, only one of which indicates a state that is always a final cause. This section elaborates on this point and argues that Ἐξίς as Ἐνέργεια is the that is always a final cause and which is therefore the type most pertinent to our analysis.

In de Anima I.4 Aristotle considers the popular notion, probably attributable to the Pythagoreans, that the soul is a harmony or proportion of the body. Among his objections, some of which are reminiscent of Plato’s objections to the same theory in the Phaedo,¹⁷⁴ is the following difficulty: it seems more appropriate to describe health and other good conditions of the body as harmonies than to describe the soul as a harmony (de An. I.4, 408a1–2). This is an interesting distinction. Both health and soul refer to formal rather than material aspects of an organism. Both health and soul go beyond mere arrangement of matter and include functioning. What, then, marks the difference between health and soul, making one a harmony and the other not?

A harmony is a kind of state or Ἐξίς, and in particular Aristotle’s objection appears to be an objection against the soul being a Ἐξίς. “It seems more in accord with the facts to connect harmony with health or generally with good conditions [ἀρετῶν] of the body than with the soul” (de An. I.4, 408a1–3). In the Nicomachean Ethics Aristotle carefully defines moral and intellectual ἀρεταί as Ἐξεις of the soul (EN II.5, 1106a11–12). On the other hand, the soul itself, and form in general, is consistently defined as an Ἐνέργεια or Ἐντελέχεια.¹⁷⁵ So, in de Anima

¹⁷⁴ See Phaedo 68a-d and 92b-95a.
¹⁷⁵ See de An. 412a21–22, 412b4–6; and Metaph. 1043a 12–13, 29–31 which equate Ἐνέργεια with λόγος and μορφή, respectively.
I.4. Aristotle appears to be arguing that the soul cannot be a harmony because harmonies are \(\varepsilon\xi\varepsilon\varsigma\), and the soul is not a \(\varepsilon\xi\iota\varsigma\), although it may have \(\varepsilon\xi\varepsilon\iota\varsigma\) of its own (for example, moral and intellectual virtues), and although, like a \(\varepsilon\xi\iota\varsigma\), it is a formal rather than material being.

What is the difference between forms such as health, harmonies, and virtues that are \(\varepsilon\xi\varepsilon\iota\varsigma\) and forms such as the soul that are \(\varepsilon\nu\nu\varepsilon\gamma\varepsilon\iota\alpha\)? In the philosophical dictionary of *Metaphysics* V, Aristotle defines \(\varepsilon\xi\iota\varsigma\) and \(\delta\iota\alpha\theta\varepsilon\sigma\iota\varsigma\). We might be puzzled, given our previous observations about natural form as actuality, to find that Aristotle initially defines a \(\varepsilon\xi\iota\varsigma\) as an \(\varepsilon\nu\nu\varepsilon\gamma\varepsilon\iota\alpha\).\(^{176}\)

We call a having \([\varepsilon\xi\iota\varsigma]\) (1) a kind of activity \([\varepsilon\nu\nu\varepsilon\gamma\varepsilon\iota\alpha]\) of the haver and the had—something like an action or movement. When one thing makes and one is made, between them there is a making; so too between him who has a garment and the garment which he has there is a having. This sort of having, then, evidently we cannot have; for the process will go on to infinity, if we can have the having of what we have. (*Metaph.* V.20, 1022b4–10)

Here Aristotle describes the activity between the one who has and the thing that is had. Such an activity may be described as a \(\varepsilon\xi\iota\varsigma\)—that is, a case of “having.” It is an active or actual state, and Aristotle tells us that the having activity is something like the activity between an agent and the recipient of an action, or between a mover and the moved object. Such agent-patient activities are actual and certainly count as \(\varepsilon\nu\nu\varepsilon\gamma\varepsilon\iota\alpha\). Although having seems less active than acting or moving (we do not necessary do anything to the object that we have), nonetheless by analogy\(^{177}\) having, too, can be construed as an agent-patient activity and hence considered an \(\varepsilon\nu\nu\varepsilon\gamma\varepsilon\iota\alpha\). So Aristotle initially defines a \(\varepsilon\xi\iota\varsigma\) as an \(\varepsilon\nu\nu\varepsilon\gamma\varepsilon\iota\alpha\).

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\(^{176}\) Some scholars, such as Irwin, seem to take the two terms as synonymous; see Irwin’s translation of the *Nicomachean Ethics*, Glossary, s.v. *state* (p. 349): “A \(\varepsilon\xi\iota\varsigma\) is a first actualization or activity.”

\(^{177}\) See *Metaphysics* IX, 1047a30–32: “The word ‘actuality’, which we connect with fulfillment, has, strictly speaking, been extended from movements to other things; for actuality in the strict sense is identified with movement.”
However, he is quick to observe that the having activity is not itself something we can have. The having cannot be had, because then the having of the having would be had, and so on, nonsensically. Although this is obviously true, it seems like an odd comment, and we must wonder why he makes it. I argue that he does so to distinguish two types of \( \varepsilon \xi \iota \zeta \)—one that cannot be had and one that can.

The first type of \( \varepsilon \xi \iota \zeta \) is the one discussed above—the activity of having. This activity cannot itself be had without danger of infinite regress, and it can, by analogy to other activities, be called an \( \varepsilon \nu \varepsilon \rho \gamma \varepsilon \iota \alpha \). So a \( \varepsilon \xi \iota \zeta \) is, in this sense, an \( \varepsilon \nu \varepsilon \rho \gamma \varepsilon \iota \alpha \). But the last line of the passage seems to imply that there is a second type of \( \varepsilon \xi \iota \zeta \)—one that can be had. This would seem to fit with \( \varepsilon \xi \epsilon \iota \zeta \) such as health, virtues, and harmony, all of which are easily thought of as being “had” by the living organism, person, or object. I suggest that Aristotle often, but not exclusively, uses the term \( \delta \iota \alpha \theta \varepsilon \sigma \iota \zeta \) to refer to this second type of \( \varepsilon \xi \iota \zeta \), which seems to be \( \varepsilon \xi \iota \zeta \) in the more fundamental and non-analogical sense.

(2) ‘Having’ means a disposition according to which that which is disposed is either well or ill disposed, either in itself or with reference to something else, e.g. health is a having; for it is such a disposition (\( \delta \iota \alpha \theta \varepsilon \sigma \iota \zeta \)). (Metaph. V.20, 1022b10–12)

First, here we have affirmation that Aristotle does consider health to be a \( \varepsilon \xi \iota \zeta \), specifically a \( \varepsilon \xi \iota \zeta \) that is a \( \delta \iota \alpha \theta \varepsilon \sigma \iota \zeta \). This implies that he objects to the notion of the soul as a harmony either because he objects to its being a \( \varepsilon \xi \iota \zeta \) in general, or because he objects to its being a \( \delta \iota \alpha \theta \varepsilon \sigma \iota \zeta \).

Further, the passage elucidates the second sense of \( \varepsilon \xi \iota \zeta \)—this \( \varepsilon \xi \iota \zeta \) is a kind of disposition.\(^{178}\)

\(^{178}\) Specifically, one that is more or less permanent. See Categories, 8b25–9a13. It is very clear in this passage that the only difference between a \( \varepsilon \xi \iota \zeta \) and a disposition is that the former is a more permanent
Finally, because Aristotle gives two distinct and contrasting definitions of ἔξωτος, one as a having that is an actuality, and one as a having that is a disposition, it is clear that actualities and dispositions are not the same sort of thing. Let us see further what a disposition (διάθεσις) is.

We call a disposition [διάθεσις] the arrangement of that which has parts, in respect either of place or of capacity or of kind [ἐπίθεσις]; for there must be a certain position [θέσεις] as the word ‘disposition’ [διάθεσις] shows. (Metaph. V.19, 1022b1–3)

A disposition is an arrangement of parts, either spatially or in the sense of relationships among capacities or form. This is what I mean by saying that this sort of ἔξωτος is “structural”—it is a relationship among parts.

First, it is immediately clear that the soul is not a διάθεσις and that this is (at least in part) Aristotle’s objection to describing the soul as a harmony, which clearly fits the definition of διάθεσις. Second, as we saw above, Aristotle differentiates carefully between ἐνέργεια and διάθεσις and defines the soul as ἐνέργεια in the de Anima. Third, this appears to imply that the soul is a ἔξωτος of the first sort—a having that cannot be had. We might say that the soul is a natural object’s having life, but we cannot say, except metaphorically, that the object’s body “has” its soul. In the relationship of having, the parties to the relationship must remain essentially separate. But the union of matter and natural form creates a third substance—the composite that is the living organism. The substance of the living organism is itself a kind of having—a composite of matter and form. Aristotle even indicates that the matter itself is different when the form is present—it is matter with potential for life, and only ensouled bodies have potential for

version of the latter, and among his examples of ἔξωτος Aristotle includes a number of formal characteristics, such as knowledge and virtue, but does not include anything that would count as an ἐνέργεια in the strong sense, such as a soul.
life (*de An.* II.1, 412b25–7). He describes the unity of the matter-form composite as an actuality, a unity that goes beyond the having relationship:

That is why we can dismiss as unnecessary the question whether the soul and body are one: it is as though we were to ask whether the wax and its shape are one, or generally the matter of a thing and that of which it is the matter. Unity has many senses (as many as ‘is’ has), but the proper one is actuality.” (*de An.* II.1, 412b5–9)

The soul is the actuality of a body with potential for life—a body that only has that potential so long as it is in fact living. The union between soul and body is, then, so fundamental, that it would be inaccurate to describe the relationship between them as one of having. In conclusion, if the soul cannot be had, then it cannot be a διάθεσις, but must be ἔξις in the first sense—as ἐνέργεια.

Another indication of this is that the soul is an efficient cause. In the soul, the formal properties shared by a διάθεσις are combined with active and final principles. In this sense, the soul differs markedly from a διάθεσις such as health. Health is necessary for the proper operation of the body, but it is not itself an active principle of that body. Health is a necessary, but not sufficient condition for the activities of an animal or plant. Nor is health a principle of movement, as the soul is, although some level of health is a condition for the first actuality. In this way, a disposition is analogous to an actuality—it is its proximate matter. This is perhaps why, in spite of Aristotle’s statement in the *Metaphysics* that a ἔξις is a kind of ἐνέργεια, he nonetheless suggests that it is a fallacy to place “what is a state inside the genus activity or an activity inside the genus state . . . .” (*Topics* IV.5, 125b15–16). There is a type of state—a διάθεσις—which is not a type of ἐνέργεια, nor is ἐνέργεια a type of διάθεσις.

Note also that although health is in some sense a final cause (since living creatures aim naturally at their health and do so in a way that is in accordance with their essential nature), this
is not always the case with \( \delta \alpha \theta \varepsilon \sigma \iota \varsigma \). If we consider Aristotle’s criticism of Democritus in the *de Anima*, we find another reason why \( \delta \alpha \theta \varepsilon \sigma \iota \varsigma \) is insufficient to provide a full causal account of natural objects. Democritus asserts that the soul is responsible for locomotion in animals, and he identifies the soul with a fiery substance that is naturally in motion. Aside from this natural motion, the fiery particles are distinguishable from other particles only by their shape and position. As Aristotle observes, this account of animal movement seems to beg the question. Democritus simply passes off the responsibility for movement to a special group of particles, but the movement of these particles is not itself explained.

But how is it possible for one of the units to fulfill this function [of causing movement]? There must be some difference between such a unit and all the other units, and what difference can there be between one unit-point and another except a difference in position? (*de An.* 409a18–21)

Position alone is insufficient to explain motion, and for this reason the soul cannot simply be \( \delta \alpha \theta \varepsilon \sigma \iota \varsigma \). If \( \delta \alpha \theta \varepsilon \sigma \iota \varsigma \), and sometimes \( \varepsilon \xi \varsigma \) (in the sense of \( \delta \alpha \theta \varepsilon \sigma \iota \varsigma \), rather than \( \varepsilon \nu \varepsilon \rho \gamma \varepsilon \iota \alpha \)), are the words Aristotle uses to point to formal states that may be (but are not always) final causes, and are not sources of change, then \( \varepsilon \nu \varepsilon \rho \gamma \varepsilon \iota \alpha \) and \( \varepsilon \nu \tau \varepsilon \lambda \varepsilon \chi \varepsilon \iota \alpha \) are the words he uses to refer to form that is always a final cause. Form is also is responsible for change, thereby converging with efficient cause. We turn to these concepts now.

**II.3 Levels of Actuality and Form: \( \delta \alpha \theta \varepsilon \sigma \iota \varsigma \), \( \varepsilon \nu \varepsilon \rho \gamma \varepsilon \iota \alpha \), and \( \varepsilon \nu \tau \varepsilon \lambda \varepsilon \chi \varepsilon \iota \alpha \)**

In the earlier part of this chapter, we traced the concept of form through several stages. In the first stage form showed up as anything predicable of an underlying subject, including accidental attributes. I want to suggest now that \( \delta \alpha \theta \varepsilon \sigma \iota \varsigma \) largely corresponds to form in this sense.
Diáθεσις is basically the arrangement or structure of parts. It is the result, rather than the cause, of change and is basically predicable of substance, rather than being identified with a substance. The design of a table, the layout of a building, the normalcy or deformation of an animal’s anatomy—these organizational or structural elements are formal, but they are predicated of substances (tables, buildings, animals) rather than being substances, and they might change quite radically and the underlying substances could go on being the same substances. In other words, to state the διάθεσις is to describe the object, but not necessarily to capture its essence.

Ἐνέργεια, on the other hand, seems to correspond to a higher level of attribution—one that demarcates secondary substances, gives definitions of natural objects, and most importantly points to the convergence of formal, final, and efficient cause. To state the ἐνέργεια is to state what the object really is. In doing so, one of course usually describes the state or structure of the object, but one also does more—one gets at its essence.

What further implications does the distinction between διάθεσις and Ἐνέργεια have for natural objects? In nature, how does the difference between having a formal aspect such as soul versus a formal aspect such as health manifest?

Aristotle’s well-known distinction among levels of potentiality and actuality provides an answer to those questions. Aristotle provides a detailed account of the distinction in de Anima II.5, in the context of a discussion on sense perception:

But we must now distinguish not only between what is potential and what is actual but also different senses in which things can be said to be potential or actual; up to now we have been speaking as if each of these phrases had only one sense. We can speak of something as ‘a knower’ either (a) as when we say that man is a knower, meaning that man falls within the class of beings that know or have knowledge, or (b) as when we are speaking of a man who possesses a knowledge of grammar; each of these is so called as having in him a certain potentiality, but there is a difference between their respective
potentialities, the one (a) being a potential knower, because his kind or matter is such and such, the other (b), because he can in the absence of any external counteracting cause realize his knowledge in actual knowing at will. This implies a third meaning of ‘a knower’ (c), one who is already realizing his knowledge—he is a knower in actuality and in the most proper sense is knowing, e.g. this A. Both the former are potential knowers, who realize their respective potentialities, the one (a) by change of quality, i.e. repeated transitions from one state to its opposite under instruction, the other (b) by the transition from the inactive possession of sense or grammar to their active exercise. The two kinds of transition are distinct.

Also the expression ‘to be acted upon’ has more than one meaning; it may mean either (a) the extinction of one of two contraries by the other, or (b) the maintenance of what is potential by the agency of what is actual and already like what is acted upon, with such likeness as is compatible with one’s being actual and the other potential. For what possesses knowledge becomes an actual knower by a transition which is either not an alteration of it at all (being in reality a development into its true self or actuality) or at least an alteration in a quite different sense from the usual meaning.

Hence it is wrong to speak of a wise man as being ‘altered’ when he uses his wisdom, just as it would be absurd to speak of a builder as being altered when he is using his skill in building a house.

What in the case of knowing or understanding leads from potentiality to actuality ought not to be called teaching but something else. That which starting with the power to know learns or acquires knowledge through the agency of one who actually knows and has the power of teaching either (a) ought not to be said ‘to be acted upon’ at all or (b) we must recognize two senses of alteration, viz. (i) the substitution of one quality for another, the first being the contrary of the second, or (ii) the development of an existent quality from potentiality in the direction of fixity or nature. *(de An. II.5, 417a22–b16)*

Actualities—or at least some of them—possess the potential for further actualization. Not only do they fulfill some prior potential, but they also represent the acquiring of new potentials that can then be actualized. In the example above, Aristotle indicates that a man, as a member of the human species, has the potential for knowledge. He can actualize this potential through a process of learning, at the end of which he possesses actual knowledge. However, precisely because he

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179 A similar passage occurs at *Ph. VIII.4, 255a25–b30*. In that passage, Aristotle distinguishes between the proper actualization of a potential and an accidental or violent (unnatural) alteration. A sign of natural or essential potential is that it is actualized when the object is in the presence of its opposite, so that even though it is being acted upon by something external to it, nonetheless “it contains within itself the source of motion—not of moving something or of causing motion, but of suffering it.”
now possesses actual knowledge, he has a potential that he did not have before—the potential to use that knowledge in distinct ways.

Two things are of particular note: first, that first actuality represents not only the fulfillment of potential, but the acquiring of new potentials; and second, that the transition of the first actualization is different from the second. The man who gains knowledge goes through a process in which the trait of ignorance is replaced by the trait of knowledge, and he does this with the help of some external agent, such as an instructor. But the man who has reached the first actuality and possesses knowledge can now exercise it when he likes (assuming nothing external hinders him). He does not require an external agent to use his knowledge, nor does this second actualization entail replacing a trait with its opposite—rather, it is the exercise of a previously acquired capacity. This means that in the first case, an alteration takes place—from ignorance to knowledge, from lacking capacities to having them—while in the second, it is not appropriate to speak of an alteration. Although the second actualization helps to maintain the first—exercising knowledge helps us to retain it—it does not represent an alteration or change in quality from the first actuality. Charlotte Witt discusses this distinction at length, refering to the first type of transition as “PE” (process and end) and to the second as “CE,” (capacity and exercise).\(^\text{180}\) These phrases nicely capture the Aristotle’s distinction in the passage.

How does διάθεσις fit into this scheme? I suggest that although διάθεσις can be either the starting point or the result of what Witt terms PE (a process instigated by an external agent and involving an alteration from one quality to its opposite), and can be the starting point for CE (the exercise of a capacity), it cannot be the result of CE, nor can it even be its starting point.

\(^{180}\) Witt, “Hylomorphism in Aristotle,” esp. 674.
without the assumption that an ἔνεργεια is present. Let us consider health and virtue as examples alongside the one he gives in the passage above, since Aristotle tells us that both virtue and health are διαθέσεις:

<table>
<thead>
<tr>
<th>PE (Process and End) ------------------</th>
<th>CE (Capacity and Exercise) -----&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Beginning State</strong></td>
<td><strong>Process</strong></td>
</tr>
<tr>
<td>sickness</td>
<td>medicine, diet, exercise, etc.</td>
</tr>
<tr>
<td>lacking moral formation</td>
<td>moral training, habituation</td>
</tr>
<tr>
<td>man as a knower</td>
<td>education</td>
</tr>
</tbody>
</table>

The table above illustrates how both health and virtue can be the results of processes that replace qualities with their opposite and that require external agents or objects such as doctors, teachers, and so on. It also shows that, once acquired, the διαθέσεις of health and virtue represent further capacities that can be actualized—the healthy person is capable of activities that the sick person is not, and the virtuous man performs actions with ease that the vicious man will avoid.

However, there is an obvious assumption underlying this entire scheme, and that is that both the sick person and the vicious one are alive—they have souls. Without souls, neither a process of change toward an end nor the exercise of any capacity would be possible. My point here is that although διαθέσεις can be crucial in explaining the kinds of actualizations that natural objects undergo (we could not understand what it means to become strong or just if we did not understand sickness/health and vice/virtue as possible states), nonetheless διαθέσεις themselves are not sufficient to explain the actualizations that occur. In fact, to understand such διαθέσεις...
themselves one must already understand something about the underlying actuality—in this case, the soul. One must understand the soul itself as a first actuality with the capacities for nutrition, intellect, and so on even to understand why health or virtue could be a possible state for the object whose soul it is. Thus, in living things, understanding διάθεσις is secondary to ἐνέργεια, and an interpretation of Aristotle’s natural philosophy that took διάθεσις to be his core understanding of form would be misleading. Likewise, a model for understanding his account of natural causality that was built around διάθεσις would be incomplete. In chapters 3 and 4, I argue that the functionalist interpretation and the artifact model suffer from those defects.

To see how soul as ἐνέργεια would fit properly into Aristotle’s scheme of first and second actualities, we can consider his comments on sense perception in de Anima II.5:

In the case of what is to possess sense, the first transition is due to the action of the male parent and takes place before birth so that at birth the living thing is, in respect of sensation, at the stage which corresponds to the possession of knowledge. Actual sensation corresponds to the stage of the exercise of knowledge. But between the two cases compared there is a difference; the objects that excite the sensory powers to activity, the seen, the heard, &c., are outside. The ground of this difference is that what actual sensation apprehends is individuals, while what knowledge apprehends is universals, and these are in a sense within the soul. That is why a man can exercise his knowledge when he wishes, but his sensation does not depend upon himself a sensible object must be there. A similar statement must be made about our knowledge of what is sensible—on the same ground, viz. that the sensible objects are individual and external. (de An. II.5, 417b17–28)

<table>
<thead>
<tr>
<th>PE (Process and End) -------------------------</th>
<th>CE (Capacity and Exercise) -----&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Beginning State</strong></td>
<td><strong>Process</strong></td>
</tr>
<tr>
<td>-----------</td>
<td>-------------</td>
</tr>
<tr>
<td>ovum</td>
<td>conception; sperm gives form to the ovum</td>
</tr>
</tbody>
</table>
First, note as Aristotle does in the passage just cited that there is a minor distinction between the CE involved in sensation and that involved in the intellect. Sensation is actualized by externals (sight by visible objects, hearing by sounds, etc.), much like what we find in PE, while thought is not, because sensation is of particulars, while thought is of universals. Aside from that point, however, we find here a scheme quite parallel to the ones given above for health and virtue. We begin with human matter that contains the potential to become a human organism, and through a process of conception, that matter is given form, resulting in a matter-form composite—a living human being with a soul. That soul represents the first actuality and includes a variety of capacities which can then be actualized—most of them without the aid of an external agent.

Again, the parallel between èvérgeta and diáthéseia is very close—soul, health, and virtue all occupy a place in the third column, as first actualities (of a sort). But soul is clearly primary as a first actuality—without it, we would not have a living being at all and it would be nonsensical to talk of states such as health or virtue. I argue that such states are only first actualities in a secondary way—they do indeed contain capacities that can be actualized, but they assume the presence of a much more basic first actuality. This more basic actuality—namely, the soul—is not just a formal aspect or feature of a living organism, but is its substance, essence, and nature. It is where the formal, efficient, and final causes converge.

Causes do not converge in that way in diáthéseia. That is why health or virtue, as dispositions, do not fully possess the capacities that represent their second actualities. Every disposition is a disposition of something, and these are dispositions of the soul, as well as the body. Properly speaking, it is the soul’s and body’s capacities (not health’s or virtue’s) that are
actualized in running a mile or in repaying a debt. The διάθεσις of health or virtue simply indicate that the soul is in good order for performing such actions.

In examining the levels of potentiality and actuality that Aristotle discusses, we see that διάθεσις and natural ἐνέργεια are different in one important respect. Although a διάθεσις can appear as a kind of first actuality—as the result of a process of change, after which the object seems to have new abilities—in fact, διάθεσις is always dependent on an underlying ἐνέργεια for its real capacities. Form as arrangement or structure may give new potentials, but if these potentials are to be exercised, the underlying actuality must come into play—διάθεσις cannot do this on its own. Health on its own does not make for jogging, and virtue on its own does not make for repaying debts—the much more basic capacities of the soul must be present and ready to become active.

We should consider briefly what objects that lack this more basic ἐνέργεια look like and how actuality plays a role in the changes they undergo. In general, artifacts fall into this class, and although I will go into more detail about this in chapter 4, it is good to consider them briefly here as a foil to the ἐνέργεια in natural objects. A wooden table makes a good example.

| PE (Process and End) -----------| CE (Capacity and Exercise) ---->
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Beginning State</td>
<td>Process</td>
</tr>
<tr>
<td>pile of wood</td>
<td>building the table; sawing, hammering, etc.</td>
</tr>
</tbody>
</table>
The PE actualization proceeds, in a way, as usual—the pile of wood is acted on by an outside agent until it has a new form. We might consider this a first actuality in a way, because as a table, the wood has capacities it did not previously have (it can be used for dining, studying, etc.). However, there is really something wrong with the last column. The table doesn’t, properly speaking, exercise anything—even the capacities of “being dined at” or “being used to store books” are capacities by analogy. The table doesn’t have any abilities that it didn’t have when it was a pile of wood. Any new apparent abilities are due to its having been rearranged in a way that is more useful to external agents, and the actualization of these abilities are really the actions of those agents. Why does the table example fall apart at CE in a way that the other examples—health, virtue, the soul—did not?

I think the answer is that there is no first actuality in the robust sense here at all. In the case of the soul, we have an obvious first actuality—the soul genuinely possesses distinct capacities that it can exercise, provided nothing hinders it. In the cases of health and virtue, we had διάθεσεις of a first actuality—dispositions of soul (and to some extent body) that suited the soul properly for fulfilling its capacities well. Thus, natural diatheses, although not form in the sense of ἐνέργεια, still have some capacities by virtue of their association with natural form. But the table has no soul, nor any other kind of ἐνέργεια that would give it distinct table-capacities that it might exercise on its own. It has no powers of nutrition, locomotion, etc. that might be actualized. Its form does not converge with efficient or final cause—it can neither instigate change, nor does it have any goal that would provide a reason for it to do so. Its form is bare διάθεσις—an arrangement of material. Natural διαθέσεις are arrangements of form as well as
matter—health implies both a disposition of the body and of the soul. This type of arrangement implies the necessity of another sort of first actuality—one that is not διάθεσις at all.

Let me return for a moment to the terms ἐνέργεια and ἐντελέχεια. As we already noted, textual evidence supports no hard-and-fast distinction between these two terms. However, their etymology suggests that they emphasize two different aspects of form, indicated by the two levels of actuality that Aristotle distinguishes. In natural objects, form not only is itself an actuality, but it can also take on the role of substrate and become the subject of further actualization. This aspect is emphasized in Aristotles’ explanation of the meaning of the word ἐντελέχεια.

For the action [ἔργον] is the end [τέλος], and the actuality [ἐνέργεια] is the action [ἔργον]. Therefore even the word ‘actuality’ is derived from ‘action’, and points to [συντείνει πρὸς] the fulfillment [τὴν ἐντελέχεια]. (Metaph. IX.8, 1050a21–23)

Although he often uses the two terms interchangeably, here we find a more clear distinction. Ἐντελέχεια signifies fulfillment or completion. Ἐνέργεια points to or stretches toward the ἐντελέχεια, but is in general not yet to be identified with it. Aristotle never straightforwardly identifies ἐντελέχεια with the second level of actuality, but this passage seems to support the idea. Here Aristotle notes that ἐνέργεια points toward a higher level of actuality, and that the word itself is derived from ἔργον—a work; he then urges that ἐνέργεια points toward a fulfillment, ἐντελέχεια. This seems to imply some level of activity in ἐντελέχεια—and activity is just what we associate with the second level of actuality. If I am right in identifying this second level of actuality with ἐντελέχεια, then the message here would seem to be that the activity or second actuality of an object is its completion or perfection—the natural object not only as a mature member of its species, but as a flourishing member, as one that has actualized
the particular capacities that it possesses by virtue of its species membership. However, Aristotle himself makes no such clear distinction. He uses both ἔνεργεια and ἔντελεχεια to refer to the soul, and uses ἔντελεχεια to refer to both soul and happiness. So although we would wish to say that soul and happiness are distinct levels of actuality, Aristotle does not use a vocabulary that expresses this distinction.

Since it is not clear exactly how Aristotle wished to distinguish between ἔνεργεια and ἔντελεχεια (or if he even wished to distinguish them at all), the rest of this dissertation treats the two terms as interchangeable. But we will see that the notion that ἔνεργεια admits of two levels, the second of which involves fulfillment or perfection, is an important one.

Chapter 1 addressed some problems with teleology, focusing on the relationship between teleology and mechanism. There, I concluded that because formal, efficient, and final cause converge in natural objects, we would need to have a better grasp of that convergence.

Chapter 2 has focused on ἰδός and its convergence with final and efficient cause. First, we discussed form as accidental being. We then noted that in a stronger sense, form is that which is specified in a definition, and that in natural objects, the form will be the essence and nature of that object. We then explored the role of form in the Physics, emphasizing that form, as nature, plays a key role in change. In this way, we were better able to see how form converges with the efficient cause. Finally, we linked ἰδός with the concept of ἔνεργεια. We saw that ἔνεργεια is a type of ἔξις but is distinct from ἔξις as διάθεσις. We also saw that ἔνεργεια
involves two levels. I argued that διάθεσις represents form as attributive and structural, while ἐνέργεια is a type of form that has further capacities. Finally, I suggested that the second level of ἐνέργεια, the activity of those capacities, be identified with ἐντελέχεια, and be considered a perfection of form. Here, in considering form as ἐνέργεια, we find Aristotle’s understanding of the relationship between natural form and final cause.

In the course of this chapter, the link between form and final cause has become clearer. Form is the end of change. As first ἐνέργεια, it is a capacity for further actualization, and second ἐνέργεια—its perfection or completion—is the goal of that further actualization. In this way, form can be identified with final cause. As first actuality, form has capacities for further actualization. In this sense, form converges with the efficient cause because it drives natural objects like plants and animals to perform the activities that lead to their survival and flourishing. The convergence of formal, efficient, and final cause, which we have analyzed in this chapter, is, I believe, the source of the obscurity of final cause and the confusion expressed so poignantly by Ackrill. Since the form is part and parcel of the object itself, and is in fact the object’s substance, essence, and actuality, to seek the final cause is, in a way, to seek the very being of the object itself. In the natural world, looking outside of the object will not help us to find the final cause. Rather, we must look at the object itself.

In the next chapter, I argue that the foregoing discussion of form and final cause in Aristotle precludes some contemporary interpretations of his teleology. In particular, I discuss why the functionalist interpretation of Aristotle’s philosophy of nature is ruled out by my interpretation.
In the last several decades, teleology has once again found a place in the philosophy of science, in particular in discussions of biology. Contemporary theories of teleology, which I will summarize below, are very different from Aristotle’s theory. Nevertheless, contemporary motivations have, at times, colored interpretations of Aristotle. I shall argue that functionalism, for example, is an interpretation of Aristotle that is largely influenced by contemporary motivations and contemporary concepts of teleology. This influence has caused it to miss the mark, especially with respect to the concept of form.

The role of teleology in the sciences has become increasingly limited since the early modern era. Having been roundly banished from physics and chemistry, teleology is now limited to the realm of biological systems, entities, and behaviors. Even here, teleology is sometimes held suspect, and efforts continue to be made to exile it farther. Some philosophers would like to see the use of teleological explanation limited to descriptions of conscious, intentional, human behavior. However, teleological language continues to be employed in discussions of artifacts and in biology, where it arises in descriptions of both plant and animal growth and activity.

The current literature on teleology is large and diverse, ranging from evolutionary biology to human action to technology and artificial intelligence. This diversity makes it difficult to formulate any general idea of one single current attitude toward or trend in teleology. However, some tentative generalizations can be made, and we can begin by observing that
contemporary philosophers of science generally limit the use of teleological concepts and language to the following categories of phenomena.\footnote{This is basically the same system of categorization used by Beckner in “Function and Teleology,” 151. Although much has changed in the literature on teleology since this 1969 paper, the limitation of teleology to functions, goals, and intentions has not.}

1. *Conscious, intentional animal or human behavior:* e.g., “Mary went to the store in order to buy milk,” or “The cat walked toward the dish to see if there was any food.”\footnote{Depending on one’s view of animal behavior, this proposition may fall under either the first or second category.}

2. *Goal-directed systems,* which may or may not possess the properties of consciousness and intentionality; e.g., “The plant produces chlorophyll in order to meet its nutritional needs,” or “The goal of the circulatory system is the circulation of the blood throughout the body.”

3. *Functions,* e.g., “The function of the heart is to pump blood,” or “The function of the odometer is to record the number of miles driven.”

In this chapter, I argue that Aristotle’s conception of teleology is more extensive than these three categories, and that we must therefore look beyond the contemporary view of teleology in order to understand Aristotle’s view of the matter.

To begin, it is evident that teleology in Aristotle includes but extends beyond conscious, intentional behavior. Humans and animals act for ends, but plants have ends as well, and we have seen that there is even a limited teleology in the inanimate realm, insofar as processes in that realm occur with regularity.\footnote{See chapter 1, section III.5 above.} In these cases, the teleology does not involve any conscious being, and no one who is familiar with contemporary scholarship on Aristotle would accuse him of invoking conscious beings to account for all of the teleology present in nature.

However, it is often argued—or, as is more often the case, tacitly assumed—that any aspect of Aristotle’s teleology not included under the first category must fall under the second or...
third. That is, if Aristotle’s assertion that dogs, stars, or marigolds have final causes is not meant to imply that such items have purposes assigned to them by some conscious agent, then Aristotle must have meant that they are goal-directed systems or that they possess functions. The goal of this chapter is to refute this position by arguing that at least some of the things that Aristotle would classify as teleological can only be understood by grasping the role of form, and that the functionalist concept of form is incomplete when compared with the Aristotelian concept we developed in chapter 2. The functionalist account of functions and goal-directed systems thus fails to capture the meaning of Aristotle’s teleology.

I. Contemporary Teleology

If we consider the three categories to which the concept of teleology is normally applied, we can see that functions and goal-directed systems present the most difficulty for the contemporary philosopher of science. Although a few physicalists might go so far as to try to banish teleology from conscious behavior, by and large philosophers are willing to accept the use of teleological language in describing such behavior as non-problematic. The difficulties arise when we try to apply such language to functions and goal-directed systems—situations in which there is not necessarily any conscious agent that can be said to hold a goal in mind.

Moreover, the contemporary debate about teleology has centered especially around function and in general has only dealt with goal-directed systems in a secondary way, in the course of dealing with functions. Perhaps this is because goal-directed systems always imply the presence of, and are sometimes simply defined in terms of, functions. The heat-seeking missile is composed of a number of smaller parts, each of which performs a particular function. The
coordination of these parts and their functions simply is the system—to understand the teleology of the functions is to grasp the teleology of the system as a whole. If goal-directed systems can be exhaustively evaluated by referring to their functions alone, discussion of goal-directed systems naturally gets subsumed under discussion of function. For this reason, I will not focus in any special way on goal-directed systems in the discussion that follows.

The contemporary view of function has its roots in the work of Carl Hempel and Ernest Nagel, whose “covering law” model inspired both support and dissent, and led to a variety of teleological theories, the most important of which are the etiological, survival value, and causal role theories. Excellent summaries of the history of teleological theories since Hempel and Nagel can be found in Arno Wouters and David Buller. Here I aim to give only the briefest outline, which will be relevant to the discussion of Aristotle that follows.

Hempel and Nagel developed what came to be known as a “covering law” model of function, based on an inferential theory of explanation, which was in turn based on the deductive-nomological model. According to that model, a grasp of natural laws enables the scientist to deduce true propositions. According to the inferential theory of explanation, a scientific explanation is one that shows why the explanandum was “to be expected,” given the presence of the explananans. The explanandum is to be deduced from the given circumstances. So, for both Hempel and Nagel, a scientific explanation is one that shows how the explanandum is deducible from a set of natural laws. Do so-called “functional explanations”—i.e. explanations

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184 See Wouters, Explanation Without a Cause, 8, n. 7. The seminal works were Hempel, Aspects of Scientific Explanation and Nagel, Structure of Science.
185 Wouters, Explanation Without a Cause, chapter 1. My own summary of the literature relies heavily on Wouters.
186 Buller, “Natural Teleology.”
187 Wouters, Explanation Without a Cause, 3.
such as “The heart pumps in order to circulate the blood” or “The function of chlorophyll is to enable photosynthesis”—meet this criterion?

Hempel thought not. Functional analysis, he argued, is inadequate as either a deductive or inductive form of explanation, and although it can show why the presence of a member of some class of objects was to be expected, there is always more than one object that could fit the bill, and hence functional explanation lacks true predictive power. It can never show why this object is present, instead of some functionally similar object. Nagel, on the other hand, focused on the notion of goal-directed systems and argued that given the limitations of a particular system, it was possible that a certain system would demand a particular item to perform a functional role and that in at least some systems there would be no functionally equivalent items. Hence, for Hempel teleological explanation has only a very generalized explanatory power, while for Nagel it might occasionally explain the presence of specific objects.

In the half century since Nagel and Hempel developed their covering-law model, more recent teleological/functional theories have sought to discount the model. John Canfield argues that functional explanations can never show why an item (or functionally equivalent member of a given class) is present, only why such an item would be useful in a given system.\(^{188}\) This criticism of the covering-law model goes quite deep, and in fact challenges whether teleological explanation can ever be considered legitimate within the deductive-nomological model of science. Robert Cummins goes even further than Canfield, and suggests that the deductive-nomological model is itself flawed: “Even if it were possible, as Nagel claimed, to deduce the presence of chlorophyll from the occurrence of photosynthesis, this would fail to explain the

\(^{188}\) Canfield, “Teleological Explanation in Biology.”
presence of chlorophyll in green plants in just the way deducing the presence and height of a
building from the existence of its shadow would fail to explain why the building is there and has
the height it does.”
Cummins’s critique thus represents a turning point in the literature on
teleology—before Cummins, the idea was either to get teleological explanation to conform to the
deductive-nomological model, or else to show how teleological explanation was unnecessary, or
merely heuristic; after Cummins, the tendency has been to acknowledge that teleological
explanations are, in fact, explanatory, and to show just how they can be explanatory, on a causal,
rather than inferential theory of explanation.

The inferential theory of explanation, based on the deductive-nomological model of
science, asserted that an explanation shows why we should expect the presence of an item—
indeed, why we can deduce the presence of an item, given the circumstances. This does not
necessarily mean explaining the causes for the item’s presence. As in Cummins’s example of the
building’s height, we can often deduce facts without knowing their causes. After Cummins, the
emphasis in teleology is on a causal theory of explanation, one which seeks to show what
actually causes the presence of the item.

There are currently three popular causal theories of teleological explanation: etiological,
survival value, and causal role. The etiological view is held by philosophers such as Larry
Wright. According to this view, part of what we seek in asking about an item’s function is an
account, not just of what the item does, but why the item is present. We are inquiring, in a sense,
about its history. The etiological theory of functions that Wright proposes may be summed up as
follows. The function of $X$ is to do $Y$, if and only if $X$ is present because it does $Y$. That is, there is

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some causal history in which $X$ comes to be where it is because of its ability to do $Y$, and $Y$’s being done is a consequence of $X$’s being there.\textsuperscript{190} Wright was not the only philosopher to arrive at this historically-oriented conception of function—Francisco Ayala had articulated a similar idea with respect to biological functions\textsuperscript{191}—but Wright’s work was seminal for the etiological interpretation of function in general. This interpretation has remained popular and has been continued by Karen Neander,\textsuperscript{192} Ruth Millikan,\textsuperscript{193} and others.

There are several criticisms of the etiological theory, one of which led to the survival value theory. John Bigelow and Robert Pargetter, for example, observe that the etiological theory is guilty of the sort of tautologizing of which Darwin is sometimes accused with respect to fitness.\textsuperscript{194} The survival of the fittest mean that only the fit survive. So, what sorts of things are fit? Whichever ones survive. Luckily for evolutionary theory, fitness can be non-retrospectively (and non-tautologically) defined (as a subjunctive dispositional property). But, Bigelow and Pargetter argue, in the etiological theory, the notion of function is defined retrospectively. To have a function, $X$, is to be present because of some past ability to do $Y$. But surely that ability in the past was the function of $X$ even then. The heart’s ability to pump blood has been its function since the first heart pumped the first blood. For if not, at what point did blood-pumping become its function? So, Bigelow and Pargetter urge that according to the etiological theory, having a function means having had the function in the past, and this is hardly to define function.

\textsuperscript{190} Wright, “Functions,” 160.
\textsuperscript{191} Ayala, “Teleological Explanations in Evolutionary Biology.”
\textsuperscript{192} Neander, “The Teleological Notion of ‘Function.’”
\textsuperscript{193} Millikan, “In Defense of Proper Functions” and \textit{Language, Thought, and Other Biological Categories}.
\textsuperscript{194} Bigelow and Pargetter, “Functions,” 105.
In response to such difficulties, the survival value theory of function asserts that an activity counts as a function if and only if that activity currently contributes to the survival of the organism. This view can be found in Canfield, Bigelow and Pargetter, and William Wimsatt. Bigelow and Pargetter suggest what they term the propensity theory, which is to some extent modeled after the biological concept of fitness. Propensities are subjunctive, dispositional properties that are evaluable non-retrospectively. An acorn has a propensity to grow into an oak because it is in such a state (disposition) that it would (subjunctive) grow into an oak given the appropriate environment. We need not wait to see if it does grow into an oak in order to attribute this property to it—we need only look at its anatomical structure, DNA, etc. The propensity theory of function holds that a function is something that confers a survival-enhancing propensity. This formulation escapes the charge of tautology leveled at the etiological theory and enables one to attribute function to an item without having to know anything about its history. Indeed, we can attribute function from the very first performance. However, unlike Wright’s etiological theory, the propensity theory will be limited to biological entities; it will not apply to artifacts. Indeed, it appears to be limited to a particular type of goal-directed systems—those in which the state aimed at is the survival of the system. Some philosophers, Wright included, will see this limitation as a significant drawback, since it prevents us from formulating a general philosophical notion of function.

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195 Canfield, “Teleological Explanation in Biology.”
197 Wimsatt, “Teleology and the Logical Structure of Function Statements.”
198 Ibid., 252.
The third contemporary approach to teleology is the causal-role theory. This theory, which stems from Cummins\textsuperscript{199} and Nagel\textsuperscript{200} suggests that functional explanations simply illustrate the role that an item or activity plays in the system in which it is present and accounts for some capacity of that system. Unlike the etiological and survival value theories, the causal-role theory does not assert that functional explanations explain why or how the item or activity is present. Functional explanations only show how the item or activity is related to the rest of the system.

This brief survey of the contemporary literature on teleology serves to highlight several important points. First, we can note again that contemporary accounts of teleology are limited to conscious, intentional behavior, functions, and goal-directed systems. Particular attention has been paid to function, and the literature on this topic is enormous. Second, we can observe the overwhelming desire—a desire that cuts across and unites the various teleological theories—to remove teleological language from teleology. Whether they attempt to describe teleological notions in terms of survival, adaptation, causal role, or past history, the vast majority of contemporary philosophers who write on the subject want to recast teleology in strictly physical terms that make no appeal to purposes, ends, or goals. In the introduction, I suggested that this tendency is a result of the modern emphasis on mechanism.\textsuperscript{201} Third, we can see clearly that all of the basic theories of teleological explanation outlined above are markedly different from Aristotle’s treatment of teleology. Let us examine them one by one.

\textsuperscript{199} Cummins, “Functional Analysis.”
\textsuperscript{200} Nagel, “Teleology Revisited,” 300. See Wouters, Explanation Without a Cause, 9.
\textsuperscript{201} See the introduction, section II, above.
First, there is the inferential theory of Nagel and Hempel, according to which teleological explanations deduce the presence of items and activities from other circumstances. This theory differs from Aristotle’s in a very basic way—it is inferential, while Aristotle’s is clearly both inferential and causal. At *de Anima* I.1, 402a7, ff., Aristotle explains how the natural philosopher comes to understand living beings:

“Our aim is to grasp and understand first its [the soul’s] essential nature, and secondly its properties; of these some are thought to be affections [παθή] proper to the soul itself, while others are considered to attach to the animal owing to the presence of soul.”

The implication of this passage is that from knowledge of the soul, one may infer knowledge of the soul’s properties and of those other affections that are present because of the soul. This explanation of the natural philosopher’s procedure is clearly inferential, but it is also causal. The διά in the above passage implies causality, and the soul is the cause of the παθή that the philosopher infers. This makes Aristotle’s view of inference in natural philosophy very different from that of Hempel and Nagel.

As I argued in the introduction, teleology is not merely a heuristic device for Aristotle, but is meant to point to real causes in the world. Hempel and Nagel, by contrast, actively seek to show that teleological language is not a necessary aspect of talk about function. Hempel sought to remove the word “teleological” from functional analysis altogether, and Nagel asserts that any functional account can be reformulated in non-teleological language. Thus, both Hempel and Nagel hold that apparent teleology can be explained mechanically, while Aristotle, as I argued in chapter 1, does not.

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202 See the introduction, section II.1, above.

But the contemporary causal theories of teleology also differ considerably from Aristotle’s approach. The etiological theory, when applied to biology, only makes sense in an evolutionary context. The heart has a function because it has a history of performing certain desirable activities that contributed to the survival of animals with hearts. But Aristotle clearly has no theory of evolution, and he does not explain the functions of organs or the \( \tau \varepsilon \lambda \eta \) of natural objects by reference to their history.

The survival value theory may be the closest to Aristotle’s view. In *Parts of Animals* I.1, Aristotle writes

> The fittest mode, then, of treatment is to say, a man has such and such parts, because the essence of man is such and such, and because they are necessary conditions of his existence, or, if we cannot quite say this then the next thing to it, namely, that it is good that they should be there. (*PA* I.1, 640a33–b1)

For Aristotle, teleological explanation is meant to show that things are present because of the \( \tau \varepsilon \lambda \eta \) they achieve. The \( \tau \varepsilon \lambda \eta \) of the parts do contribute to the survival of the whole organism, and the survival of the whole organism is, in a sense, its \( \tau \varepsilon \lambda \eta \). But what is missing from the contemporary account is the notion of essence, which Aristotle mentions in the passage just quoted. For Aristotle, an organism is the instantiation of an essence, and the survival of the species as a whole is the continued instantiation of that essence. There is a “what-it-was-to-be”—an essence—of a cat, a horse, a human being; and certain things are necessary for the survival of those natural composite beings. Hence, some explanations will show why organs or activities are present by showing that they are necessary (or at least good) for the survival of composite beings that have that particular essence. Although essences themselves are eternal, composite beings are not, and certain conditions are necessary for the continued existence of a species. Explaining
which conditions are necessary and why is an important goal for the natural philosopher, in Aristotle’s view.

Contemporary survival value theory is, by contrast, concerned with the survival of the current individual, not with the species as a whole, which may change over time. Most contemporary biologists would reject natural essences, since evolutionary theory suggests that what it is to be a cat or sparrow changes over the course of time. If the outlines of species are malleable, then it is survival of the individual (or perhaps its genes) that we are concerned with, whereas for Aristotle, it is the essence (which is the same for all members of a species) that concerns us.

The causal-role theory also differs in important ways from Aristotle’s view. If teleological explanations merely illustrate the role that an item or activity plays in the system in which it is present, then they do not explain why or how the item or activity is present. For Aristotle, however, teleological explanation is clearly meant to explain why natural objects are the way they are, not merely to illustrate how natural objects work.

In one sense, it should be no surprise that contemporary theories of teleology are so different from Aristotle’s. The goals and motivations of contemporary thinkers are quite different from Aristotle’s, and two thousand years of science, including evolutionary theory, stand between us and Aristotle. Nevertheless, it is helpful to note contemporary trends in philosophy of science, because they have, sometimes subtly, influenced Aristotle scholarship. One example of such influence can be found in the functionalist interpretation of Aristotle, which I discuss in the next section, and which, I argue, is an inadequate account of Aristotle’s theory.
II. Making Aristotle Our Contemporary

Scholars sometimes allege that not only has Aristotle’s view of teleology been historically subject to misinterpretation, but that in fact Aristotle actually has a conception of teleology that is quite friendly to the contemporary one.²⁰⁴ According to this view, if we only knew how to read Aristotle properly we would see that his views are quite amenable to ours. While there is certainly something to this view—Aristotle has been widely misinterpreted, and he is perhaps friendlier to contemporary natural science than one might think—I want to argue that this view has been taken too far.

Aristotle’s teleology has sometimes been interpreted as being exhausted by the contemporary view of teleology; in particular, many philosophers seem to think a certain type of goal-directed system tallies with Aristotle’s biological accounts. We should note that the phrase “goal-directed system” can be used in two quite distinct ways. In one sense, it may refer to something that is oriented to a goal outside of itself—as a cat is oriented toward her food, or a missile is oriented toward its target. It should be obvious by now that such systems do not exhaust Aristotle’s teleology. To say what a dog or star is for is not to point to anything outside of the dog or star. This is precisely the source of the opacity that we focused on in the last two chapters.

On the other hand, a system may be oriented, not toward an external goal, but toward the maintenance of some state of the system itself—as animal bodies regulate temperature, or as plants maintain their adequate functioning through respiration and metabolism. It is this second

sense of goal-directedness that is sometimes thought to exhaust Aristotle’s teleology, and it is easy to see why. As we have been emphasizing in the last two chapters, Aristotelian final cause is inborn in natural objects. Since a natural object’s τέλος converges with its form, τέλη are not, in nature, limited to external goals. Might not the contemporary notion of a goal-directed system, then, correspond to Aristotle’s concept of natural teleology?

I shall argue that the contemporary description of such goal-directed systems that aim at survival does not do justice to Aristotle’s account of biological form and therefore fails to capture his conception of how final causes work in natural objects.

Not too long ago, it was standard to dismiss Aristotle’s philosophy of science as hopelessly antiquated and possibly absurd, and some of this attitude has remained. Michael Ruse, for example, deals cavalierly with Aristotelian tradition: “In the good old days, that is, in the days of Aristotle and his Christianized followers, teleology used to refer to life forces moving toward their goals, or to a Superior Being’s plans and to the world being directed toward Its ends, or (in a pinch) to causes somehow working backward out of the future.”²⁰⁵ Losee, too, off-handedly mentions that for Aristotle “a future state ‘pulls along,’ as it were, the succession of states which leads up to it.”²⁰⁶ Aristotle’s teleology has often been dismissed as involving occult forces or backwards causation.

But, more recently, this view has ceased to be the norm. Elliot Sober, for example, suggests that Aristotle “believed that stars, no less than organisms, were to be understood as goal-directed systems. An inner τέλος drives heavy objects to fall toward the place where the

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²⁰⁵ Ruse, *Philosophy of Biology Today*, 44.
earth’s center is. Heavy things have this as their function.”\textsuperscript{207} Sober, of course, thinks Aristotle is wrong about this—inanimate objects are not goal-directed, nor do they possess functions, and modern science has rightly removed teleology from physics. But it is notable that Sober does not hesitate to describe Aristotle’s science in contemporary terms, like “function” and “goal-directed system.” This contemporization of Aristotle seems to be becoming more popular, and I shall argue that it derives from the functionalist account of Aristotle, which is largely inspired by contemporary philosophy of science.

In order to see how contemporary philosophy of science has affected our view of Aristotle, consider, for instance, the view of Aristotle that biologist Ernst Mayr derived from reading “the modern literature.”\textsuperscript{208} In Mayr’s view, Aristotle’s form (\(\epsilon \overline{i} \delta \alpha \zeta\)) may be equated with the genetic program encoded in DNA. Mayr remarks,

\begin{quote}
Much of Aristotle’s discussion becomes remarkably modern if one inserts modern terms to replace obsolete sixteenth- and seventeenth-century vocabulary. There is, of course, one major difference between Aristotle’s interpretation and the modern one. Aristotle could not actually see the form-giving principle (which, after all, was not fully understood until 1953) and assumed therefore that it had to be something immaterial [i.e. a soul].\textsuperscript{209}
\end{quote}

The assumption here is that Aristotle’s physics consists of reasoning from effects to causes and being willing to hypothesize to the best of one’s ability about the existence of causes that one cannot see. In particularly difficult cases, one must even be willing to attribute immaterial causes to some effects. In this way, Aristotle arrives at the notion of \(\epsilon \overline{i} \delta \alpha \zeta\), which in the case of a living body, is the soul. On Mayr’s account, Aristotelian soul is a hypothetical immaterial entity posited

\textsuperscript{207} Sober, \textit{Philosophy of Biology}, 84.  
\textsuperscript{208} He cites Gotthelf, Nussbaum, Sorabji and Balme. See Mayr, \textit{Toward a New Philosophy of Biology}, 61.  
\textsuperscript{209} Mayr, \textit{Toward a New Philosophy of Biology}, 56.
to account for certain material phenomena—in particular, the consistent passing on of biological form from parent to child—which are better explained in modern science by DNA.

This whole picture of Aristotle’s project is, I think, wrong-headed. Aristotle does have an empiricist bent—he is largely concerned with giving an account of the phenomena—and he does sometimes take the tact in natural science of reasoning from effects to causes. But this does not seem to be the right approach to his view of form or soul. While form is explanatory of phenomena, it is not merely a hypothesis. Rather, as we saw in the chapter 2, form and matter are the first principles of nature; in a sense they are nature. But no science establishes its own principles, and so natural philosophy or science cannot establish the existence of form and matter. As types of substance, form and matter are established by metaphysics. Hence, neither form nor matter can be hypotheses for Aristotle, since they are not to be proven by empirical science. Further, soul is not for Aristotle, what Mayr sees DNA to be—a mechanism that enables the passing on of form. On the contrary, soul is form—Aristotle is quite clear about this (de An. II.1, 412a16–21).

Mayr and Sober, of course, are not Aristotelian scholars, but biologists, and I have not mentioned them in order to criticize unfairly their understanding of Aristotle’s philosophy of nature. But these views bear remarking on because they show what sort of impression someone outside of the field is likely to come away with after reading the contemporary literature. What is to account for this sudden willingness (in Mayr’s case, for example) to give more credence to Aristotle’s philosophy of science than it was previously accorded? Clearly, it is the belief that Aristotle’s theories are more modern than we had thought. Sober describes Aristotle’s teleology in terms of goal-directed systems and functions, and Mayr emphasizes that Aristotle’s notion of
form is not a far cry from that of contemporary biologists. Being able to express Aristotle’s philosophy in these modern terms allows them to take Aristotle more seriously. But is the modern formulation true? Can Aristotle’s teleology be adequately unpacked using the contemporary view of teleology we examined in the last section?

To answer this question, I focus on the functionalist interpretation of Aristotle. In particular, contemporary functionalist accounts of Aristotle have made him out to seem strikingly modern, and I think it is this view that has often been responsible for making Aristotle seem more palatable to scientists like Mayr. I want to show, however, that functionalism is not a viable interpretation of Aristotle, in particular because it fails to capture the nuances of his teleology that we explored in chapter 2. The functionalist account of form (and therefore of final cause) does not adequately capture Aristotle’s views.

II.1 The Functionalist Account of Form

Functionalism is a philosophy of mind that represents a compromise between reductive physicalism on the one hand and dualism on the other. While the reductive physicalist holds that minds are not substantial entities and that mental states are reducible to physical states, and the dualist holds that minds and bodies are distinct substances, the functionalist holds that minds are the functional states of bodies. This avoids the anti-intuitiveness of reductive physicalism and the other-worldliness of dualism. Minds are neither ultimately non-existent, nor are they immaterial substances—they have a real existence, but it is an existence that supervenes on and is ontologically dependent on bodies.
For the functionalist, a mind is a functional state comprised of relations to other states and to sensory inputs and behavioral outputs; it can therefore be exhaustively described in completely non-mental language, appealing only to physical entities, properties, events, and states. This makes functionalism very appealing to anyone who shares the views of contemporary philosophy of science with respect to teleology. As we saw in the previous section, the contemporary view of teleology aims at describing functions and goal-directed systems in essentially non-teleological language—language that appeals only to the physical. Functionalism rests on the view that functions (such as mental ones) and intentional and goal-directed systems (such as minds and the animals that possess them) can be adequately explained in basically physical terms. Inspired by contemporary philosophy of science’s seeming success in removing the non-physical from teleology, functionalists seek to extend this success to the mental realm, and the functionalist view can be reasonably viewed as an application of contemporary teleology to philosophy of mind. Let us see how this extension works.

From the early seventies onward, proponents of functionalist accounts of mind such as Martha Nussbaum and Hilary Putnam have sought to show that Aristotle’s account of the mind-body relation is functionalist in nature. The mind-body relation, they urge, is underpinned by the form-matter relation in general, of which the mind-body relation is just a special example. The overarching purpose of functionalism is to offer metaphysics a middle road between

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physicalism on the one hand and dualism on the other. Functionalism is a philosophical theory that suggests that both the formal (in the sense of form) and the material exist, but are not different substances—rather, the formal is a function of the material. When applied to the mind-body problem, dualism attempts to explain minds as functional states of bodies.

According to the functionalist reading, Aristotle’s account of the soul and its functions (sensing, thinking, etc.) is to be found in his emphasis on form rather than matter. This emphasis is due to the form’s explanatory priority over matter—an account that includes that form is simpler, more general, and more relevant than a purely materialistic account. This is not meant, of course, to suggest that a physical account of an organism that did not mention form would not also be completely explanatory. The “detailed atom charts” of Nussbaum’s Democritus would presumably tell the whole story—they would just be extremely inconvenient. But form, for the functionalist, is just the way the matter is organized; it is nothing over and above the matter. The mind, then, as form, is not separate from the body, nor is it identical to the body; rather it is the form realized in or constituted by some matter. In this way, the functionalist hopes to avoid raising the mind-body problem altogether.

The functionalist reading of Aristotle’s hylomorphism has met with many objections, especially in relation to its implications for philosophy of mind. I am not here concerned with

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214 Ibid., 33.
215 For some of the main objections, see Burnyeat, “Is an Aristotelian Philosophy of Mind Still Credible?”; Robinson, “Mind and Body”; and Shields, “Soul and Body in Aristotle.” Shields, however, later changed his mind in “First Functionalist,” and Green, “Was Aristotle Really a Functionalist?” takes a more middle-of-the-road approach, suggesting that Aristotle was a functionalist, but only in a limited sense. Sorabji is often thought to have given a functionalist account of Aristotle in “Body and Soul in Aristotle” (see, e.g. Cohen, “Hylomorphism and Functionalism,” 57), though he objects in a revised version of that article that that was not his intention (see Sorabji, “Body and Soul in Aristotle,” 186–87).
these implications, or with the mind-body problem. But, as Nussbaum and Putnam observe, the mind-body relationship is just one instance of the larger functionalist picture—a picture that describes the matter-form relationship in general. It is this latter relationship that I am interested in, and I am particularly concerned with the way in which the functionalist picture of hylomorphism misrepresents form and limits teleology.

In Nussbaum’s work on *De Motu Animalium*, she is concerned with showing how Aristotle defends himself against the materialist challenge. He does so, she argues, in part by defending the use of teleological explanations. Nussbaum claims that this defense is two-fold. First, Nussbaum uses *Metaphysics VII* to emphasize that form is explanatorily stronger than matter. In this she seems correct. Second, however, she points to *Parts of Animals*, 639b12 ff., and *de Anima* II, in order to exhibit the appropriate use of teleology. She argues that since animals and plants are self-maintaining, any good explanation must account for this fact; teleological explanations, by appealing to the form as a goal, account for self-maintenance better than materialistic accounts can. This argument seems apt in the sense that part of the reason why we require teleological explanations of plants and animals is their characteristic of self-maintenance. However, for Aristotle, self-maintenance is not a pre-requisite for possessing a teleology. The elements, for example, do not maintain themselves, but they have τέλη nonetheless. Nussbaum, however, asserts without argument that Aristotle holds that there is no

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teleological explanation involved in the activities of inanimate items. She thus limits teleology to the living realm. We have already seen that this limitation is not true to Aristotle’s texts.

It might seem that the exclusion of natural, inanimate bodies from teleology is a small matter. But, as we saw in chapter 1, a serious misconception underlies this exclusion. At the root of the limitation of teleology to living things is a misunderstanding concerning form, and this misunderstanding is not a small matter at all. The functionalist’s conception of form as merely a level of explanation seems to reveal such a misunderstanding. For example, Nussbaum begins Aristotle’s imagined defense against the materialist Democritus by arguing that explanation at the level of form is to be preferred in many cases to explanation at the level of “ultimate matter.” Whether by this she means prime matter or the elements is not clear, but in any case, she begins by criticizing Democritus’s reductionistic spirit and aims to show that formal explanations are more useful than material ones. First, form “enables us to identify and reidentify complex substances,” in particular, living substances. Second, form best explains activity and motion “of both living beings and artifacts.” (Notice again that the third category is missing: the inanimate natural world.) Nussbaum concludes that formal explanations are superior to material ones for three reasons: they are simpler, more general, and only take into account the relevant data. Materialistic accounts fail in all three ways. She observes that “from eight lines of Homer I learn more that is general and valuable about the behavior of lions that I would from

217 Ibid., 60.
218 See chapter 1, section III.5 above, esp. n. 64.
219 Nussbaum, Aristotle’s “De Motu Animalium,” 68.
220 Ibid.
221 Ibid., 69.
222 Ibid., 70.
two volumes of detailed atom-charts.” All of these points are well taken. In general, what is wrong with Nussbaum’s account is not so much what she says, as what she leaves out.

The trouble with the functionalist account is that nowhere does it defend form as a real constituent of a living being. Aristotle, however, clearly believes that form is a real constituent of living beings. For example, at *de Anima* II.1, 413a2–3, he writes, “as the pupil plus the power of sight constitutes the eye, so the soul plus the body constitutes the animal.” Aristotle also describes the living being as a composite \([\sigma\nu\epsilon\tau\omicron\varsigma]\) of body and soul, for example at *de Anima* II.1, 412a15: “every natural body which has life in it is a substance in the sense of a composite.” If the soul is simply a function of the body, or if talk about souls is simply a way of speaking about functional states of bodies, then it is hard to see how the notion of a living body as a composite substance will be meaningful. Passages such as these show that Aristotle intends that the soul be taken as a real constituent of a living being that is different from the body.

In Nussbaum’s case, her defense of Aristotle against Democritus is not a defense of form, but a defense of formal explanation. And although her defense of the latter is succinct and accurate, at root her theory seems to lack a sense of the metaphysical reality of form. Indeed, at one point she observes,

> Form is not a constituent of the animal over and above its material constituents (although my [i.e., Aristotle’s] expression “the compound” might mislead one on this point—cf. *Metaph.* 1041b12 ff.); it is the arrangement of the constituents themselves.224

On the previous page, Nussbaum defines soul as “a functional state of some matter . . . .”225 Both of these passages show that she does not interpret Aristotle as having a robust sense of form.

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223 Ibid., 71.
224 Ibid., 73.
Given texts such as those just cited, I think that this interpretation is not feasible. Aristotle treats the soul as a constituent of a composite substance, not as something that arises from a material substance.

Nussbaum is not the only functionalist to lack Aristotle’s robust conception of form. Others, such as Putnam, Hartman, Wilkes, and Shields, also appear to fall short of this conception. Putnam’s discussions of functional organization distinguish no qualitative difference among types of forms—the form of a square peg is less complex, but not qualitatively different from the form or functional organization that is the human soul or mind. Like Nussbaum, he emphasizes that specifying the form is preferable to giving a material explanation for reasons of relevancy and explanatory power. Putnam goes a bit further than Nussbaum in wanting to suggest that sheer material explanation—what he calls “microstructural deduction”—is really of very little explanatory use at all. But, nevertheless he concedes that it is a form of explanation, “it is just a terrible explanation.” Thus, Putnam is a little more adamant than Nussbaum on the need for formal explanation, but his conception of form is no more robust than hers.

Functionalist interpretations of Aristotle can also be found in Edwin Hartman and Kathleen Wilkes. Both assert that Aristotle is essentially a materialist (Hartman) or physicalist (Wilkes) but that he holds a functionalist version of these theories. Commenting on *de Anima* II.1, 413a2 ff., Hartman writes:

> There is no problem in the statement that the soul cannot exist without the very organs and parts whose activity is the second actuality of the live body, nor without the organs

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226 Putnam uses the square peg example to illustrate what he means by functional organization in *Mind, Language and Reality*, 94.

227 Ibid., 95.

228 Ibid., 95.
and parts necessary for that activity, for they cause the activity that makes the organism a human being.\textsuperscript{229}

Hartman’s assertion that the body and its organs are the cause of the soul seems to fly in the face of Aristotle’s conception of four distinct causes, and of his conception of the soul as a formal and efficient cause in its own right. But Hartman is not unaware of this problem. He solves it by asserting that the soul, properly speaking, is not an efficient cause. The heart, he argues, is the real efficient cause for Aristotle, but sometimes Aristotle refers to the soul when he really means the heart, in the same way that we might refer to an army by the name of its general.\textsuperscript{230}

Hartman goes further and argues that not only is the soul a functional state of the body, but that this functional state can be identified with a mechanistic state.\textsuperscript{231} He argues against Putnam’s (and Aristotle’s) high standards for identity\textsuperscript{232} and urges that his own view is not, properly speaking, functionalist at all, but simply materialist.\textsuperscript{233} Nevertheless, his views are relevant to us here, because he clearly views the soul as a functional state, and this is just what I wish to argue against.

The problem with Hartman’s view is not so much his criteria for identity as his conception that the body and its motions cause the soul. If the body brings the soul into existence, as the passage quoted above suggests, then the soul cannot be a substance-maker for the body as we saw in chapter 2 that it must be. This is one of the basic problems with

\textsuperscript{229} Hartman, \textit{Substance, Body, and Soul}, 135.
\textsuperscript{230} Ibid., 139-142. He cites \textit{Physics} IV.3, 210a22 ff. and \textit{Metaphysics} XII.10, 1075a11–15 to support this claim.
\textsuperscript{231} Hartman, \textit{Substance, Body, and Soul}, 162.
\textsuperscript{232} Ibid., 157.
\textsuperscript{233} Ibid., 163.
functionalism—it reverses the order of causality that Aristotle himself argues for, making matter causally prior to form.

Wilkes appears to hold a similar view. She argues for a functionalist-physicalist interpretation of Aristotle. Her treatment of Aristotle, which occurs in the last chapter of *Physicalism*, is admittedly compressed and is perhaps not so much an interpretation of Aristotle as an attempt to bolster the functionalist program by pointing to its ancient heritage. Wilkes’s arguments appear to rest exclusively on passages in the *de Anima*, in particular 412a 6–413a10,\(^{234}\) where, she suggests, Aristotle solves the mind-body problem by not allowing it to arise in the first place. In defining the soul as the form of the body, Wilkes argues, Aristotle has essentially identified the soul with the set of biological and behavioral processes, or capacities for those processes, that account for a human being’s behavior.\(^{235}\) Unlike Hartman, Wilkes is more truly a functionalist: “. . . Aristotle is no more interested than is a modern physicalist in defending an identity theory between psychological and physiological processes.”\(^{236}\) Her conception of soul includes capacities as well as the processes themselves, and also includes behavioral processes (e.g. memorizing) that she would not want to identify simply with physiological ones. However, she still holds that their basis is physiological, and in this she and Hartman agree. The soul, for Wilkes, is a set of processes that is ultimately dependent on the body. Although she questions the post-Cartesian conception of body,\(^{237}\) her conception of soul still lacks the strong sense of form that is evident in Aristotle’s philosophy.

\(^{235}\) Ibid., 118.
\(^{236}\) Ibid., 120.
\(^{237}\) Ibid., 127.
Shields is more explicit in his rejection of form in the strong sense. He observes that functionalism is theoretically neutral with respect to ontology, and that, in theory, any system, material or immaterial, can realize functional states. However, he immediately concedes that “nearly all modern functionalists, as a matter of fact, are materialists . . . .” Indeed, one of the primary motivations for functionalism is, he says, the “need to structure an account of the mental compatible with a commitment to ontological materialism . . . .” Whatever functional states are, then, they do not constitute an ontological category of their own for the functionalist, as form clearly does for Aristotle.

However, Shields neglects the ontological problems inherent in making Aristotle a functionalist and instead focuses on the issue of multiple realizability. Functionalism holds, as one of its main tenets, that functional states may be realizable in a variety of suitable matters. As Putnam memorably puts it, “We could be made of Swiss cheese and it wouldn’t matter.” In favor of his functionalist interpretation of Aristotle, Shields cites various passages that he thinks support the multiple realizibility of the Aristotelian soul. These arguments are interesting and important from a functionalist point of view, but I think they do little to convince the reader that Aristotle is a functionalist in a general way, since even if some forms are multiply realizable, this need not necessitate that all forms be multiply realizable. Among functional states that Shields discusses are states such as being an eye, being a pain, and being human. In particular, we

239 Ibid., 20.
240 Putnam, Mind, Language and Reality. 91.
241 In particular, he cites Metaphysics VII. 11, 1036a31–b7 and de Anima II.1, 414a25–27.
243 Ibid., 24.
244 Ibid., 23.
would want to distinguish between attributive forms such as the form of an eye or the form of
pain on the one hand and substantive forms such as the human soul on the other. Shields fails to
make this distinction, which shows right away that his interpretation of Aristotle misses the
mark. Being an eye and being a pain may be multiply realizable without difficulty, since they
may indeed be forms in the sense of attributes or functional states. A difficulty for my
interpretation of Aristotle’s hylomorphism would arise only if Shields’s contention regarding the
human soul is correct. If the human soul is multiply realizable, then this may imply that
Aristotle’s view of the soul is functionalist. Several responses may be made to this.

First, although it is clear that functionalism implies multiple realizability, it is less clear
that multiple realizability implies functionalism. Is it not conceivable that substantial forms
might enter into composite relationships with different materials?

Second, even assuming that multiple realizability does imply functionalism, there is
reason to think that Aristotle is not completely committed to multiple realizability, especially
where the soul is concerned. At de Anima I.3, 407b19–25, he criticizes the views of some of his
predecessors:

All, however, that these thinkers do is to describe the specific characteristics of the soul;
they do not try to determine anything about the body which is to contain it, as if it were
possible, as in the Pythagorean myths, that any soul could be clothed in any body—an
absurd view, for each body seems to have a form and shape of its own. It is as absurd as
to say that the art of carpentry could embody itself in flutes; each art must use its tools,
each soul its body.

This passage, like others in the de Anima that we have mentioned, treats the soul as a co-
constituent of the living body. Aristotle’s language in this passage strongly implies this
relationship—the body contains or receives the soul, the soul is clothed in the body. This passages argues against the view that Aristotle countenances the multiple realizability of souls.

The passages that Shields cites in favor of the multiple realizability of souls are *de Anima* II.1, 414a25–27 and *Metaphysics* VII.11, 1036a31–b7. The first passage reads, “the actuality of any given thing can only be realized in a matter of its own appropriate to it. From all this it is plain that soul is an actuality or account of something that possesses a potentiality of being such.” On the face of it, this hardly sounds like an argument for multiple realizability. Rather, Aristotle is saying that not just any matter will do, but that forms have matter that is appropriate to them—in particular, a matter that already possesses the potential for that form. If we link this passage to a earlier passages, we can see just what sort of matter this will have to be: “[T]he soul is an actuality of the first kind of a natural body having life potentially within it. The body so described is a body which is organized.” (*de An.* II.1, 412a27–28) And a little further: “We must not understand by that which is potentially capable of living what has lost the soul it had, but only what still retains it; but seeds and fruits are bodies which are potentially of that sort.” (*de Anima* II.1, 412b25–26) This passage rules out the possibility that Swiss cheese or computer chips might make up a living being for Aristotle, since neither retain (or possess at any point) a soul. Neither contains within itself the potential for life in the way that living bodies, seeds, and fruits do.

The second passage that Shields mentions is *Metaphysics* VII.11, 1036a31–b7. This reads:

In the case of things which are found to occur in specifically different materials, as a circle may exist in bronze or stone or wood, it seems plain that these, the bronze or the stone, are no part of the essence of the circle, since it is found apart from them. Of things
which are not seen to exist apart, there is no reason why the same may not be true, e.g. even if all circles that had ever been seen were of bronze (for none the less the bronze would be no part of the form); but it is hard to effect this severance in thought. E.g. the form of man is always found in flesh and bones and parts of this kind; are these then also parts of the form and the formula? No, they are matter; but because man is not found in other matters we are unable to effect the severance.

Is Aristotle really implying here that man, like the circle, could have been found in other matters? Shields thinks so, but I am not so sure. First, this would directly contradict the passages from the *de Anima* cited above. Second, Shields seems to take the *Metaphysics* passage out of context. The passage occurs in the course of a discussion about definition. The passage is in fact a raising of questions and difficulties about the issue and does not necessarily represent Aristotle’s final word on it. Shortly after this passage, Aristotle writes

> Now we have stated that the question of definitions contains some difficulty, and why this is so. Therefore to bring all things thus to Forms and to eliminate the matter is useless labour; for some things surely are a particular form in a particular matter, or particular things in a particular state. And the comparison that Socrates the younger used to make in the case of animal is not good; for it leads away from the truth, and makes one suppose that man can possibly exist without his parts, as the circle can without the bronze. But the case is not similar; for an animal is something perceptible, and it is not possible to define it without reference to movement—nor, therefore, without reference to the parts and to their being in a certain state. For it is not a hand in any state that is a part of man, but the hand which can fulfill its work, which therefore must be alive; if it is not alive it is not a part. (*Metaph.* VII.11, 1063b21–33)

This passage, unlike the earlier one, is a clear statement of Aristotle’s own view. Man and the circle are not similar in this respect—the circle is multiply realizable, while man is not. Rather, we are brought back to the contention from the *de Anima*—man can only be realized in an already living body.

So, against Sheilds’s multiple realizibility theory, we can argue that although Aristotle countenanced multiple realizability with respect to some cases—in particular, cases such as the
circle, in which the form is attributive rather than substantial—he did not countenance it with respect to all cases. In particular, Aristotle does not seem to have thought of animals souls as multiply realizable, and this argues strongly against considering him a functionalist. Yet more can be said against the functionalist interpretation of Aristotle. In what follows I develop my criticism of this interpretation more fully.

**II.2 Why Aristotle Is Not a Functionalist**

In chapter 2, we saw that Aristotelian ἐἴδος admits of a spectrum of uses. In particular, the stronger uses of ἐἴδος interest us here. Aristotle distinguishes between formal attributes such as “white” and “hot,” which are mere accidents, and forms that are specified in definitions and which give the essence of a natural object—the forms of horse, marigold, or human. We saw that form in the latter, stronger sense is in one sense the nature of a natural object and that it converges with efficient and final cause. Finally, we saw that the distinction between ἔξεις and ἐνέργεια corresponds to the distinction of form as attributive and form as a natural principle that converges with final and efficient cause.

The trouble with functionalism is that it fails to distinguish clearly between attributive and substantial form. In particular, the functionalist literature on Aristotle fails to acknowledge the distinction between the weaker and stronger senses of form and blurs the line between formal dispositions or ἔξεις and actualities, resulting in an insufficient conception of Aristotelian form. In this chapter, I want to argue that functionalism fails because it treats natural form as a ἔξεις instead of as an ἐνέργεια. In particular, it treats form as a mere disposition, διάθεσις.
To begin, the notion of a functional state corresponds to Aristotle’s definition of a disposition more accurately than to his definition of ἐνέργεια. Of dispositions, Aristotle writes,

We call a disposition [διάθεσις] the arrangement of that which has parts, in respect either of place or of capacity [δύναμιν] or of kind [εἶδος]; for there must be a certain position [Θέσις] as the word ‘disposition’ [διάθεσις] shows. (Metaph. V.19, 1022b1–3)

Aristotle’s definition of disposition in this passage sounds very much like a functional state. It is an arrangement or organization, but is not limited to arrangement in place. Going beyond spatial arrangement, disposition can refer to an arrangement of capacity and of form.\(^{245}\) In her description of the soul or “functional state” of a lion, Nussbaum describes this as a “set of vital capacities, the functional organization, in virtue of which it lives and acts... how lions are organized to function, what vital capacities they have, and how these interact.”\(^{246}\) She, like Aristotle, is talking about something that involves an arrangement or organization of parts and capacities. And for that reason, Nussbaum’s description of the soul sounds more like a description of a disposition than an actuality. The fact that Aristotle gives two distinct definitions of ἐξίς, one as an ἐνέργεια and one as a kind of disposition, seems to imply that actuality and disposition are to be contrasted. (Metaph. V.20) Therefore, if the form of a living being is regularly identified with an ἐντελέχεια and ἐνέργεια, as it is in his text, then it clearly cannot be a functional state in the sense that Nussbaum envisions. Once again, the distinction between form as merely attributive and form as substantial proves to be vital to grasping Aristotle’s doctrine. Health, like other

\(^{245}\) I am following Ross’s gloss of κατὰ δύναμιν in this passage. “This must mean a non-spatial arrangement of parts according to their respective functions, e.g. the hierarchy of the parts of the soul...” Ross, Aristotle’s “Metaphysics,” 335. Again, the soul itself admits of dispositions, but is not itself a disposition.

\(^{246}\) Nussbaum, Aristotle’s “De Motu Animalium,” 71.
states, is an attribute of a substance; it is a certain functional arrangement of matter and is certainly formal rather than material. But it is not part of the definition of the object. It does not make the object to be what it is in essence, although it may be more proper to that object. For example, an unhealthy horse is still a horse, although it is not in its most proper form; but a horse without its soul is a horse in name only.

In turning to the passage from the *Metaphysics* cited by Nussbaum above, we find Aristotle explaining why complex substances are not simply compounds of their material parts.

The syllable, then, is something—not only its elements (the vowel and the consonant) but also something else; and the flesh is not only fire and earth or the hot and the cold, but also something else. Since, then, that something must be either an element or composed of elements, if it is an element the same argument will again apply; for flesh will consist of this and fire and earth and something still further, so that the process will go on to infinity; while if it is a compound, clearly it will be a compound not of one but of many (or else it will itself be that one), so that again in this case we can use the same argument as in the case of flesh or of the syllable. But it would seem that this is something, and not an element, and that it is the cause which makes this thing flesh and that a syllable. And similarly in all other cases. And this is the substance of each thing; for this is the primary cause of its being; and since, while some things are not substances, as many as are substances are formed naturally and by nature, their substance would seem to be this nature, which is not an element but a principle. An element is that into which a thing is divided and which is present in it as matter, e.g. $a$ and $b$ are the elements of the syllable. 

(\textit{Metaph.} VII.17, 1041b16–34)

Here Aristotle argues that complex substances are not merely heaps—they involve something in addition to their elements. He considers what this something might be and by a \textit{reductio ad absurdum} shows that it cannot be another element or something composed of elements. (Here he appears to use “element” in its non-technical sense, as a constituent part, rather than in the sense of the four elements, since he refers to the parts of syllables as elements.) Aristotle concludes that the something in question must be of a different sort altogether—not an element, but a substance that is an $\alpha \rho \chi \acute{n}$. A few lines earlier, he identified this substance as form: “Therefore
what we seek is the cause, i.e. the form, by reason of which the matter is some definite thing; and this is the substance of the thing.” (Metaph. VII.17, 1041b7–9)

Nussbaum’s interpretation of this passage is that the something in question is merely the arrangement of the matter. She is right to point out that form is not a constituent of the compound in the way that its elemental parts are. But, as we saw in chapter 2, Aristotle’s contention is that form determines essence and therefore makes the compound a substance, and being a substance that has an essence seems to imply something beyond possessing a form that is merely the arrangement of parts. Nussbaum herself is careful to extend form beyond spatial arrangement to include function, but to say that the arrangement of the matter constitutes not only a certain shape, but also a “functional state” still does not go far enough.

What implications does the functionalist reading of form have for teleology? Aristotle’s own contention is that form is a substance, an ἀρχή, and an actuality. As we saw in chapter 2, it is thus an ἔντελεχεία and a final cause. The functionalist assertion that the soul is just a functional state of the matter seems to take away from the sense of the form as cause and an ἀρχή. One of Aristotle’s objections to soul as a harmony is that soul is meant to be responsible for movement. Soul is active; it does things. Health doesn’t do anything—it is just an accurate description of the way some matter is arranged and behaves. Soul, on the other hand, is a principle of a natural body, and natural bodies are those that contain a source of movement in themselves. In living bodies, the soul is the source of this movement, since it provides for nutrition, growth, appetite, locomotion, imagination, and intellection, which are the faculties of living beings that facilitate their movements. Such faculties imply goals (de An. II.4, 415a20–

Ibid., 70–71.
22), but the functionalist account treats matter as the source of movement instead. In that account, the matter, on its own level, is engaged in some motion or behavior, and on the higher level of form this constitutes a certain disposition—a functional state. In the end, what is really going on is the motion of the matter. Ultimately, functionalism seems to collapse into physicalism. Nussbaum, for example, does not object that Democritus’s atom charts are explanatorily incomplete, just inefficient.

These observations have already been made to some extent in the literature. I am only urging, by way of addition, that the distinction between ἐξις and ἐνέργεια is of use here. Marc Cohen, for example, defends functionalism against Burnyeat’s well-known critique, but then goes on to cast doubts on the validity of the functionalist view of form. He admits that “Aristotle (perhaps unwisely) was working with a richer conception of form. For him, form or essence can also be an agent, an efficient cause.” Cohen urges that this is a serious difficulty for the functionalist, since it goes beyond the merely supervenient notion of form, which I have suggested best correlates with the Aristotelian notion of ἐξις. In Cohen’s view the only option left open to the functionalist is to suppose that

... Aristotle’s attribution of efficient causal efficacy to ψυχη (and to form in general) should not be taken literally. His talk of ψυχη as an agent may be just a manner of speaking. ... The success of the functionalist interpretation seems to me to depend on whether the apparent role of ψυχη as efficient cause can be satisfactorily explained away. I am not convinced that it can be.

The functionalist account gives form some ontological status, but only as a functional disposition—it cannot permit it to be an efficient cause. The upshot of this is that the

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248 Burnyeat, “Is an Aristotelian Philosophy of Mind Still Credible?”
250 Ibid., 71–72.
functionalist account is not so very far from the materialism to which it sometimes claims to be an alternative.\textsuperscript{251} As Code and Moravcsik observe, “The typical modern functionalist is driven by materialist sympathies . . . .”\textsuperscript{252}

By permitting teleological language, functionalism aims, not at taking any non-physicalist stance in metaphysics, but at increasing the explanatory power of the physicalist account. For instance, Nussbaum’s objections to Democritean materialism are not so much that it is untrue as that it is inefficacious. Explanations at the “formal level” are preferable for explanatory reasons—they are simpler, more general, more relevant—but not necessarily more true. She nowhere argues that formal explanations are better because they point to real causes or because they more accurately reflect states of affairs. Thus, although her observations about the explanatory power of formal accounts are well taken, she appears to leave out a great deal from Aristotle’s account. In the end, form seems to be for the functionalist an epiphenomenon, not a substance or an \textita. Materialism is objectionable because it is not perspicuous; nevertheless, it may still be true. But, as we saw in the introduction,\textsuperscript{253} Aristotle’s \textita go beyond explanatory value—they are real causes for him, even if they are not for many of his contemporary readers.

In short, functionalists seem to hold that Aristotle’s teleology is a teleology of goal-directed systems, and, specifically, self-maintaining systems. If living systems are teleological because they aim at some functional state, and only living systems are teleological, then clearly teleology is limited to goal-directed systems whose end is survival. But we have seen that Aristotle’s teleology is not limited to living things. Perhaps more importantly, the \textita in

\textsuperscript{251} Or at least a more reasonable version.
\textsuperscript{252} Code and Moravcsik, “Explaining Various Forms of Living,” 138.
\textsuperscript{253} See the introduction, section III.1, above.
teleology is, for the functionalist, a functional state, but we have seen that the notion of a state
does not capture Aristotle’s understanding of form, so that the contemporary grasp of teleology
even within goal-directed systems will be impoverished.

Functionalism undermines our understanding of Aristotle’s natural teleology, because it
lacks a strong conception of form as ἔνεργεια. Its teleology is hollow—if form is merely a
disposition, a functional state, then it is completely determined by the matter it informs, and
cannot do anything; it cannot be a cause in its own right, and does not therefore account for its
inherent possibility for further actualization. In chapter 2, we saw that for Aristotle, form
converges with both efficient and final cause. This double convergence is at the heart of
Aristotle’s teleology. Natural objects have their being, their actuality, their capacities for further
actualization, and their ability to fulfill these capacities, all on account of their form. This is why
they can properly be said to be teleological—because in themselves they possess propensities for
change and further actualization. Neither the ἔνεργεια that permits this actualization, nor the
ἔντελέχεια that represents that fully actualized state itself is equivalent to a functional state. A
functional state is an epiphenomenon, brought about by underlying structures and activities.
There is, to be sure, a kind of teleology at work in functional states—the underlying structures
and activities are aimed at producing the state, and the latter is their final cause. But this fails to
capture what an ἔνεργεια is—not only final cause itself, but a set of capacities for further
actualization. It is this feature of Aristotelian form that seems to be missing from the
functionalist account. For the functionalist, natural forms do not really converge with efficient
causes, and so they lack capacities for further actualization. Functional states are no more than

254 See esp. chapter 2, section I.3, above.
the arrangement of parts and their functions; these states lack powers of their own. As we will see in chapter 4, this is a view of teleology that is quite appropriate for artifacts, but not for the natural world.

In conclusion, contrary to what some contemporary scholars have argued, Aristotle’s teleology is quite different from the contemporary conception. Efforts to render Aristotle as a functionalist ultimately fail, because Aristotle has a conception of form that goes beyond arrangement and function. Aristotle himself seems to have a conception of the notion of functional state, a notion that he describes as a disposition, and which he clearly denies to be equivalent to the form that is stated in the definition of natural objects. Thus, contemporary work on teleology does little to help us understand Aristotle, and we shall have to look elsewhere for clarification. In the following chapter, I will begin to explore one possible method for achieving clarification—modeling. We will discuss the artifact model of natural teleology, identifying both its strengths and weaknesses, and will end by suggesting that additional modeling is needed.
Chapter Four
Ποίησις and the Artifact Model

In chapter 1, we saw that the meaning of final cause in nature can be clarified by a better grasp of the convergence of formal, efficient, and final cause. In chapter 2, I argued that that convergence is best expressed by Aristotle’s concepts of ἐνέργεια and ἐντελέχεια, which play a vital role in his philosophy of nature. In chapter 3, we saw that contemporary views of teleology in general, and especially the functionalist approach to Aristotle’s own work, fail to capture what is meant by actuality and instead reduce form to a διάθεσις.

This chapter introduces a modeling approach to the problem of natural teleology. First, I show why a model is needed for natural ποίησις. Then I evaluate the most popular model applied to natural teleology, in which natural ποίησις is modeled on human ποίησις, and natural objects are modeled on artifacts. I show that this model, used by Aristotle himself, has distinct benefits, but is ultimately inadequate to solve the particular difficulty I outlined in chapter 1. In the end, I will suggest that πρᾶξις, which Aristotle frequently contrasts with ποίησις, and which also has a distinct teleological structure, may offer an additional useful model for natural teleology.

1. Modeling Natural Ποίησις

The opacity of final cause due to its inborn nature (outlined in chapter 1), combined with the failure of contemporary teleology to illuminate the situation (discussed in chapter 3), has placed us in an interesting position. I have sketched broadly what Aristotle intends by final cause and
linked final cause with formal and efficient cause, and with ἐνέργεια and ἐντελέχεια (chapters 1 and 2). I have also shown that it is at work in both the inanimate and animate realms and have used it to point the way to a solution of the teleology versus mechanism debate (chapter 1) and to show why Aristotle cannot be classed as a functionalist (chapter 3). Nevertheless, the broad sketch that we have made remains insufficient.

Final cause remains opaque to modern understanding because of its being inborn to a thing. As I observed earlier, we simply cannot see the final causes of trees and dogs, except that insofar as we perceive them we do take in their natural form, and this form converges with their τέλος. But as a response to the question, “What is this dog or star for?”, the statement “You’re looking at it,” is singularly unsatisfying. Final cause is inborn in an object because of its relationship with form and efficient cause. Natural forms are principles of movement and rest, and their perfection provides a goal at which self-originated change aims. This set of relationships among formal, efficient, and final cause means that the final cause amounts to what Aristotle calls ἐνέργεια and ἐντελέχεια. We explored these concepts in chapter 2, where we explained how form as actuality converges with the final and efficient causes. At this point in our discussion, then, final cause in nature has become somewhat more clear. If nature is a principle of change and final causes are the ends of natural changes, then final cause converges with the principle of nature itself. Since form is nature more than matter is—because form represents the actuality of a natural object—then final cause also converges with form. This further implies that it converges with efficient cause, since in natural objects the efficient cause is allied with form as capacity—the form itself acts as an efficient cause by being responsible for changes and further levels of actualization in the object. Thus, we have gone some way in unpacking natural
teleology, yet these descriptions remain at the level of abstract, metaphysical description. How do we apply this to concrete natural objects?

One means of shedding light on such puzzles—one which Aristotle himself uses frequently—is to use a model or analogy. We have already emphasized Aristotle’s view, repeated several times throughout the corpus, that scientific investigation begins with what is better known to us and ends with what is better known in itself. A model or analogy furnishes a means of progressing from the first stage to the second. In science and philosophy, models may take a variety of forms. The models I am concerned with are what Rom Harré has described as “iconic” models, ones in which there is a correlation between the components that make up the internal structure of the model and those that make up the internal structure of the phenomenon being modeled. Such models map onto their corresponding phenomena, in contrast to the formal models used in math and logic, which symbolize idealized entities and relationships, but do not necessarily correlate to any particular state of affairs in the world.

According to Harré, iconic models have two purposes in science: a logical purpose—to “enable certain inferences, which would not otherwise be possible, to be made”; and an epistemological purpose—to “express, and enable us to extend, our knowledge of the world.”

Ideally, such models not only provide an illustration of the phenomenon in question, but are also such that they can provide the material infrastructure that would explain the phenomenon. “The ideal model . . . is one which might be conceived to be a hypothetical mechanism which might

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really be responsible for the phenomena to be explained.” In the sciences, models can play a powerful role in furthering our understanding of nature.

I must note from the outset that my philosophical goals are more modest than the ones outlined by Harré. The models I will be discussing in the following chapters are iconic rather than formal, but their use is limited to the epistemic sphere—they will provide us with a better way of grasping final cause, but they will not seek to explain its details in a scientific way. They illustrate the structure of natural phenomena and try to conceive their principles and causes more clearly. As for the discovery of the particular facts about nature and its causes, this is best done in the laboratory.

The sort of model best used in natural philosophy, and the reasons for using it, have been described by Wallace in his discussion of epistemic models:

The fact that a nature is only progressively disclosed in experience, and perhaps is never exhaustively understood, makes it especially amenable to study through modeling techniques. . . . For purposes here, a model will be taken to be an analogue or analogy that assists or promotes the gradual understanding of something not readily grasped in sense experience. . . . When we encounter something new, we attempt to understand it by conceiving it after the fashion of what is already familiar to us. We thus use the things we know, or at least think we know, to advance into the realm of the unknown. . . . [A] model as used in discovery and clarification, which we shall henceforth refer to as an epistemic model, has two referents that can serve to explain its function. The first is something more known, from which the model is taken, and the other is something less known, to which the model is applied.

The purpose of epistemic models is to provide a means of illustrating the unfamiliar by means of the familiar, and such models are particularly well-suited to Aristotelian science, which is, as Aristotle tells us, a progression from the familiar to the unfamiliar. (Ph. I.1, 184a16–21; APo. I.1, 71a1–9) By using a model, we take something we already understand and map the unfamiliar

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257 Harré, Philosophies of Science, 178.
onto it. In this way, we provide ourselves with a kind of guide through foreign terrain. Our first question, then, is, which familiar thing might we use to model natural causality, and in particular the final cause?

Both plants and animals engage in growth and reproduction; and some animals engage in further activities that count as \( \pi\omicron\iota\eta\sigma\iota \), e.g. nest-building. Even chemical compounds such as mineral deposits are the result of a sort of production. In short, natural processes can generally be viewed as some type of making. Since much of what nature does counts as \( \pi\omicron\iota\eta\sigma\iota \), we might think that a model drawn from \( \pi\omicron\iota\eta\sigma\iota \) would be appropriate.

I.1 \( \Pi\omicron\iota\eta\sigma\iota \)

Both artifacts and natural objects come to be through a process that Aristotle terms \( \pi\omicron\iota\eta\sigma\iota \) — production, or making. \( \Pi\omicron\iota\eta\sigma\iota \), and its verbal form \( \pioi\epsilon\iota\nu \), are roughly equivalent to the English “making,” and like it, they admit of a wide usage. In English I can make a cake, make my bed, make faces, make a scene, make friends—and if I make a mistake and make my friends angry, I can make amends. Likewise, the Greek \( \pi\omicron\iota\eta\sigma\iota \) can be used in a variety of contexts: producing physical objects, representing through poetry, musical composition or writing, satisfying a condition, procuring, causing, making sacrifices, holding festivals, making war or peace, submitting a plea, and so on.\(^{259}\) Both the Greek \( \pi\omicron\iota\eta\sigma\iota \) and the English “making” can refer to a variety of acts, not all of which have concrete artifacts as results.

\(^{259}\) *LSJ*, s.v. \( \pioi\epsilon\iota\omega \).
Aristotle, too, uses ποίησις in a variety of contexts, not all of which involve artifacts. In the *Nicomachean Ethics*, for instance, he notes that we are able to make our own desires (*EN* I.3, 1095a 10), that political science makes a certain character in the citizens (*EN* I.9, 1099b30), that experience can make us appear brave although we are not (*EN* III.8, 1116b9), that justice can involve making payments (*EN* IX.1, 1164b1), and that emotions can make us mad (*EN* VII.3, 1147a17). He also, very occasionally, uses ποίησις or ποιεῖν to refer to what would normally be considered a mere action, lacking any product at all, concrete or otherwise. Thus, at *Nicomachean Ethics* V.9, 1136b29–31, we find the following: ἐτι ἐπεὶ πολλαχῶς τὸ ποιεῖν λέγεται, καὶ ἔστιν ὡς τὰ ἄψυχα κτείνει καὶ ἡ χείρ καὶ ὁ οἰκέτης ἐπιτάξαντος, οὐκ ἀδικεῖ μὲν, ποιεῖ δὲ τὰ ἀδίκα. “Again, since things are said to do [lit. to make] things in different senses, and there is a sense in which lifeless things, or a hand, or a servant who obeys an order, may be said to slay, he who gets an excessive share does not act unjustly; though he does what is unjust [lit. makes unjust things].” Here the actions themselves are spoken of as things made. The man who acts unjustly makes an unjust action. We find something similar at *Nicomachean Ethics* X.3, 1174a1–4: οὐδείς τ’ ἀν ἔλοιπο . . . χαίρειν ποιῶν τι τῶν αἰσχίστων, μηδέποτε μέλλων λυπηθῆναι. “No one would choose. . . to get enjoyment by doing [lit. making] some most disgraceful deed, though he were never to feel any pain in consequence.” Here again, we see that actions or deeds can in some sense be the products of ποίησις. The notion of moral action as a kind of ποίησις will be explored in greater depth in chapter 5.
In particular, Aristotle frequently uses ποίησις to describe natural processes. At Physics III.3, 202a24 and V.2, 225b13–14, Aristotle uses ποίησις in the general sense of active change, in contrast to passive suffering. In these passages, ποίησις is used in the broad sense of “doing.” But ποίησις exists in nature in the narrower sense as well, for minerals, plants and animals are produced. Aristotle often makes use of the verb ποίειν in this way in the biological works. Mammals produce milk (HA III.21, 522b32), crayfish make their dens (HA VIII.2, 590b23–24), bees produce their larvae (HA V.22, 554a15–16), and the generation of plants and animals is often described as a ποίησις (GA I.21, 729b10 and I.23, 731a24). In general, natural objects are parallel to artifacts, and the implication is that nature is a producer as much as humanity is; indeed nature “acts like an intelligent workman” (GA I.23, 731a24).

Aristotle’s use of ποίησις and ποίειν fall within normal Greek usage and admit of a variety of nuanced meanings. However Aristotle also has a technical usage of ποίησις. In the technical sense, ποίησις refers only to actions that produce products beyond the acts themselves. Indeed, he defines ποίησις over against πραξις —acting—in Nicomachean Ethics VI, so that the distinction between them would seem to be a very important one. In general, Aristotle’s technical usage of ποίησις seems to be carefully distinguished from πραξις.

Among things that can be otherwise are included both things made and things done; making and acting are different (for their nature we treat even the discussions outside our school as reliable); so that the reasoned state of capacity to act is different from the reasoned state of capacity to make. Nor are they included one in the other; for neither is acting making nor is making acting. (EN VI.4, 1140a1–6)

Ποίησις and πραξις share a genus—both are concerned with things that could be otherwise and so fall within the scope of human deeds. But they are distinct classes; neither is a sub-species of
the other. At *EN* 1140b6–7 the distinction is made more clear: “For while making has an end other than itself, action cannot; for good action itself is its end.”

Ποίησις and πρᾶξις are distinguished teleologically—while the former finds its end in some product or ἐργόν, the latter finds its end in itself. In fact, this distinction is made in the opening lines of the *Nicomachean Ethics*: “But a certain difference is found among ends; some are activities (ἐνέργειαι), others are products (ἔργα) apart from the activities that produce them” (*EN* I.1, 1094a3–5). But the distinction is not made explicit here, and the terminology is loose—for example, the passage implies that ποίησις is an ἐνέργεια, but Aristotle in the *Metaphysics* asserts that it is properly a κίνησις—a process or movement.

In fact, the κίνησις / ἐνέργεια distinction is important and can help us deepen the ποίησις / πρᾶξις distinction. One place that the distinction arises is in a discussion of pleasure. Pleasure is clearly a sort of change, and Aristotle is concerned to discover what sort of change it is.

Seeing seems to be at any moment complete, for it does not lack anything which coming into being later will complete its form; and pleasure also seems to be of this nature. For it is a whole, and at no time can one find a pleasure whose form will be completed if the pleasure lasts longer. For this reason, too, it is not a movement. For every movement (e.g. that of building) takes time and is for the sake of an end, and is complete when it has made what it aims at. It is complete, therefore, only in the whole time or at the final moment. In their parts and during the time they occupy, all movements are incomplete, and are different in kind from the whole movement and from each other. For the fitting together of the stones is different from the fluting of the column, and these are both different in kind from the making of the temple; and the making of the temple is complete (for it lacks nothing with a view to the end proposed), but the making of the base or of the triglyph is incomplete; for each is the making of a part. (*EN* X.4, 1174a14–27)

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260 A similar distinction is made at *EN* VI.2, 1139b3–4.
Aristotle concludes that pleasure is not a movement, but rather a kind of activity. Activity, in contrast to movement, is complete at any given time at which it is occurring. In the passage above, seeing is taken as an example: at any given moment in the course of the process of seeing, seeing is in fact occurring. The seeing has been achieved from the first moment and continues to be achieved for as long as seeing continues. By contrast, at most moments in the process of building a temple, the temple has not in fact been built. Indeed the building of the temple has not been achieved until the very end of the process has been reached—until the stones have been fit together and the columns have been fluted, and so on. To see, even for a moment, is really to see. But a moment of temple-building does not produce a temple. Aristotle describes the distinction further in the *Metaphysics*.

> For it is not true that at the same time we are walking and have walked, or are building and have built, or are coming to be and have come to be—it is a different thing that is being moved and that has been moved, and that is moving and that has moved; but it is the same thing that at the same time has been and is seeing, or is thinking and has thought. The latter sort of process, then, I call an actuality, and the former a movement. (*Metaph.* IX.6, 1048b30–35)

Here Aristotle distinguishes the two classes by the tense of the verbs appropriate for describing them at a given time. Movements, as they occur, are happening but have not happened, while activities both are happening and have happened. Charles puts it this way:

> For all activity verbs, every period within the period of application of that activity verb is itself a period of application of that verb. . . . For all process verbs, no period within the period of application of that verb is itself a period of application of that verb. . . . Hence each process is ‘incomplete,’ while no activity is ‘incomplete.’

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In short, movements or processes can only be said to have happened when they are over, while activities have happened even as they are happening.

Note that this distinction is again a teleological one—the movement is not complete while it is occurring because its end has not yet been reached, while the activity itself is its end and so is complete in any moment in which it occurs. Applying this distinction to ποίησις and πραξις, we can observe that a ποίησις is oriented toward its end in such a way that because its end lies outside itself, it cannot be complete until it is over and the external end has been produced. Πραξις, on the other hand, has its end in itself, and is therefore an activity—it is complete because it achieves its end in every moment in which it exists.

This distinction between ποίησις and πραξις gives us a clear picture of the teleological structure of ποίησις. Ποίησις is a movement or process that aims at the production of an external product or goal. Ποίησις brings something new into being—something that lies outside of the agent. Does this really describe what nature does? In some sense, the answer is clearly “yes.” Many natural processes result in the existence of new objects, objects which are distinct from the process itself and from any agents that may be participating in the process. The process of nest-building, for example, is clearly ποίησις in just this sense. The goal (the nest) is distinct both from the process (nest-building) and from the agent (the bird). Nature engages in many such processes.

Moreover, these processes seem to mirror human ποίησις. Birds build nests; we build houses and temples. It seems natural, then, to propose a model for natural ποίησις based on human ποίησις.
II. The Artifact Model

The model most frequently used by Aristotle to elucidate causality in nature, and the final cause in particular, is the model of human ποίησις and its resulting artifacts. In many instances, the workings of nature can become more clear when seen through the lens of human ποίησις, where we find distinct analogues for matter, form, and efficient and final cause. However, I will ultimately show that this model, although in many respects useful, is inadequate to solve the puzzle outlined in chapter 1.

The Greek conception of nature as a craftsman and the use of the artifact model for natural objects has roots much further back than Aristotle. As Friedrich Solmsen has observed, even in Hesiod, who does not conceive the cosmos itself as an artifact but as something that comes into being through a succession of births, we nevertheless find the Olympians crafting human beings. As time goes on, craft imagery becomes more and more predominant, until we have in Plato the great figure of the Demiurge, the divine craftsman who produces the physical cosmos itself according to the plan laid out by the Forms.

Aristotle’s use of the artifact model is, unlike his predecessors’, completely non-mythological. While Plato’s demiurge is a mythical figure, still to be treated as part of a “likely story,” Aristotle’s use of the artifact model is metaphorical without being mythological. Aristotle does not treat nature as divine craft. Rather, τέχνη is a distinctly human endeavor, one which seeks to imitate nature (Ph. II.2, 194a21–22), which itself actually features ποίησις, but without any craftsman. The fact that τέχνη is an imitation of nature makes it an extremely useful

metaphor for nature. But it is, nevertheless, a metaphor, because nature has no craftsman, no external agent responsible for its processes. Rather, in Aristotle’s analogy, nature itself is both craftsman and craft object. (*Ph.* II.8, 199b30).

This is a particularly important distinction because, as Solmsen notes, for Plato, “nothing good—no order, form, or meaningful structure—could ever emerge from [nature’s] crude and erratic ways. . . . Form and direction have to come *ab extra.*” In Plato’s production model, it is the presence of a craftsman—an external being who deliberates about and fashions nature—that guarantees the presence of the good in nature. In Aristotle’s model, on the other hand, the craftsman—who, if anyone, is nature itself—recedes into the background, and the production process itself and its results come to the fore. “[T]he craftsmanship which in the *Timaeus* supervened from the outside is now an immanent characteristic of nature’s own operations.”

The processes of nature and the causal structure underlying them are frequently conceived on the model of τέχνη, but this is done without any implication of a divine craftsman external to nature itself. Again, Aristotle is careful to distinguish between nature and craft, even as he uses the latter to model the former.

Aristotle uses the artifact model in both the *Physics* and *Metaphysics* as a general illustration of the four causes. In addition to this general use, the artifact model is found primarily in the second book of the *Physics*, in which Aristotle establishes the principles for the study of nature. In this book, we find three distinct sets of texts:

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263 Ibid., 485.
264 Ibid., 487.
I. The artifact analogy illustrates the relationship between matter and form and shows how the physicist should approach each: *Ph.* I.7, 191a9–11; II.1, 193a30–b4; II.2, 194a21–27 and 194a34–b8.

II. The artifact analogy illustrates how nature acts for an end and shows how this involves hypothetical necessity, in which orderly successions of events occur without deliberation: *Ph.* II.8, 199a8–b20 and 199b27–31; II.9, 200a1–14 and 200a24–30.

III. The artifact (dis)analogy shows that natural forms are essential, while artificial forms are accidental and that while natural objects have a source of motion in themselves, artifacts do not: *Ph.* II.1, 192b12–30, 193a12–17, and 193b8–12.

In the sections below on the benefits and inadequacies of the artifact model, we will examine each of these texts in turn. First, however, we must say more about human ποίησις, which Aristotle uses as a model for natural ποίησις.

II.1 Τέχνη

Discussion of human ποίησις cannot be complete without some mention of its relevant virtue, τέχνη, craftsmanship, and in fact attention to τέχνη will give us several keys to understanding what ποίησις means for Aristotle. Like, ποίησις, τέχνη admits of both a broader and a more limited usage. Traditional meanings include not only craft knowledge, whether in the form of a set of rules or a definite method, or whether of a more casual sort, but also cunning or cleverness (in a negative sense), or any art, profession, or trade. In this latter sense, τέχνη would seem to

265 *LSJ*, s.v. τέχνη.
be almost interchangeable with human ποίησις, to the extent that it denotes production itself rather than any excellence in production. At Nicomachean Ethics I.7, 1097a16–17, it is paired with πραξις, just as ποίησις might be, and at Nicomachean Ethics VI.5, 1140b21–22 Aristotle states that the distinction between τέχνη and φρόνησις is that there is excellence in the former, but not the latter. That is, φρόνησις is here treated as a virtue, but τέχνη is presumably not a virtue, but something that admits of virtue—that is, it is the process of production itself.

This is the word’s broad sense, and Aristotle arguably sometimes uses it in this broad way, especially in the Physics. However, Nicomachean Ethics VI.4 also provides for a more limited meaning of τέχνη and treats τέχνη, not as the process of production, but as excellence in producing. The strict meaning of τέχνη is that it is

... a state of capacity to make, involving a true course of reasoning. All art is concerned with coming into being, i.e. with contriving and considering how something may come into being which is capable of either being or not being, and whose origin [ἀρχή] is in the maker and not in the thing made; for art is concerned neither with things that are, or come into being, by necessity, nor with things that do so in accordance with nature (since these have their origin in themselves). Making and acting being different, art must be a matter of making, not of acting. (EN VI.4, 1140a10–17)

Τέχνη is the virtue concerned with ποίησις; it is the habit of making and making well, in accordance with certain rules prescribed by reason. Thus, like ποίησις, it is concerned with things that could be otherwise—it is the ability to bring something into being that might not have existed and to do so in a way that demands rational planning. But here τέχνη is contrasted with nature, another realm where we find contingent things coming into being. The difference, Aristotle tells us, is that a natural object has its ἀρχή in itself, while an object of τέχνη has its ἀρχή in the craftsman. This distinction will prove to be crucial.
We have seen that in addition to its limited meaning of the virtue of craftsmanship, τέχνη admits of a more general usage. Aristotle sometimes seems to use τέχνη in this broader sense, in particular in the Physics, where τέχνη provides an analogy for the workings of nature. However, overemphasis of this point has led to misinterpretations, and it is important to note that even here τέχνη is never quite simply synonymous with ποίησις, but still carries some connotation of being an excellence. The Nicomachean Ethics defines τέχνη as a μετὰ λόγου ποιήτικη έξις (EN VI.4, 1140a8–9), a capacity or state of making in accordance with reason, and τέχνη is treated as such in the Physics as well. Physics II.8, for example, treats τέχνη as something that is inherently directed toward an end and that therefore admits of mistakes (Ph. II.8, 199a35–b7). This seems to emphasize τέχνη’s status as a virtue: a rational capacity that is, therefore, susceptible to error.

If τέχνη is a reasoned capacity—a virtue—even within the Physics, then this would avoid one potential difficulty with the artifact model. The difficulty is this: is τέχνη value-neutral, and if so, is it an appropriate analogy for natural ποίησις? Is τέχνη simply instrumental, a set of skills that can be used for any given end, or is it a body of knowledge basically oriented toward goods? Irwin, for example, seems to think that Aristotle’s treatment of τέχνη implies that it is instrumental. Irwin appears to suggest that τέχνη is simply a making, and a making that is abstracted from any agent who can recognize goods or deliberate about the means to them. Jan Edward Garrett has (I think rightly) criticized this instrumental conception of

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266 See Irwin’s translation of EN VI.5, 1140b22–23: “there is virtue [or vice in the use] of craft, but not [in the use] of prudence.” Garrett comments on this passage extensively in “Aristotle’s Nontechnical Conception,” 286 and 288, n. 27.
τέχνη as being an inappropriate reading of the *Nicomachean Ethics*. The latter argues for a πρὸς ἑν conception of τέχνη, in which the central meaning of the term is that it is an excellence.²⁶⁷ The sort of τέχνη that is merely instrumental is derivative, imperfect. Τέχνη, most properly so called, is oriented toward goods. It perfects and completes. If τέχνη were so highly abstracted in the *Physics* as Irwin suggests, it would fail substantially as an analogy for nature. The analogy would, in fact, distort our view of nature, which, Aristotle thinks, tends toward ends that are complete or perfect and, hence, good. To remove τέχνη from its normative context is, by analogy, to remove natural ποίησις from its normative context and thus to distort it. Natural ποίησις would then become an instrument or mechanism isolated from the ends it serves.

But it seems unnecessary to interpret Aristotle’s use of τέχνη in the *Physics* in this value-neutral way, and in fact *Physics* II.8 argues against this interpretation. There, Aristotle discusses the teleology in nature—the directedness of nature’s activities and processes. Aristotle insists that chance cannot account for natural objects and activities, because nature is so clearly and predictably goal-oriented. This predictable orientation toward definite goals might be summed up by saying that nature acts μετὰ λόγου. But this is just what τέχνη is—a capacity for making that is μετὰ λόγου. Hence, the τέχνη that appears as an analogy for nature in *Physics* II.8, cannot simply be a value-neutral instrument, but an excellence that, when it is properly realized, achieves completion and perfection in its objects.

I raise these issues because I want to be very clear about the ways in which τέχνη is and is not a good analogy for nature. As we will see, the artifact analogy has both benefits and drawbacks.

II.2 The Benefits of the Artifact Model

The Physics makes extensive use of the analogy between τέχνη and nature. The main reasons that this analogy works as well as it does are that nature does engage in ποίησις itself and that it does engage in it in a rationally ordered way that is similar to human τέχνη.

The analogy between nature and τέχνη serves at least three valuable ends. These ends correspond to the first two sets of texts listed above and to Aristotle’s more general use of the analogy in the Physics and Metaphysics. First, the artifact model illustrates the relationship between matter and form and shows how the physicist should approach each, in particular showing why form is nature more than matter is, and thus indicating that the physicist must be concerned with both matter and form. Second, the artifact model highlights an important feature of natural teleology—hypothetical necessity—and shows how this can create orderly succession without deliberation. Third, the artifact analogy is in general a useful pedagogical tool, because it provides distinct analogues for each of the four causes.

Aristotle uses the artifact analogy to explore the relationship between form and matter. At Physics I.7, 191a 7–12, he states,

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268 See p. 195, above.
The underlying nature can be known by analogy. For as the bronze is to the statue, the wood to the bed, or the matter and the formless before receiving form to any thing which has form, so is the underlying nature to substance, i.e. the ‘this’ or existent.

Here the artifact analogy is meant to illustrate the metaphysical distinction between matter and form. In fact, Aristotle is interested in the matter and form of natural objects, as the passage just before this indicates: “We have now stated the number of the principles of natural objects . . .” (Ph. 1.7, 191a3–4) But the form/matter relationship is sometimes difficult to discern in these objects, while it is easy to discern in artifacts, since in the latter we choose the matter and inform it ourselves. We know much more about the relationship between wood and the structure of a bed than we do about the relationship between blood or bone and the soul of an animal. So we use the analogy to see that just as artifacts have informed, underlying matter, just so there will be informed underlying matter in natural objects, which are more mysterious to us. Once we accept that this matter/form framework is at work in nature, we can begin to understand natural changes as movements from privation to presence of form. Thus, the framework disclosed in the analogy has direct relevance to the physicist—it helps him to begin to grasp natural change.

Aristotle continues to use the artifact analogy to illustrate the matter/form distinction in book II of the *Physics*. Here Aristotle considers the meaning of φύσις. Does it refer to an object’s material, or to its form? He considers both sides of the case and comes to a sort of compromise: in natural objects, the form is more the nature than the matter, but nevertheless, the matter is important and must not be neglected by the physicist. He reaches both parts of this compromise through consideration of the analogy between nature and τέχνη, and between natural objects and artifacts.
For the word ‘nature’ is applied to what is according to nature and the natural in the same way as ‘art’ is applied to what is artistic or a work of art. We should not say in the latter case that there is anything artistic about a thing, if it is a bed only potentially, not yet having the form of a bed; nor should we call it a work of art. The same is true of natural compounds. What is potentially flesh or bone has not yet its own nature, and does not exist by nature, until it receives the form specified in the definition, which we name in defining what flesh or bone is. Thus on the second account of nature, it would be the shape or form . . . . (Ph. II.1, 193a31–b4)

By examining the products of τέχνη, with which we are so familiar, we can gain insight into the importance of form in the natural world. A pile of wood is not a bed or a table—why should a pile of flesh and bones be an animal? The difference between the pile and the actual object is clearly the presence of form. The analogy makes apparent the essence-giving function of form—and indeed, we do not even call a thing by its name until it possesses the requisite form, unless we do so metaphorically.

But in spite of the significance of form, the other half of Aristotle’s conclusion to the form versus matter question is that the matter of natural objects is still important enough to necessitate its investigation by the physicist. At Physics II.2, 194a21–27, Aristotle points out another similarity between τέχνη and nature.

But if on the other hand art imitates nature, and it is the part of the same discipline to know the form and the matter up to a point (e.g. the doctor has a knowledge of health and also of bile and phlegm, in which health is realized and the builder both of the form of the house and of the matter, namely that it is bricks and beams and so forth): if this is so, it would be the part of natural science also to know nature in both its senses. (Ph. II.2, 194a21–27)

Here Aristotle gives the reasoning behind the artifact analogy: τέχνη, human ποίησις, is an imitation of natural ποίησις. Therefore, at least in most respects, we may be justified in assuming similarities between them. The similarity highlighted here is the concern with matter. Again, we use arts that are well known in the human sphere to shed light on what is less well
known in nature. Doctors must know about both health and bodily fluids. The builder must have both a blueprint and bricks. Just so, the physicist will have to know about the matter and forms of natural objects.

The physicist’s proper understanding of form and matter are developed further at Physics II.2, 194a34–b8. In that passage, Aristotle distinguishes between final causes as goals and final causes as beneficiaries. He notes that in crafts, there are really two separate crafts that concern themselves with the same objects—the craft that creates the object (i.e. that has the object as its goal) and the craft that uses the object (i.e. the craft that is the beneficiary of the object). Aristotle suggests that the former is concerned with the matter, while the latter is more concerned with the form: “For the helmsman knows and prescribes what sort of form a helm should have, the other [i.e. the helm-maker] from what wood it should be made and by means of what operations” (Ph. II.2, 194b5–6). However, nature differs from craft in that craftsmen choose their matter, whereas in nature the matter is already present. Moreover, as Aristotle observes, we treat things as though they were for our sake—that is, we make ourselves the beneficiaries of natural objects. Overall, this passage reinforces the idea that the physicist should be more concerned with form than matter.

Second, Aristotle uses the artifact analogy to shed light on the teleology of nature by pointing out the nature and importance of hypothetical necessity. In Physics II.8–9, Aristotle addresses two issues: in what sense nature acts for an end, and in what sense necessity exists in
nature (*Ph.* II.8, 198b10–12). I have dealt with both of these issues at length in chapter 1.\(^{269}\) Here, I want to note the use of the τέχνη analogy in both of these discussions.

It turns out that the issues are closely related, since the teleological orientation of natural and artificial objects demands that they be subject to a certain sort of necessity. We recall the passage at *Physics* II.8, 199a8–20, where Aristotle takes the ordered succession of events as a sign of the presence of teleology.\(^{270}\) Aristotle believes that an ordered succession implies the presence of a final cause. In nature, this ordered succession can be seen most clearly in ποίησις, and in reproduction and growth in particular, in which the organism passes through various stages on the way to maturity. Thus, Aristotle sees that nature and τέχνη are alike to the extent that they have products as their ends, and that whenever a product is to be made, certain events must occur in a certain order. This is as true in nature as it is in τέχνη. Ποίησις, then, whether natural or human, is always a teleological process. Here the analogy between nature and τέχνη serves to unite the two under the common umbrella of ποίησις.

The teleological structure shared by the different types of ποίησις is explained in terms of hypothetical necessity. Key passages on hypothetical necessity occur in *Physics* II.9 and *Parts of Animals* I.1. Again, both have been discussed in chapter 1, but here I will focus on the role of the τέχνη analogy. Against those who would argue that there is simple necessity in nature, Aristotle asserts that this is

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\ldots \text{just as if one were to suppose that the wall of a house necessarily comes to be because what is heavy is naturally carried downwards and what is light to the top, so that the stones and foundations take the lowest place, with earth above because it is lighter, and}
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\(^{269}\) See chapter 1, sections II.1–4 and section II.5, above.
\(^{270}\) See chapter 1, section III.4, above.
wood at the top of all as being the lightest. Whereas, though the wall does not come to be without these, it is not due to these, except as its material cause: it comes to be for the sake of sheltering and guarding certain things. Similarly in all other things which involve that for the sake of which: the product cannot come to be without things which have a necessary nature, but it is not due to these (except as material); it comes to be for an end. For instance, why is a saw such as it is? To effect so-and-so and for the sake of so-and-so. This end, however, cannot be realized unless the saw is made of iron. It is, therefore, necessary for it to be of iron, if we are to have a saw and perform the operation of sawing. What is necessary, then, is necessary on a hypothesis, not as an end. (Ph. II.9, 200a1–14)

Here the artifact analogy points out the absurdity of failing to acknowledge hypothetical necessity in things that are end directed. It would be evidently absurd in the case of the house, and the image of the house sort of “falling together” by the laws of motion is comical, because it is obvious to us that houses are made with an end in view and that the structure and choice of materials both depend on this end. (This analogy is repeated at Physics II.9, 200a24–30.) Once we see the absurdity of supposing that things for an end could fall together by simple necessity, and we acknowledge that natural objects are end-directed, it is easy to see that nature, too, will have to feature hypothetical necessity.

Moreover, the artifact analogy sheds light on the hypothetical necessity found in nature by showing how such goal-directed processes can exist without deliberation. For we might worry how orderly, goal-directed processes can occur in nature without some conscious agent deliberating about and ordering them. Aristotle addresses this issue at Physics II.8, 199b27–31, where he observes that τέχνη itself does not deliberate. The good craftsman, truly skilled in his craft, performs his art through a kind of intellectual habit that does not involve deliberation, the choosing of means to an end. The master craftsman has, as it were, internalized the rules of his or her craft, and applies those rules as a matter of habit. Nature, Aristotle says, is something like
that—it produces definite ends by means of orderly processes, but without any conscious agent who selects the processes.

Third, the artifact analogy plays an important pedagogical role. In both the *Physics* and the *Metaphysics*, Aristotle introduces the four causes with a host of artifact examples. As we have seen, one of the troubles with natural teleology is that the final, formal, and efficient causes normally converge in nature. They are aspects inborn in the natural object, and they seemingly hide behind and within each other—it is difficult to tease them apart. In artifacts, however, each of the four causes stands alone. In the overused sculpture example, the bronze, the shape of the statue, the sculptor, the goal of having a thing of beauty—each of these causes stands apart quite plainly and is open to inspection. This is, of course, why the sculpture example is overused—it is undoubtedly the easiest way to get students to distinguish among the four causes. This pedagogical use is important.

Unfortunately, this last benefit of the artifact analogy is also one of its greatest drawbacks. As we will see, the non-convergence of the formal, efficient, and final causes in artifacts obscures natural teleology when artifacts are used to model natural objects.

### II.3 The Inadequacy of the Artifact Model

I am by no means alone in criticizing the artifact analogy. Rosamund Kent Sprague, for instance, criticizes the pedagogical tradition of construing the four causes based on an artifact analogy, arguing that this distorts, among other things, the notion that the causes can adequately describe natural change.\(^{271}\) Erol Katayama has argued that artifacts, unlike most plants and animals, are

not substances, because they are ontologically dependent on craftsmen and therefore fail to meet
the criterion of ontological priority given for substances in the Metaphysics.\textsuperscript{272} Sarah Broadie has
argued that, in use, the artifact analogy has the effect of isolating \( \tau \varepsilon \chi \nu \eta \) from its actual context
within the life of the craftsman and that this actually robs the analogy of its strongest point—
namely, that the analogy emphasizes the plurality of substances and agents, and therefore ends,
in nature.\textsuperscript{273} The role of the craftsman must be downplayed in the artifact analogy (because there
is no analogously separate craftsman in nature—nature is like a doctor doctoring himself—
Physics II.8, 199b30), and the upshot of this is that the artifact analogy significantly reduces the
sense of natural objects as having individual natures, of being metaphysical centers of activity.\textsuperscript{274}
Whatever the status of Sprague’s, Katayama’s, and Broadie’s particular arguments, the
dissimilarities between artifacts and natural objects are not negligible.

Nature and \( \tau \varepsilon \chi \nu \eta \) are not entirely parallel. Sometimes the analogy between them proves
to be a disanalogy—one which is no less informative about natural objects. Although \( \tau \varepsilon \chi \nu \eta \)
offers several parallels to nature, Aristotle sometimes uses \( \tau \varepsilon \chi \nu \eta \) as a foil for the natural. He
does this to make at least two points: first, that nature is more form than matter; and second, that
the most fundamental feature of natural objects is that they contain a source of change in
themselves. The first point may seem ironic. Did we not just see Aristotle using the \textit{similarities}
between nature and \( \tau \varepsilon \chi \nu \eta \) to highlight the importance of form? We did, and yet in the very same
chapter he also emphasizes their dissimilarities to the same end. I think this is a sign of

\textsuperscript{272} Katayama, \textit{Aristotle on Artifacts}, 107.
\textsuperscript{274} Ibid., 42.
Aristotle’s attitude toward the analogy between τέχνη and nature—it is not cut and dried. It is a sophisticated analogy that admits of many dialectical uses, and we should be appropriately cautious in our interpretation of it.

At Physics II.1, 193a12–17, just before Aristotle urges that form is essential to both artificial and natural objects, he uses Antiphon’s example of the bed to show that form does not play quite the same role in each of these contexts. Artifacts possess their forms accidentally, rather than essentially, for

. . . if you planted a bed and the rotting wood acquired the power of sending up a shoot, it would not be a bed that would come up, but wood which shows that the arrangement in accordance with the rules of the art is merely an accidental attribute, whereas the substance is the other, which, further, persists continuously through the process. (Ph. II.1, 193a12–17)

The artificial forms of things cannot be passed on through reproduction, while natural forms are so passed on, and this seems to imply the greater strength of the latter. A little further on, at Physics II.1, 193b8–12, this idea is reiterated.

Again man is born of man but not bed from bed. That is why people say that the shape is not the nature of a bed, but the wood is—if the bed sprouted, not a bed but wood would come up. But even if the shape is art, then on the same principle the shape of man is his nature. For man is born from man. (Ph. II.1, 193b8–12)

Here Aristotle uses the disanalogy between nature and τέχνη to point out an important difference between their goals. Artifacts lack goals in themselves—beds do not produce beds; carpenters produce them. Natural objects, on the other hand, tend to reproduce, and when they do so they reproduce their own forms. So, the upshot of Aristotle’s first disanalogy between nature and τέχνη is specifically teleological. The disanalogy shows that nature is more form than matter is, and it shows this by pointing out that natural forms have causal powers that artificial
forms lack. Natural objects have ends in themselves; artifacts do not. A natural object’s form acts as final cause; an artifact’s form does not. This is crucial, since one of the features of natural teleology that makes it opaque is precisely the convergence of form and final cause. Artifacts will not model this convergence for us.

Another way to describe this is to say that artifacts possess their forms, their defining and “essential” characteristics, by accident. A pile of wood takes on a certain form, not because of anything in the nature of the wood, but because an outside agent makes something out of it. Once it has become a chair, the form it possesses—that which makes it a chair—is incidental to the wood. Although the craftsman selects appropriate materials (cotton balls would not do, for example), the relationship between the matter and the form is much looser than it is in nature. This is because the form is imposed from the outside. By contrast, a tree possesses its form by nature. From its very beginning as an acorn, it already possessed this form in potentiality. All its growth and change has been determined by the form, and its form is not accidental to it. A tree is not a tree because someone else has made it so or called it so, but because it has, and has had from the first moment of its existence, the appropriate form. Such forms are inborn; they are not imposed. This is why they can be final causes for the objects whose forms they are. Artificial forms are not final causes for their objects, and this is precisely because they are accidental.

The accidental quality of artificial forms comes from their being imposed by outside agents, and this means that artifacts cannot model the convergence of formal and efficient cause either. Aristotle makes a second disanalogy between τέχνη and nature: natural objects contain a

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275 In this way, there is a hypothetical necessity at work in such craft activities—if there is to be a pile, then there must be a suitable material. But the material itself has no inborn potential to undergo such a process or to take on such a form.
source of change (including reproduction) in themselves, while artifacts do not. This distinction
is so vital for grasping what a natural object is that Aristotle loses no time in making it, and it
occurs in the opening lines of Physics II, as he begins to expound his own philosophy of nature.

Natural objects

. . . plainly differ from things which are not constituted by nature. For each of them has
within itself a principle of motion and of stationariness (in respect of place, or of growth
and decrease, or by way of alteration). On the other hand, a bed and a coat and anything
else of that sort, qua receiving these designations—i.e. in so far as they are products of
art—have no innate impulse to change. But in so far as they happen to be composed of
stone or of earth or of a mixture of the two, they do have such an impulse, and just to that
extent—which seems to indicate that nature is a principle or cause of being moved and of
being at rest in that to which it belongs primarily, in virtue of itself and not accidentally. I
say ‘not accidentally’, because (for instance) a man who is a doctor might himself be a
cause of health to himself. Nevertheless it is not in so far as he is a patient that he
possesses the art of medicine: it merely has happened that the same man is doctor and
patient—and that is why these attributes are not always found together. So it is with all
other artificial products. None of them has in itself the principle of its own production.
(Ph. II.1, 192b12–30)

Again, human ποιησις and its objects act as a foil for natural ποιησις and natural objects.

Artifacts, as artifacts, neither come into being, nor grow, nor move on their own, but only by
virtue of the craftsman and his craft. This turns out to point to the key distinguishing feature of
natural objects. It is the hallmark of natural objects to possess an innate impulse for change, and
Aristotle defines nature accordingly. Thus, at the very beginning of Aristotle’s statement of his
own natural philosophy, in the passage in which he defines nature itself, it is the disanalogy
between nature and τέχνη that proves vital. Natural objects are efficient causes; artifacts are not.
The forms of natural objects provide them with distinct capacities for change and for further
realization. Artificial forms, however, cannot initiate change of any kind.
This non-convergence of formal and efficient cause can be first observed in how artifacts come into being, namely by having their forms externally imposed. Artifacts come into existence when outside agents (efficient causes) impose forms of their choice on a given material for reasons of their own devising. Any change that occurs to the artifact then originates outside of it. Natural objects, on the other hand, already have their forms within them potentially from the outset, and their maturation is a process of developing or realizing this form. The inborn nature of the form seems to be what grants the natural object a source of change in itself as the form is realized and becomes fully active. Wood is a table only by accident, and a sign of this is that, as a table, it does nothing, and undergoes no change or development. But natural objects do undergo change and development as the objects that they are. It is as a kitten that a kitten grows into a cat; it is as a dog that a dog chases a squirrel. Cats do cat stuff, and dogs do dog stuff, but chairs do not do chair stuff. There is no chair stuff for them to do, qua chairs.\textsuperscript{276} Aristotle takes the ability to engage in natural motions as a sign that the form is possessed essentially. This is because only form that is possessed essentially, and not accidentally, converges with the efficient and final causes. The form of a table can never be an efficient cause, and its status as a final cause is completely determined by some outside agent who has set its form as a goal worthy of realization.

The upshot of both of the problems with the artifact model is that artifacts do not possess ενεργεια or εντελεχεια in the way that natural objects do. Instead, artificial forms are more like διάθεσις, properly speaking. In chapter 2, we saw that a διάθεσις is the disposition of parts in a functional state. Natural objects, of course, have ἔξεις that are διάθεσις (health, for example),

\textsuperscript{276} Of course, insofar as they are composed of natural materials, artifacts do engage in natural motions. For example, a stone bowl responds to gravity as well as a rock does, but it does so insofar as it retains some of the natural form of stone, not insofar as it possesses the form of a bowl.
but their natural forms are not \( \delta \iota \alpha \theta \varepsilon \sigma \iota \varsigma \), but \( \dot{\epsilon} \nu \acute{\epsilon} \rho \gamma \varepsilon \iota \alpha \); that is, their natural forms are essential and substantive, not mere epiphenomena or byproducts of matter and structure; perhaps most importantly they have inherent capacities for further actualization, for achieving second \( \dot{\epsilon} \nu \acute{\epsilon} \rho \gamma \varepsilon \iota \alpha \). The formal qualities of artifacts, however, are no more than the arrangement of their parts and the functionality that results. The arrangement is determined by external agencies and represents a state of actuality only by convention. As agents, we define what artifacts are to be and then rearrange the matter to suit our needs. A pile of wood becomes a table when we say it has—when it is arranged in the way we determined it should be to fulfill our goals. We may call this state a \( \dot{\epsilon} \xi \iota \varsigma \) or even, in an extended sense, an \( \dot{\epsilon} \nu \acute{\epsilon} \rho \gamma \varepsilon \iota \alpha \), but it is clear that it is not first \( \dot{\epsilon} \nu \acute{\epsilon} \rho \gamma \varepsilon \iota \alpha \) in the strong sense—it contains no inherent potential for further actualization. Artificial forms have no further capacity for perfection. They cannot reproduce after their own kind, nor can they engage in activities that represent the flourishing or perfection of their form. Certainly, a well-tuned piano is better than a poorly tuned one, and a computer capable of performing high-speed calculations is preferable to an obsolete model only good for playing solitaire. But these artifacts themselves are not the beneficiaries of the states or activities in which they participate, and they cannot be said to flourish. Pianos and computers are good for agents, but there is no good for the artifacts themselves.

Of course, Aristotle unquestionably uses the term \( \dot{\epsilon} \nu \acute{\epsilon} \rho \gamma \varepsilon \iota \alpha \) in conjunction with artifacts. The statue of Hermes is actual, as opposed to the block of marble, which is merely potential, because the statue has its form, while the block does not \((Metaph. \text{ V.7}, 1017b1–10)\). We have already seen that Aristotle sometimes uses the term \( \dot{\epsilon} \nu \acute{\epsilon} \rho \gamma \varepsilon \iota \alpha \) almost synonymously with
But further textual analysis showed that the two terms do not designate quite the same thing, especially in the natural world. In distinguishing between actuality and potentiality, the Hermes example is a good one. But when it comes to the natural world, ἐνέργεια takes on an added dimension that cannot be captured by artifacts. Because artificial forms are accidental, because none of their causes converge, and because they have no capacity to achieve second ἐνέργεια, artificial forms are not really first ἐνέργεια. They cannot, therefore, perfectly model natural form.

We have seen that craft ποίησις is a useful model for several reasons: it highlights the fact that form is nature more than matter is and teaches us that the physicist must be concerned with both; it emphasizes hypothetical necessity and shows how this can result in orderly, goal-oriented successions without deliberation; and it illustrates each of the four causes distinctly and separately. On the basis of these reasons, Aristotle was surely justified in emphasizing the analogy between human and natural ποίησις. However, he also points out the limits of this analogy and is careful to distinguish in the Physics between τέχνη and natural production. The differences between them prove to be such that the artifact model cannot illuminate the internality of final cause or the ἐνέργεια and ἐντελέχεια possessed by natural objects, although it does usefully illuminate other aspects of them.

Which, then, is more significant—the analogy or the disanalogy? Or is it unnecessary to decide? It seems to me that neither is more significant. My discussion has hopefully shown that

277 See chapter 2, section II.2, above.
there are sufficient similarities between nature and тέχνη regarding form, teleology, and hypothetical necessity, to make it a useful tool for philosophy of nature. The dissimilarities do not, I think, trump this use. However, the dissimilarities between nature and тέχνη leave a gap in our understanding of teleology. This gap corresponds precisely to the puzzle I outlined in chapter 1—the puzzle of the inborn nature of teleology in natural objects.

In chapter 1, I discussed the inborn nature of final cause and why it is a puzzle deserving of a solution. Earlier in this chapter I argued that a modeling approach would be appropriate in this case. I have examined one possible model and found it wanting. It would be appropriate, then, to suggest an alternative. The alternative I suggest is that some form of πραξις will offer a model for teleology. Like ποίησις, πραξις is familiar to us as part of ordinary life. It is among the things better known to us. Also like ποίησις, πραξις has a definite teleological structure. In the next chapter, I argue that moral πραξις in particular has features that make it a good supplemental model for natural teleology.
Chapter Five
Πραξις and the Moral Life

The goal of this chapter is to outline a supplemental model for natural teleology, one that focuses on moral action instead of craft. The first notable difference between this model and the one outlined in chapter 4 is that the new model is based on πραξις rather than ποιησις. The first section of this chapter will provide a discussion of πραξις in general, distinguishing it from ποιησις and highlighting some of the main features of πραξις that will make it a suitable model for natural teleology. In section II, I narrow my focus to one particular type of πραξις: moral action. I give some preliminary arguments to show that of the possible types of πραξις, moral action is most likely to offer a model for natural teleology and then explain how an inclusivist reading of ευδαιμονια provides us with a view of moral action that mirrors the feature of

278 The debate over whether ευδαιμονια is to be construed as an inclusive or dominant end is one of the most well-known debates in modern scholarship on Aristotle. It begins at least as early as Gauthier and Jolif’s 1958 commentary (or is perhaps implied by Greenwood’s 1909 commentary—see Greenwood, “Nicomachean Ethics” Book Six, 73–85) and has continued into the present decade. The question, simply put, is this: Is the activity that meets Aristotle’s criteria for an ultimate end of human life—and hence the criteria for ευδαιμονια—a single, dominant activity (such as contemplation), or must the final activity include a number of different activities? The inclusivist reading of ευδαιμονια is widely accepted, but by no means uncontested. One clear and fairly traditional starting point for the debate is the difference between the treatment of ευδαιμονια in the Eudemian and Nicomachean Ethics. (See Verbeke, “L’idéal de la perfection humaine,” 84. Kenny, too, takes the division between the Eudemian Ethics and the Nicomachean Ethics as his starting point and uses it to argue for his thesis that the common books (EN V–VII and EE IV–VI) in fact belong to the Eudemian Ethics. See Kenny, Aristotelian Ethics, esp. 203–206.) There is almost universal agreement in the literature that the Eudemian Ethics overall describes an inclusive-end view of ευδαιμονια. (For example, see Ackrill, “Aristotle on Ευδαιμονια,” 354; Cooper, Reason and Human Good, 97, 119, 141–42; Kenny, Aristotelian Ethics, 190.) However, if the interpretation of the Eudemian Ethics (and therefore the common books) as basically inclusivist is traditional, a similar interpretation of the Nicomachean Ethics is certainly not. There is widespread agreement that Nicomachean Ethics I can be interpreted inclusively (for example, by the writers just mentioned, as well as Bostock—see Bostock, Aristotle’s Ethics, 25). But an early dominant view of the Nicomachean Ethics as a whole was expressed by Jaeger. (See Jaeger, Aristotle, 438.) More recently,
natural teleology that we have focused on throughout this dissertation—the convergence of formal, efficient, and final causes.

I. Προξείς as a Model for Natural Teleology

In some passages in the corpus, Aristotle distinguishes quite sharply between ποίησις and προξείς, while in other passages he allows the line to be more blurred. The technical distinction occurs at Nicomachean Ethics VI.4, 1140a1–20 and VI.5, 1140b6–7. In these passages, Aristotle states both the genus and the differentiae of these two kinds of human endeavor. Ποίησις and
πρᾶξις are both classed among those endeavors that concern things that might be otherwise, but the former aims at an end outside of itself, while the latter is done for its own sake. The discussion of pleasure at Nicomachean Ethics X.4, 1174a13 ff., and the passage at Metaphysics IX.6, 1048b18 ff. give a firmer basis to this distinction by distinguishing further between processes or movements (κίνησις) on the one hand, and activities (ἐνέργεια) on the other. While ποίησις is a process, πρᾶξις is an ἐνέργεια. In the course of πρᾶξις a thing achieves some kind of actuality.

These features of πρᾶξις—that it is done for its own sake and that it is an ἐνέργεια—seem to make it a likely candidate for a model for natural teleology. In particular, they point to the possibility that beings that engage in πρᾶξις might have their final causes within themselves, since the πρᾶξις itself is an end, and since it is also an end that is an ἐνέργεια. Section I explores what it means that πρᾶξις is an ἐνέργεια and that it is done for its own sake. I then analyze two types of πρᾶξις—moral action and pleasure—and suggest that the former is an apt model for natural teleology.

I.1 Πρᾶξις as Ἐνέργεια

In his explanation of the πρᾶξις / ποίησις distinction, Aristotle states that the former is an ἐνέργεια while the latter is a κίνησις. Unfortunately, the distinction between κίνησις and ἐνέργεια is no more cut and dried than that between πρᾶξις and ποίησις, and so further analysis is necessary. We have already analyzed the distinction to some extent in chapters 2 and 4. In chapter 2, I discussed the general meaning of ἐνέργεια, its distinction from δόναμις, the
distinction between first and second actuality, the identification of ἐνέργεια with form, the
difference between ἐνέργεια and ἔξις, and the tenuous distinction between ἐνέργεια and
ἐντελέχεια. The conclusion of this discussion was that because of the convergence of formal,
efficient, and final cause, ἐνέργεια is a key concept in Aristotle’s natural teleology and that a
fully adequate explanation or model of that teleology would have to shed light on the nature of
ἐνέργεια. In chapter 4, I pointed to the passage at Nicomachean Ethics X.4, 1174a14–27, where
Aristotle distinguishes between ἐνέργεια and κίνησις in the context of a discussion of pleasure.
I also pointed to the passage in Metaphysics IX.6, where Aristotle uses a verb-tense distinction to
capture the difference between ἐνέργεια and κίνησις. I used Charles’s gloss to interpret the
passage in this way: movements or processes can only be said to have happened when they are
over, because their goals are not encompassed in the movement itself, while activities have
happened even as they are happening, because they are their own goals. The action has its end in
itself. This interpretation was sufficient to show that the distinction between ἐνέργεια and
κίνησις is a teleological one and that the artifact model is questionable as a model of natural
teleology. For natural objects have their goals in themselves, and artifacts, which are the
products of ποίησις, do not. Ποίησις, as defined by reference to κίνησις, cannot adequately
reflect the teleology of natural objects, which clearly involves an ἐνέργεια that is a fulfillment
of inborn potentials.  

279 Man-made objects also have a kind of ἐνέργεια in the sense that they can be complete or incomplete
according to our designs and standards for them. However, their completion is not defined by their inborn
form, nor is it a fulfillment of their inborn potentials. Also, the completion of an artifact is an event, not
an ongoing activity. The behaviors and/or processes of a natural object sustain its ἐνέργεια, while in
general, the processes used to create artifacts result in their completion and then cease. However, there are
The discussions in chapters 2 and 4 were thus sufficient for their purposes. But more is needed to show that πράξεις is a useful model for natural teleology. To show the inadequacy of ποίησις is not enough. How does knowing that πράξεις, properly speaking, are ἐνέργειας, help us? In order to answer this I turn to another passage in *Metaphysics* IX.6, one that immediately precedes the verb-tense distinction passage. (In fact, the two passages hang together as a whole, and I reproduce the whole text here.)

Since of the actions which have a limit [πέρας] none is an end but all are relative to the end, e.g. the process of making thin is of this sort, and the things themselves when one is making them thin are in movement in this way (i.e. without being already that at which the movement aims), this is not an action or at least not a complete one (for it is not an end); but that in which the end is present is an action. E.g. at the same time we are seeing and have seen, are understanding and have understood, are thinking and have thought: but it is not true that at the same time we are learning and have learnt, or are being cured and have been cured. At the same time we are living well and have lived well, and are happy and have been happy. If not, the process would have had sometime to cease, as the process of making thin ceases: but, as it is, it does not cease; we are living and have lived. Of these processes, then, we must call the one set movements, and the other actualities. For every movement is incomplete—making thin, learning, walking, building; these are movements, and incomplete movements. For it is not true that at the same time we are walking and have walked, or are building and have built, or are coming to be and have come to be—it is a different thing that is being moved and that has been moved, and that is moving and that has moved; but it is the same thing that at the same time has seen and is seeing, or is thinking and has thought. The latter sort of process, then, I call an actuality, and the former a movement. (*Metaph.* IX.6, 1048b18–35)

In chapter 2, we noted that limit (πέρας) is one of the key concepts for understanding Aristotle’s conception of form. Some formal attributes are accidental (e.g. “white” or “musical” as applied to “human”), and some get at the essence of the object (e.g. “rational” as applied to “human”). The distinction lies in their limiting function. Essential formal attributes contribute to puzzling exceptions to this—the performance of music, for example, which shares features of both πράξεις and ποίησις.

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280 See chapter 2, section I.1, above.
a definition, the laying down of a boundary between what an object is essentially and what is incidental to it.

Here, in *Metaphysics* IX.6, we see Aristotle using the concept of limit to distinguish between κίνησις and ἐνέργεια. The former, he asserts, have limits, while the latter do not. As examples, he suggests that losing weight, walking, learning, and being cured are κίνησις, while seeing, understanding, thinking, living, living well, and being happy are ἐνέργεια. In what sense do members of the former class have a limit while those in the latter class do not? As several scholars have remarked, the distinction is not as clear as one might think.\(^{281}\)

For it is neither clear that all of the verbs in the first class have a limit, nor is it clear that those in the second class lack one. Consider, for example, learning. Certainly, one might say at some point that one has learned the times tables from one to twelve, that the limit has been reached, and that no further learning of them is necessary. But other cases are not so clear. At what point can one say that one has finished learning Greek, for instance? Or economic theory? Or Aristotelian philosophy? Likewise, things like seeing, understanding, living, and so on do not go on forever. They do cease, and in some cases, their limits are not entirely unpredictable—death is the necessary limit of life, but it is not our τέλος, as Aristotle himself notes (*Ph.* II.2, 194a30–33). What, then, does Aristotle mean by saying that κίνησις have limits and ἐνέργειαι do not?

He cannot mean that κίνησις cease at some point in time, while ἐνέργειαι do not. Rather, as C.C.W. Taylor has suggested, “we should say that κίνησις are defined as processes

\(^{281}\) See, for example, Potts and Taylor, “Symposium: States, Activities, and Performances,” especially pp. 65–68 and 85–89.
towards a terminal state whose attainment requires the cessation of the process, whereas ἐνέργειαι are defined as activities which have no such terminal state.  

We must add yet another caveat, however: the phrase “processes towards” must be taken in the strong sense of “processes oriented toward as a goal.” Again, death is the terminal state of life, but death is not the goal of life, nor is living to be considered a κίνησις simply because it has a terminal state.

The ultimate point of the limit discussion at *Metaphysics* IX.6 seems to me to be teleological. Κίνησις aim at limits—final states during which the process can be called complete. Ἐνέργεια, although they may come to an end, do not aim at a limit. Instead, they occur for their own sake and can therefore be considered complete at every moment in which they occur. It may seem ironic that in another passage (*Metaph.* IX.3, 1047a30–31) Aristotle explicitly states that the meaning of actuality (in this context he uses ἐντελέχεια rather than ἐνέργεια) comes originally from the concept of κίνησις and is applied to other things by analogy. Yet, as Chung-Hwan Chen has pointed out, it is precisely because κίνησις is a kind of actualization that it is incomplete. In the *Metaphysics*, Aristotle defines κίνησις as “the ἐνέργεια of the potential as such” (*Metaph.* XI.9, 1065b16), and Chen urges that ἐνέργεια is here better rendered as “actualization” than “actuality.” Since κίνησις is a process through which actualization occurs—but is not yet the actualization itself—it is necessarily incomplete. It has not reached the limit defined by actuality.

I emphasize the limit discussion here because I want to point out this important feature of πράξις: if πράξις is an ἐνέργεια, then it has no terminal state at which it aims. Instead, it is

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283 Chen, “Different Meanings of the Term *Energeia,*” 64.
complete in itself. This is a helpful formulation for understanding what it means to say that πρᾶξεις are performed for their own sake, and deepens our understanding of the ποίησις / πρᾶξις distinction. For ποίησις does not always aim at the creation of a new being.

Some crafts result in the production of distinct objects—coats and temples—but others aim at a change in state—as doctoring aims at health. Yet the teleological distinction remains valid: even when its goal is not the production of a distinct object, ποίησις is still incomplete—its aims lie outside itself, whether in the production of an object or a state—while πρᾶξις is complete in itself, even if it should involve the production of an object. This distinction will become more clear when we discuss the practical syllogism in section 1.2.

Πρᾶξις as ἐνέργεια will become important when we turn to the idea of πρᾶξις as a model for natural teleology. Since so much of what nature does results in tangible objects, it is very tempting to consider such processes simply as ποίησις, without any further thought. But I will argue that in some key respects the activities of nature actually resemble πρᾶξις. Thus, it helps if we can recognize that even in the realm of human affairs, production is not always straightforwardly ποίησις.

We begin by investigating the nature of πρᾶξις, focusing on its key feature being done for its own sake. This feature can be viewed from the point of view of philosophy of action or of logic, and we will thus turn to the practical syllogism, which is meant to explain how choices in action are made. This analysis will help us to see how moral actions, which occur for the sake of something, can also have value in themselves, a feature that shows up in the practical syllogism.

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in a distinct way. The practical syllogism also highlights an important similarity between natural motions and moral action—that each is normally made up of many smaller movements or actions, all of which must be ordered in a particular way. Part of excellence in practical reasoning is the ability to determine which smaller actions should be taken and how they should be ordered. That determination of actions depends sometimes on rule/case reasoning and sometimes on end/means reasoning, both of which are reflected in the practical syllogisms that follow one another in the deliberation that leads to an action. In both types of reasoning, we find a similarity to natural motions, while in the rule/case reasoning we find the explanation for how moral actions can be taken for their own sake. Finally, I will distinguish between moral action and action whose end is pleasure, both of which qualify as \(\pi\rho\alpha\xi\iota\varsigma\), and argue that of these two types of \(\pi\rho\alpha\xi\iota\varsigma\), moral action better qualifies as a supplementary model for natural teleology.

1.2 \(\pi\rho\alpha\xi\iota\varsigma\) as Action Done for Its Own Sake

In the opening lines of the *Nicomachean Ethics*, Aristotle makes a distinction between things done for the sake of some product and things done for their own sake (*EN* I.1, 1094a4–5 and 16–18). Although it is not clear in this passage, the things done for their own sake later turn out to be \(\pi\rho\alpha\xi\iota\varsigma\) in the technical sense of that word. What does it mean for something to be done for its own sake? Aristotle seems to have two types of actions in mind: actions that are inherently pleasant on the one hand, and moral actions—that is, actions that are inherently fine—on the other. But before we can turn to these two types of actions, we need to understand in a general way what Aristotle means by saying that \(\pi\rho\alpha\xi\iota\varsigma\) are done for their own sakes. An analysis of the relationship between \(\pi\rho\alpha\xi\iota\varsigma\) and \(\pi\omicron\eta\sigma\iota\varsigma\), and of the practical syllogism—the form of
deliberation that leads to either \( \pi\rho\alpha\xi\iota\varsigma \) or \( \pi\omicron\iota\eta\varsigma\iota\varsigma \)—will help to clarify the teleology of these performances.

This idea that \( \pi\rho\alpha\xi\iota\varsigma \) are done for their own sakes is not transparent and seems to be contradicted by several passages in which Aristotle suggests that some actions are performed as means to an end, thus blurring the line between \( \pi\rho\alpha\xi\iota\varsigma \) and \( \pi\omicron\iota\eta\varsigma\iota\varsigma \).\(^{285}\) Such contradictions led Ackrill to conclude that Aristotle had no real theory of action, properly speaking.\(^{286}\) Aside from the various contradictory passages, there is additional textual evidence for this, at least to the extent that the formulation of \( \pi\rho\alpha\xi\iota\varsigma \) as action done for its own sake and its consequent sharp distinction with \( \pi\omicron\iota\eta\varsigma\iota\varsigma \) seem to have been taken from other thinkers and not to be original to Aristotle.\(^{287}\) Nevertheless, it is clear that Aristotle does adopt the distinction, and it remains for us to understand what he meant by it.

Since Ackrill’s assertion that Aristotle lacks any real philosophy of action, several scholars have tried to rebut his claim. Freeland, for example, argues that if we see Aristotelian actions as concrete, individual actions, rather than as the action-types that Ackrill conceives them to be, then Aristotle can be seen to have a fully developed philosophy of \( \pi\rho\alpha\xi\iota\varsigma \).\(^{288}\) David Charles has worked out an Aristotelian philosophy of action in great detail.\(^{289}\) And M.T. Thornton has offered a useful and pertinent analysis of the practical syllogism that has direct

\(^{285}\) Ackrill cites \textit{EN} I.1, II.4, II.3, VI.2, 4, 5, 12, and X. 6, 7. See Ackrill, “Aristotle on Action,” 595.

\(^{286}\) Ibid., 601.

\(^{287}\) See \textit{EN} 1140a2–3: “for their nature [i.e. that of \( \pi\omicron\iota\eta\varsigma\iota\varsigma \) and \( \pi\rho\alpha\xi\iota\varsigma \)] we treat even the discussions outside our school as reliable.”

\(^{288}\) Freeland, “Aristotelian Actions,” 398.

\(^{289}\) Charles, \textit{Aristotle’s Philosophy of Action}. 
application to this problem.\textsuperscript{290} I will draw primarily from Freeland and Thornton to show what I think Aristotle means by saying that an action is something done for its own sake.

Ackrill’s initial, and insightful, objection is that in reality the line between ποίησις and πράξις is frequently blurred, so that Aristotle’s apparent contradictions are in a way understandable. Consider, for example, the man who mends his neighbor’s fence as an act of repaying a debt. Is the act a ποίησις (fence-mending) or is it a πράξις (repaying a debt)? Perhaps it is both, but under different descriptions. The difference seems to lie in how the end or goal shows up. If the man is to perform the act virtuously, then the performance must be done for its own sake—the performance itself must be a goal. On the other hand, as ποίησις, the performance clearly has a goal outside of itself—a functional fence. But this remains confusing. Does Aristotle really have a conception of action that necessitates multiple descriptions of the same act?

Freeland offers a textually sound solution to this problem. Pointing to passages in the corpus in which Aristotle asserts that actions are context dependent,\textsuperscript{291} she suggests that Ackrill has gone wrong by focusing on action-types instead of on concrete individual actions. The performance considered above, in which a man mends a fence to repay a debt, can be viewed, on the one hand, as an instance of the production-type “fence-mending,” and on the other hand, as an instance of the action-type “repaying a debt.” That is, the action instantiates two performance-

\textsuperscript{290} Thornton, “Aristotelian Practical Reason.”

\textsuperscript{291} Freeland points specifically to \textit{EN} III.1, 1110b6–7 and 1110b 33–1111a1, where Aristotle asserts that actions involve particulars; and \textit{EN} III.1, 1111a3–6, where he asserts that being ignorant of any of the following would reduce or remove an agent’s responsibility for an action: “who he is, what he is doing, what or whom he is acting upon, and sometimes also what (e.g. what instrument) he is doing it with, and to what end (e.g. for safety), and how he is doing it (e.g. whether gently or violently).”
types and hence admits of two competing descriptions. But, Freeland argues, this is not a fruitful way to view such performances. Nor is it the only one open to us based on Aristotle’s texts.

Because he is careful to provide so many qualifications for actions, and because he makes these qualifications the deciding factors in issues like voluntariness and moral worth, it is clear that Aristotle thinks that actions are concrete and specific—they are not mere instantiations of a type. For example, the killer who mistakes her son for an enemy, or the archer who mistakenly thinks his arrow is blunt, cannot be held accountable in the same way as someone who is not ignorant of these particulars (EN III.1, 1111a9–13). In short, Freeland argues, Aristotle has a “bundle theory of actions,” a theory that “treats actions as instantiations by individual moral agents of certain very complex properties constructed out of at least six component parts.”

We should note that one of the six components that Freeland emphasizes is the goal or end of the action. Action is inherently teleological, and it is the distinction between goals that differentiates action from production. Further, we should observe that this applies not only to moral πρᾶξις, but includes pleasant acts as well. For pleasant action may also, under another description, be productive. People do take pleasure in a variety of productive activities, from baking to woodworking to exercising. Perhaps there are even people who enjoy mending fences. Presumably, we can apply Freeland’s theory to such performances as well. Baking-a-cake-for-sale is not the same performance as baking-a-cake-for-pleasure, nor is it the same as baking-a-cake-to-fulfill-a-debt. Although the physical movements may be identical, a teleological

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292 Freeland, “Aristotelian Actions,” 412. The six components she refers to are those listed at EN III.1, 1111a3–6: “who he is, what he is doing, what or whom he is acting on, and sometimes also what (e.g. what instrument) he is doing it with, and to what end (e.g. for safety), and how he is doing it (e.g. whether gently or violently).”
distinction is present—in pleasure, the goal is the performance itself, while in cases that do not primarily involve pleasure, the goal falls outside of the performance.

Freeland’s contention is that since actions are concrete particulars, they must be evaluated on the basis of several features—that they are performed by this agent at this time in this manner, for this purpose, and so on. This view helps to show how actions are chosen for their own sakes. Being-chosen-for-a-goal is one of the features that makes an action this action rather than another. If the action is also productive, and consists in a movement, it will have the product as one of its goals and will be judged (at least in terms of its craft value) on the quality of the product and its meeting the goal. But actions that are not merely productive also have being-chosen-for-a-goal as part of their identity in another way, and they must be morally evaluated partly on this basis. 293 For example, once we know that the man in Ackrill’s example is not simply engaging in production, but also repaying a debt, we evaluate his action differently with respect to morality, although our evaluation of his craft or skill in production may not differ. In this case, we look not only to see if a functional fence results from his movement, but we also look to see that the debt is repayed, that the payment is part of the intention behind the action, and that the agent recognizes the payment as an instance of justice. In other words, we look to see that repayment, as an instance of justice, is a consciously held goal and thus directs (or is at least part of the teleology of) the action. This changes our evaluation of the action itself. The performance as ποιήσις is not negated, but the performance as πράξις comes to the fore as a normatively significant component, and part of what makes the performance a πράξις is the

293 Note that the purpose alone is not sufficient to make the action an instance of exercising virtue. As Freeland notes, repaying a debt is just on the face of it, but if the agent is motivated purely by fear of punishment rather than by justice as a means to εὐδοκίμονια, then the repayment does not represent the exercise of virtue. See Freeland, “Aristotelian Actions,” 402–403.
intention behind the action. Aristotle is clear that this intention must be such as to set the action itself as a goal in some way—the virtuous agent takes the right action for its own sake, and this feature of being-taken-for-its-own-sake is one criterion we use for judging the action. This much is clear. But how do such intentions express themselves in deliberation? From the perspective of the agent, what does it mean to intend an action for its own sake? We turn to Thornton’s discussion of the practical syllogism, which he has argued illustrates the deliberation behind both moral and pleasant action.

While Freeland addresses the “done-for-its-own-sake” issue from a philosophy of action perspective, Thornton addresses the same issues from a logical perspective. Aristotle’s theory of practical reason, which pertains primarily to moral action, entails that a freely chosen action is preceded by a train of thought that involves the recognition that some action-type is valuable and that the proposed action is of that type. Then, provided that the agent is of a certain character, this train of thought results in the performance of the action.

If everything sweet ought to be tasted, and this is sweet, in the sense of being one of the particular sweet things, the man who can act and is not restrained must at one and the same time actually act accordingly. (EN VII.3, 1147a29–31)

This matter of the practical syllogism is notoriously hard to interpret, and most of the major issues concerning it will not be settled here. The only issue relevant to our concerns is the relationship of the practical syllogism to actions being done for their own sake. If \( \pi\rho\alpha\xi\epsilon\iota\varsigma \) are chosen for their own sake and the practical syllogism explains how choice comes about, then it is reasonable to suppose that the “for-its-own-sake” must appear somewhere in the practical syllogism.
Thornton explains where teleology appears by pointing to the relationship between the major and minor premises. It is difficult to give a single formal account of the practical syllogism, because Aristotle uses a variety of examples, but in general the syllogism takes the following forms:

**Agents should always perform action-type A in situation-type S or with respect to object-type O.**
This is an instance of S or O.
[The agent performs A.]

For example:

All sweet things are to be tasted.
This is sweet.
[The agent tastes this.]

In the syllogisms above, the major premise gives a general rule for dealing with types of situations or objects, and the minor premise asserts that a concrete situation or object belongs to the type in question. Alternatively, the syllogism sometimes appears in this way:

**Agents should always perform action-type A.**
In this particular situation, the concrete action C is an instance of A.
[The agent performs C.]

One should always be courageous.\(^{294}\)
In this situation, courage means standing one’s ground.
[The agent stands his ground.]

In this example, the syllogism hinges on the concrete action as an instance of a class, rather than on the situation or object as an instance. But in either case, as Thornton argues, the major premise expresses either a general rule for conduct or an end to be obtained. The minor premise expresses either a particular case or application of the rule, or a means to an end. By accepting

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\(^{294}\) Arguably, “being courageous” isn’t yet an action. Perhaps the major premise can sometimes refer to states of character as well as action-types.
that the practical syllogism can express both a rule/case distinction and a means/end
distinction, he goes against the views of both Hardie and Cooper and improves upon (but
does not always contradict) the solutions of Kenny and Nussbaum. Thornton refers in
particular to De Motu Animalium VII, where Aristotle discusses the link between thought and
action and distinguishes between the theoretical and practical syllogisms. Thornton analyses
three viable interpretations of this passage: those of Nussbaum, Kenny, and G.E.M.

In the end, he sides with Anscombe, saying that the premises of the practical
syllogism do not entail their conclusion with necessity. Rather, the conclusion (i.e. the ultimate
action taken) depends in part on the agent’s desires, character, and so on.

In this way, the practical syllogism is a statement of the agent’s reasons for acting, rather
than a strict account of how the act came about. Now, if the practical syllogism states the agent’s
reasons, and \( \pi\rho\xi\epsilon\iota \) are things done for their own sake, then being-done-for-its-own-sake must
appear somewhere in the syllogism as a reason. This is why Thornton urges that practical
syllogisms can make use of both the rule/case distinction and the means/end distinction. Even

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295 A rule/case syllogisms is one in which the agent observes that a given action will fulfill a moral rule
(“Truth-telling ought to be done, and this is an case of truth—telling. Therefore, I tell the truth.”) A
means/end syllogism is one in which the agent observes that a given action will lead to a valuable end
(“People ought to be benefited, and this action will benefit others. Therefore, I take this action.”)
Thornton argues that although one might think rule/case syllogisms would apply especially to \( \pi\rho\xi\epsilon\iota \),
while means/end syllogisms apply especially to \( \pi\sigma\iota\sigmai\epsilon\iota \), this is not always the case (as the example
above shows). Instead, he suggests that means/end syllogisms “say what must be done if the end is to be
attained (in the best and easiest way) . . . [while rule/case syllogisms] say what must be done if the action
is to accord with right principle. Both are involved in practical reasoning.” See Thornton, “Aristotelian
Practical Reason,” 69. For although the agent must recognize some inherent value and must recognize
some class of actions as having that value (rule/case), he must also see that this particular concrete action
is the best means to achieving that value (means/end).

296 Hardie, Aristotle’s Ethical Theory, chapter 12.
297 Cooper, Reason and Human Good, 24 ff.
298 Kenny, “Practical Inference,” esp. 72–5 on the “logic of satisfactoriness.”
299 Nussbaum, Aristotle’s De Motu Animalium, esp. 197–203.
300 See Nussbaum, Aristotle’s De Motu Animalium, 197–203; Kenny, “Practical Inference,” 72–75; and
Anscombe, Intention.
when the syllogism urges a particular action as a means to a valuable goal, it must—in cases of
moral reasoning—indicate why the action is valuable in itself. What Thornton appears to
envision is something like the following:

(1) Virtue is to be practiced. (rule)

(2) Courage is a virtue. (case)

(3) I should do something courageous.

The trouble here, of course, is that this is not yet a practical syllogism at all. One might try to
rewrite (3) as [I do something courageous], but this is too vague. And so our syllogizing must
continue.

(4) I should do something courageous. (end)

(5) Not running away is courageous in this situation. (means)

(6) [I do not run away.]

With (6) we arrive at a concrete, definite action that can actually be taken. Thornton seems right
to point out that both the rule/case distinction and the means/end distinction are necessary in
order to get from the general notion that virtue is to be practiced to the concrete action required
in a particular situation. Indeed, there are really two syllogisms here, and both rules and cases,
means and ends, are at work. Since I hold virtue to be an end, I also hold the rule that it is to be
cultivated. I recognize that courage is a case of virtue, and so it too becomes an end for me. Not
running away is—in this situation—a means to practicing courage, so I do not run away. It is
important to see that not running away is a means and not a case. For not running away might, in
a different situation, be rash. It is not straightforwardly a case of courage, as courage is
straightforwardly a case of virtue. Rather, the specific act of not running away seems to be a
means to courage in this instance. Rule/case syllogisms have a universality and a necessity that mean/end syllogisms lack. Courage is always—and therefore necessarily—a case of virtue, while a particular performance is not always a means to exhibiting courage, and different performances may be possible in different situations.

Aristotle’s own example of making a cloak seems to bear this out (MA 7, 701a17–24). The syllogisms here appear to be:

(1) I need a covering.

(2) A cloak is a covering.

(3) I need a cloak.

That syllogism is purely theoretical. It is followed by one that is practical.

(4) What I need I ought to make. (rule)

(5) I need a cloak. (case)

(6) [I make a cloak.]

Unlike our previous example, Aristotle actually does make that second syllogism a practical syllogism. But he quickly shows that (6) is not really yet a concrete action, much as we saw that “doing something courageous” is not yet a concrete action. He does not spell out just what he thinks the final syllogism is, but we can easily supply one.

(7) I am to make a cloak. (end)

(8) Cloaks require fabric. (means)

(9) [I buy fabric.]
Here, by the use of the end/means syllogism, we arrive at an action that is sufficiently specific.\footnote{Of course, the idea of a “sufficiently specific” action must remain somewhat vague. The point is that we would not wish to go on with practical syllogisms \textit{ad infinitum}; for example, before I can buy fabric, I must drive to the store, turn on the ignition, leave the house, find my wallet, shut down the computer, move my right hand, etc.} Again, the distinction between case/rule and end/means is significant—a cloak is a case of something needed, but buying fabric is not a case of making a cloak; it is a means to doing so. And, as Thornton points out, the distinction between case/rule and end/means seems to rest on the distinction between recognizing what is good and recognizing what is possible. To know that one needs a cloak is to recognize the cloak as a good; it is to assign value to it. To know that what one needs one ought to make, is to recognize the value of a certain action. But to know that buying fabric is a prerequisite for making a cloak is not to know anything normative; it is rather to know something about how cloaks might be fashioned.

It is useful at this point to consider a similarity between human action and natural production—both can fail to reach their goals. Since goals are not always achieved in action, Thornton’s distinction between case/rule and end/means reasoning is important. Even when the agent makes mistakes in his end/means reasoning, the case/rule reasoning makes his action both intelligible and normatively evaluable. Although the action may fail to reach its goal, we still recognize the action as a case of fulfilling some rule and can evaluate it on that basis. For example, if the agent recognizes that mending a fence is, in his situation, a case of repaying a debt and goes about mending the fence based on that reasoning, then even if he mistakenly imagines that the fence can be mended with (say) glue instead of nails, and therefore fails to take the right means or to reach the end of mending the fence, we can still salvage the moral value of his action (although not its craft value) by pointing to his case/rule reasoning.
In natural objects and processes, we do not suppose any deliberation is at work, but there is still a parallel to human action in the sense that even when natural productions fail, they remain intelligible. A withered plant or a maimed animal is still intelligible because we still view it as directed toward natural goods, such as survival, flourishing, and reproduction, even when it does not reach them. In both cases—human action and natural production—it is the presence of a goal throughout the whole process that makes the process intelligible, regardless of what its final state actually turns out to be. Sometimes the goal turns out to be impossible to reach, but even in this case the goal is still recognizable as determining the process that would have led up to it, had other conditions been right.

It is perhaps this distinction between the good and the possible that Aristotle had in mind when he distinguished between cleverness and excellence in deliberation by saying that the latter is guided by practical wisdom while the former may not be (EN VI.9. 1142b16–35). Thus, cleverness alone does not make for excellence in deliberating. I suggest that this is because cleverness is the means/end intellectual virtue, but not the rule/case virtue. Practical wisdom is the ability to hold the right end, and excellence in deliberation is to take that end as a rule, and to apply the rule to various cases.

For example, in the syllogisms above regarding courage, that virtue is to be practiced is a rule taken up by practical wisdom; that courage is a virtue is again something recognized to be true by practical wisdom; that not running away is courageous in this particular case is recognized by cleverness as a means to the end of doing something courageous. Both cleverness and practical wisdom are at work here; or perhaps to speak more properly, cleverness is a part of practical wisdom, because in order to do the good, one must understand both what is good (e.g.
courage) and also what is possible, that is, what can be done here and now to bring the good about.

We can combine the contributions of Freeland and Thornton to address Ackrill’s initial objections in a new way, by seeing that Aristotle does not contradict himself when he suggests that actions are done for their own sake and are also in a sense means to an end. The composite, or “bundle” actions of Freeland are done for their own sake because they are cases of a rule, even as they are also means to ends. Courage is a case of virtue, and virtue is inherently valuable, so I choose to do something courageous as being something that is inherently valuable. Not running away is a means to being courageous in this situation, so I choose the following action: not-running-away-as-a-means-to-courage. (Note that not-running-away-as-a-means-to-rashness would be a different action, under Freeland’s theory.) This action, not-running-away-as-a-means-to-courage, is inherently valuable and worthy of being chosen for its own sake, and it is the conclusion of a set of syllogisms, one a case/rule syllogism and one a means/end syllogism.

This helps us to understand what Aristotle means by limits in regard to \( \pi\rho\alpha\xi\iota\varsigma \). Baking-a-cake-to-fulfill-a.promise is, in an important sense, a \( \pi\rho\alpha\xi\iota\varsigma \). As Freeland and Thornton argue, the fact that the performance results in a tangible object does not detract from its status as a \( \pi\rho\alpha\xi\iota\varsigma \). It is still a performance done for its own sake. Its particular teleology is part of what makes it this particular performance and informs an evaluation of it. This clarifies the concept of limits as applied to \( \pi\rho\alpha\xi\iota\varsigma \). If, instead of simply defining \( \pi\omicron\iota\eta\varsigma\iota\varsigma \) as a process with a product and \( \pi\rho\alpha\xi\iota\varsigma \) as an action with no product, we define \( \pi\omicron\iota\eta\varsigma\iota\varsigma \) as a process that aims at a limit and \( \pi\rho\alpha\xi\iota\varsigma \) as an action that is its own goal, then we can see clearly how things like baking-a-cake-to-fulfill-a.promise are \( \pi\rho\alpha\xi\varepsilon\iota\varsigma \). Baking-for-the-sake-of-a-cake is defined by an external
limit—the finished cake—and this limit shows up in deliberation as the end part of the means/end practical syllogism. Because the performance has a limit that is its goal, we turn to that limit to judge the performance: Is this a good cake? Baking-a-cake-to-fulfill-a promise—although it is still clearly a ποίησις in the sense that it results in a cake—is also an action complete in itself, because it is done primarily for its own sake. Its goal is virtue, of which justice is a case. In taking the action, the agent fulfills or instantiates the rule, and this is illustrated in deliberation through a rule/case syllogism. Here, there is no external limit. The action is in itself an end, and it is the action itself that we judge: Is this an instance of virtue? We expect the action to be an ἐνέργεια, which is justified by its own performance.

This example also illustrates another way in which πρᾶξις lacks the limits we find in ποίησις. Baking-a-cake-to-fulfill-a promise has an enduring quality, appropriate to an ἐνέργεια, that merely baking-a-cake lacks. For the cake can be eaten or thrown out, but that particular debt is permanently repaid.

In this way, an analysis of action and the practical syllogism reveals the link between πρᾶξις and ἐνέργεια. The link is teleological. Πρᾶξις is an ἐνέργεια because it is chosen as a case that falls under a rule—it is in this sense that it is chosen for its own sake and therefore has its end in itself, one of the clear criteria for being an ἐνέργεια. This case/rule structure can, in a sense, apply to natural objects, for although they do not deliberate, they do exhibit processes and behaviors that are more cases of rules than they are means to ends. For example, the functioning of organs or the behaviors of animals are in a sense means to health, reproduction, etc. Yet, in another sense, they are cases of those things—is a well-functioning circulatory system a means to health, or a case of health? Probably, it is a case, since if one were to detail what health means...
for an animal, one would in the end describe the functioning of the various systems of organs. Again, is cellular reproduction a means to a plant’s survival or a case of it? It is more like a case, for if we were to describe survival, cellular reproduction would inevitably figure in our description. I shall discuss this in more detail shortly.

First, we should briefly observe that whatever use the practical syllogism has in developing an analogy to natural objects and processes, it applies to pleasure as well as to virtue. Indeed, Aristotle supplies one such syllogism at *Nicomachean Ethics* VII.3, 1147a29–31, regarding the tasting of sweet things. There is, however, an interesting difference. In the case of moral syllogisms, the performance of the action depends in part on the agent’s character and not on the mere entertaining of the syllogism. For the akratic person may think: “Courageous actions are to be undertaken, and not running away is courageous” and may yet run away. But consider the pleasure syllogism: “All sweet things are to be tasted, and this is sweet: [I eat this].” The difference between the temperate and intemperate man is not that one acts out the conclusion while the other does not. Rather, the temperate man does not entertain this syllogism at all, for he does not accept the first premise. Thus, although the practical syllogism seems to apply in both virtue and pleasure, it applies in a slightly different way in each case. We will return to these different applications in section I.3 below.

The foregoing discussion has elucidated two important features of προξείς. First, moral actions are always particular actions, and even when they can also be considered as productive, the fact that they are chosen for their own sake shows them to be προξείς, and this is part of the identity of the particular action. Second, their being chosen for their own sake is indicated by the
practical syllogism that leads up to them—such actions will require both a rule/case and a means/end syllogism in the agent’s deliberation.

Because $\pi\rho\alpha\xi\iota\varsigma$ is chosen for its own sake, it obviously reflects at least one of the features of natural teleology that I outlined in chapter 1. Natural objects and processes seem to be their own final causes, in the sense that their formal, efficient, and final causes converge. I have referred to this feature as the inborn nature of final cause and identified it as one of the major problems facing an interpretation of Aristotle’s teleology. Here, in $\pi\rho\alpha\xi\iota\varsigma$, we have found an activity that seems to be analogous to natural teleology in this respect: it is its own final cause. In at least some cases, it seems reasonable to think of natural processes as cases of a rule rather than means to an end. However, here we must be cautious.

First, in the natural world, forms, efficient causes, and final causes converge, and the activities and processes in which plants and animals engage are only ends in themselves by being part of the ends of survival, health, and reproduction. Nest-building is not simply an end in itself, but it can be viewed that way because it is an essential part of the lifestyle that it seeks to further. We are looking for an analogy in human life that has that same causal structure, but it is not yet clear that $\pi\rho\alpha\xi\iota\varsigma$ will have that structure.

Second, the fact that $\pi\rho\alpha\xi\iota\varsigma$ is its own final cause is not necessarily to say that in $\pi\rho\alpha\xi\iota\varsigma$ formal and final cause converge. More argument will be required to say this, and in section I.3 below I will show that this is only true for one type of $\pi\rho\alpha\xi\iota\varsigma$—moral action. However, the fact that $\pi\rho\alpha\xi\iota\varsigma$ is done for its own sake, and that this is a defining feature of a given $\pi\rho\alpha\xi\iota\varsigma$ and the deliberation behind it, is a sign that we are on the right track in our search for an additional model for natural teleology.
Supposing that at this point we are on the right track, and that πρᾶξις, as an ἐνέργεια, as something whose end is in itself, is a likely candidate for a model for natural teleology, in which we find a convergence of form and end, then which πρᾶξις should be our model? At this point, the analogy is vague, and it will remain so until we find a more specific example of πρᾶξις. Otherwise, the analogy can have no real use. In particular, we must determine whether there is some πρᾶξις in which formal, final, and efficient cause clearly converge. I observed above that there seem to be two main examples of πρᾶξις: pleasurable activities and moral actions. In the next section, I eliminate pleasure as a model for natural teleology.

I.3 Types of Πρᾶξις: Pleasure vs. Moral Action

At Nicomachean Ethics II.3, 1104b31, Aristotle tells us that there are three objects of choice: the useful, the pleasant, and the fine. Actions of expedience will obviously not fall under the technical definition of πρᾶξις. Something is expedient precisely because it leads to some other end; the expedient is, by definition, not done for its own sake. Pleasure, on the other hand, is most obviously pursued for its own sake, and Aristotle seems to think we will need little argument to convince us that that is the case. Indeed, one of the reasons why he spends so much time discussing pleasure in the Nicomachean Ethics is that pleasure is so immediately and instinctively desirable that it frequently has the unfortunate effect of leading human beings away from other, more important goals. In Nicomachean Ethics VII.12, he explains pleasure’s power to lead us astray in terms of its status as an ἐνέργεια. Here he distinguishes between ἐνέργειαι and γένεσεις and argues that because pleasure is an ἐνέργεια and not a γένεσις it is something.

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302 This list is reiterated in the discussion of friendship and the objects of love at EN VIII.2, 1155b17–19.
that is done for its own sake, and not for the sake of some resulting state. This distinction between ἐνέργεια and γένεσις is clearly parallel, if not essentially identical, to the distinction between ἐνέργεια and κίνησις in the *Metaphysics*. The point is that pleasure leads to no product or result beyond itself. Pleasure is thus experienced as inherently good and Aristotle treats it as an inherent good, although it is clearly not the highest good. Because pleasure is an activity and is therefore a good in itself, the actions or activities that constitute it clearly count as πράξεις.

Fine actions, too, must count as πράξεις for the same reason. But it is more difficult to say just why fine actions are chosen for their own sake. Section II will be devoted to this topic. That pleasures are so chosen, however, requires little argument—it is a fact of life that one can experience for oneself. Can pleasure be used to model the teleology of nature?

Pleasure is a good candidate, but it falls short in two important respects. First, we require an analogy from something that is better known to us, but pleasure is not as well known to us as moral action. We experience pleasure long before we have the use of our reason, and we share the faculty of appetite with animals. Thus, we have a life-long familiarity with it. Nevertheless, pleasure itself is not rational, and although we are conscious of it, we are not necessarily conscious of why certain things give pleasure and others pain, nor do we have much control over our immediate responses of pleasure and pain. As a biological category, pleasure remains mysterious to the layperson. Moral action, on the other hand, involves deliberation and choice and is therefore more fully conscious. For this reason it seems that moral action is more among the things known better to us than pleasure is.
There is a second reason why moral action is preferable to pleasurable activities as an analogy for natural teleology. In chapter 1, we observed that the puzzle of the inborn nature of final cause can only be solved by clarifying the notions of ἐνέργεια and ἐντελέχεια. Now, pleasurable activity is clearly an ἐνέργεια, and it is sought for its own sake. But if pleasure is something that we share with other animals, something that does not in itself make use of reason, then it is an activity that does not make use of our distinctive human function. For this reason, pleasurable activity, although truly an ἐνέργεια rather than a γένεσις or κίνησις, does not in itself represent a perfection of the human form, although it may be a perfection of animal form. Perhaps the life of pleasure is the best that an animal can have, and perhaps it even represents a sort of animal thriving, analogous in a way to ηὐδαιμονία. But again, we are here concerned with what is best known to us, and we should therefore seek an analogy that shows our perfection. But the moral life is precisely concerned with human perfection.

In fact, Aristotle’s account of pleasure is more complex than this. In EN X.1–5, Aristotle evaluates various accounts of pleasure and then gives his own explanation, in which he concludes that pleasure is an ἐνέργεια rather than a κίνησις and that it is therefore a kind of completion or perfection (EN X.4, 1174a15–19). However, this does not imply that all pleasures are completions of the human form, for “since actualities [ἐνέργειαι] differ in respect of goodness or badness, and some are worthy to be chosen, others to be avoided, and others neutral, so too are the pleasures” (EN X.5, 1175b24–26). Aristotle then argues against excessive subjectivity in the account of pleasure—pleasure is not whatever seems pleasant to anyone, and “bad” pleasures are not really pleasures, but only seem so to men who are “ruined and spoiled” (EN X.5 1176a21). Thus, if pleasure is taken in its strictest sense—that is, pleasures that are good (and therefore truly pleasures)—then pleasure is more closely related to the human form and the human good than we might have thought. In this vein, Aristotle writes that pleasure follows upon virtue “like the bloom of youth upon those in the flower of their age” (EN X.4 1174b31–32). That is, real pleasure is a natural byproduct of virtue and is a sort of perfection; it should therefore have some characteristic human quality that differentiates it from the bad pleasures enjoyed by those who misperceive the good or the neutral pleasures that we presumbably share with other animals. So, in a sense, pleasure—properly and carefully conceived—might serve to illustrate human perfection. Still, it does not seem to be that perfection itself, but a natural outgrowth of it—it is the bloom on the rose, not the rose itself.
In the following sections, I will argue that the moral life is the analogy we have been looking for. I will show that as πράξις, the moral life shares these main features of natural teleology—it involves activities that are done for their own sake, whose final cause is inborn in the agent; further, in the moral life, the formal and final causes converge, just as they do in nature; finally, in aiming at happiness, the moral life aims at the perfection or completion of our soul. For these reasons, the moral life is a good analogy for natural teleology.

II. The Model of Moral Action

Aristotle makes a clear distinction between ποίησις and πράξις in the Nicomachean Ethics, and at first glance, at least, the distinction seems to be vital to his project, since we have seen that it is fairly clear that ethical action is the paradigm case of πράξις. In the following section, I will develop the general features of moral action, and show how it can be a useful supplementary model for natural teleology.

II.1 General Structure of Moral Action

As I have already noted, I am taking for granted here an inclusivist conception of εὐδαιμονία. This interpretation is important to my thesis because it allows for moral actions to be ends in themselves and allows for an inner structure of εὐδαιμονία that will help in developing an analogy to natural production. One of the problems with the dominant-end view of εὐδαιμονία is that it subordinates moral action to contemplation and thus runs the risk of making morality merely instrumental. Even if we conceive of virtuous action as both good in itself and also good as a means to the goal of contemplation, what will happen when conflicts arise? What if doing
the right thing conflicts with our ability to enjoy the contemplative life? The dominant-end view is committed to subordinating virtuous action to contemplation in such a case, even if it admits that virtuous action may be, in general, good in itself.

The inclusive view pictures the relationship between virtuous action and happiness differently. For while virtuous action may be a means in many cases to the life of contemplation, it is not straightforwardly a part or type of it. Rather, moral action, which involves practical reasoning, is a quite different sort of activity from contemplation, which involves theoretical reasoning. The inclusive view improves upon this situation by suggesting that happiness supervenes on, or is perhaps partly constituted by, virtuous action. In this view, there is a kind of nested structure to moral action—virtuous action is good in itself precisely because of its relationship to happiness, which is good in itself. Virtue is an end in itself and is not precisely a means to anything else, even happiness. Whether we think of virtuous action as partly constituting happiness, or we think of happiness as supervening on virtuous action, the virtuous action is so bound up with happiness that by being part of it, virtuous action itself is an end.

Since it is virtuous action’s status as \( \pi\rho\alpha\xi\varsigma \), as something done for its own sake, that will allow me to use moral action as a mirror for natural teleology, the inclusive view of \( \varepsilon\omega\delta\alpha\iota\mu\omicron\omicron\nu\alpha \) is integral to my thesis.

Put briefly, the inclusive view runs something like this. Everything that we do, Aristotle asserts, we do for the sake of \( \varepsilon\omega\delta\alpha\iota\mu\omicron\omicron\nu\alpha \). The view that this is the case is offered as an \( \varepsilon\nu\delta\omicron\xi\omicron \), an appearance whose truth is presumed, but whose meaning requires further
elaboration. Aristotle offers two discussions of why εὐδαιμονία is conceived as the ultimate goal of human life in Nicomachean Ethics I. In I.1, he observes that political science is the highest human science and that it has εὐδαιμονία as its goal. A second discussion occurs at I.7, where he observes that εὐδαιμονία is the highest good because it is more complete than any other good (EN I.7, 1097a30–b 6). These discussions, however, should not be viewed as proofs—Aristotle thinks that we will agree that εὐδαιμονία is the highest goal of human life without further proof and that the real disagreements arise, not over whether εὐδαιμονία is the goal of life, but in discovering just what εὐδαιμονία is. The four lifestyles outlined in Nicomachean Ethics I.5 reflect disagreements about the nature of εὐδαιμονία, but they all agree that everything else is ordered toward εὐδαιμονία.

Aristotle’s own conception of εὐδαιμονία and the manner in which it is to be achieved is based on what he takes to be the human function—reason. Theoretical reason can be used in isolation from practical reason, in which case it may exemplify intellectual virtues such as science and understanding. On the other hand, it may be used in conjunction with practical reason—either in production, which makes use of the intellectual virtue of τέχνη, or in relation to appetite. In the latter case, if we reason and act well, we possess the moral virtues. Moral action, then, is one of the ways in which we can exercise our human function of reasoning well. Such action involves choosing a mean, and when we choose means we use our reason in an exemplary way. Functioning well means being a good example of our type, and so a life of morally good action will be a good life for a human being. But this good life is clearly not

304 For an argument that this is Aristotle’s method with respect to the ἔνδοξα, see Pritzl, “Opinions as Appearances,” 44–47.
something that comes in after or on top of the good actions that we perform—rather, the life of
good action itself constitutes a form of εὐδαιμονία (EN X.8, 1178a9–10). In good action itself,
we perform our function well—the good action itself is, if you will, a “happy” action. That, I
suggest, is what is captured by expressing that good action is an ἐνέργεια; it is chosen for its
own sake because it is a further actualization of the human life—it is a type of εὐδαιμονία.

The view that good action can constitute a type of εὐδαιμονία is thus central to my
argument for why we can take the moral life as a model for natural teleology, since it shows how
good actions are ἐνέργειαι, actions that have their ends in themselves.

Notice, too, that this causal structure is different from that of pleasure. Pleasant activities
are experienced as ends in themselves in a straight-forward, fairly immediate way. Although the
question of whether they count as real or good pleasures is a matter of their relationship to virtue
and therefore a matter of the character of the person experiencing them, pleasure in general
presents itself as something immediately and simply desirable. An account of pleasure must fit
into a larger conceptual (moral) framework, but in the moment pleasures just seem desirable.
This is presumably why Aristotle discusses pleasure at such length in EN II, and why he
emphasizes the importance of cultivating the right tastes, since we cannot help but be affected by
them. But we do not have to understand how a particular pleasure fits into a larger moral
framework in order to perceive it as pleasant (in fact, this is precisely the danger with pleasures.)
Good actions, on the other hand, are also ends by being part of something larger—the overall
perfection or flourishing of the human form—but unless they are taken with an awareness of
their place in the overall picture, they don’t count as good actions. This roundabout way of
being-an-end-in-itself precisely mirrors the causal structure of natural processes and behaviors.
II.2 Causal Convergence in Moral Action

Thus far, I have shown that natural teleology stands in need of a model and that the traditional model offered from the realm of human ποίησις is, although useful in several respects, inadequate. I have also shown that no help is to be found in contemporary theories of teleology. In chapter 4, I suggested that a helpful model might be found in πράξις, in particular in the moral life. We have now seen that the moral life has εὐδαιμονία as its goal, and good action contributes to εὐδαιμονία by being included in it. Thus, in the moral life, means and ends merge and become indistinguishable—good actions, we might say, are “happy” actions.

Moreover, εὐδαιμονία is not only the τέλος of the moral life, but Aristotle also defines it as an ἑνέργεια. But, if the soul is the first actuality of a living body, then εὐδαιμονία is clearly a second actuality. Εὐδαιμονία, when present, is thus part of the form of a human being. It is also the natural goal of human life. Hence, εὐδαιμονία is a union of form and final cause.

Εὐδαιμονία is thus potentially inborn in human beings. External circumstances, no matter how fortunate, cannot simply bring about εὐδαιμονία. It must arise from within, through good actions that bring it about by already being part of it. This inborn nature is directly linked to the fact that both virtuous actions and εὐδαιμονία are unions of form and final cause. The form of virtuous action is a state that decides on a mean for its own sake and for the sake of happiness. Virtuous actions are themselves activities of the soul, and it is only through these activities that the second actuality of the soul—εὐδαιμονία—can come about. Since the final cause of virtuous action is its form and is also an activity—that is, since the final cause in this case is an
— the actualization cannot be accomplished by an external agent. It must come through the activity of the agent. Likewise, happiness itself will have to come about in large part through the activities of the agent.

Thus, in the moral life we find the same convergence of causes that we find in nature. The human soul is the motive power of human life. It is the first source of motion of a living human body; it is the efficient cause. It is also the formal cause of the living being, which exists for the sake of its own flourishing. Its flourishing, or perfection, called εὐδαιμονία, represents an end, a goal that is to be achieved, in part through good action. Naturally, external things might intervene to prevent the achievement of εὐδαιμονία (accidents, disease, war, etc.), and other external goods can support happiness (friends, wealth, etc.). Εὐδαιμονία is never completely a product of external events. Rather, it is itself a final cause, by being the perfection of the soul. Thus, three causes converge in the soul—the soul is the formal and efficient cause of moral action, and the soul’s activities—of either development and maturity—constitute its end.

II.3 The Moral as a Mirror for the Natural

I suggest that the features of the moral life just outlined are precisely those features shared by the teleology of the natural world—that is, in terms of the relations among the causes, what is true of the second actuality in the moral life is true of the first actuality in nature.\(^\text{305}\) In nature, final cause is opaque because it is inborn—it converges with form. The natural form of a plant or animal and the maintenance of that form simply is its final cause. Its final cause is not to be found outside; the final cause is rather an actualization that must come from within. Precisely

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\(^{305}\) This becomes more clear in the chart below. See p. 248.
how does this actualization come about? Through activities and functions that are themselves already part of it. How does a cat survive and thrive? By maintaining its physical structure, eating, sleeping, moving about, purring, hunting, digesting its food, and so on. What is the being of a cat? To be a cat is to maintain a certain physical structure, to eat, sleep, move about, purr, hunt, digest food, and so on. The formal characteristics and activities that lead to the final end are themselves included in the final end. And this is just what the inclusive view holds to be true of εὐδαιμονία.\textsuperscript{306}

Again, this is not true of either τέχνη or pleasure. In τέχνη, processes such as hammering or administering a drug are straightforwardly means to other ends, such as having a table or curing a patient. The processes of τέχνη are thus basically instrumental. Pleasure suffers from the opposite defect. Because it is so completely an end in itself, it can actually be detrimental to εὐδαιμονία. Only in moral action do we find an activity that is an end precisely by being part of something larger.

Moreover, the union of form and final cause in natural objects is related to the fact that their forms are always ἔνεργεια. The form of a living being is not a static thing, but an activity that is also an end. It can therefore only be maintained through activity. Just as εὐδαιμονία can only be achieved from within, through the agent’s own actions, so also the maintenance of natural form must come from within—from an element’s distinct potential for a certain kind of

\textsuperscript{306} See p. 214, n.1, on the inclusivist interpretation. One thing at stake in the dominant vs. inclusivist debate is that a dominant interpretation of Aristotle’s ethics, by arguing that contemplation alone constitutes happiness, runs the risk of making moral action and good character unnecessary, or perhaps in some instances, detrimental to the happy life. The inclusivist interpretation takes morality to be a necessary part of happiness, although not sufficient to achieve it.
motion, from the functioning of a plant’s organs, and from the functioning and behavior, both conscious and unconscious, of an animal.

Thus it should be clear that the moral life models natural teleology in several significant respects. The following table provides a specific example of how the moral life maps onto natural teleology, and shows how the artifact analogy would model the same example.

<table>
<thead>
<tr>
<th>Example</th>
<th>Natural Teleology</th>
<th>Artifact Model</th>
<th>Moral Life Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final Cause / τέλος</td>
<td>being a living cat; the cat as beneficiary</td>
<td>being a thing that can be sat on; an external agent as beneficiary</td>
<td>ἑὖδαιμονία; the human being as beneficiary</td>
</tr>
<tr>
<td>Form</td>
<td>cat soul; the first actuality of the body</td>
<td>shape and arrangement of its parts</td>
<td>human soul, but particularly an activity of that soul—a second actuality of the body</td>
</tr>
<tr>
<td>Convergence of Formal, Efficient, and Final Cause?</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>Final Cause Also an ἐνέργεια / ἐντελέχεια?</td>
<td>yes</td>
<td>no; final cause is a διάθεσις-type ἔξεις</td>
<td>yes</td>
</tr>
<tr>
<td>How is the Final Cause Achieved?</td>
<td>from the nature (inborn principle) of the living cat, by appropriate functioning and behavior; supplemented by external goods (resources, lack of predators, etc.)</td>
<td>by the imposition of form by an external agent</td>
<td>from within, by appropriate good actions; also supplemented by external goods (friends, wealth, education, etc.)</td>
</tr>
</tbody>
</table>

This table shows that the natural teleology of plants and animals (including the human animal) is, in certain key respects, mirrored by the teleology of the moral life. In both cases, there is a convergence of causes; in both cases, the formal cause is a first or second ἐνέργεια and not merely a ἔξεις; and in both cases, the final cause is inborn rather than being externally imposed. The artifact model, on the other hand, lacks these features.
In chapter 4, I argued that there are two distinct dissimilarities between human and natural ποιήσις, which make the former an inadequate analogy for the latter. Specifically, artifacts possess their forms accidentally, while natural objects possess them essentially; and natural objects possess a source of motion and change in themselves, while artifacts lack such a source. If the moral life is to be a better model than human productive life, then it will have to be similar to the latter on these counts. It is abundantly clear that the moral life does meet these criteria. Human agents certainly contain a source of motion in themselves, and moral actions are done by the agents in this way. Indeed, an action done under compulsion or ignorance cannot be said to come from the agent, and so does not count as moral. By definition, moral actions must originate in the moral agent.

Further, human beings possess neither their souls, nor the perfected activity of their souls—happiness—by accident. The end of building is a house; at the end of the building process, the house has a certain form; but it possesses this form in a way that is accidental to the materials, and although the materials are brought together purposefully, the processes they undergo do not originate from within them or from the form that is imposed on them (although it is hypothetically necessary for this agent to impose this form on this material for this end). On the other hand, the end of moral action is happiness; this end is reached, in a way, the moment a good action begins—this is why it is an activity (ἐνέργεια) and not a process (κίνησις).307 The

307 In Physics VI.6, Aristotle discusses change (μεταβολή) and movement (κίνησις) and asserts that a change or movement can be said to take place at any moment during the whole of its proper time. He seems to be referring specifically to locomotion, but the assertion applies logically to any change that takes place during a continuous period of time. This might seem to contradict his assertion in Metaphysics IX.6 that κίνησις, in contrast to ἐνέργεια, are incomplete. However, I think there are two senses of completion at work here—one involves the actualization of an inborn potential, while the other involves a change brought about by external forces. Changes or movements are brought about by changers or
second actualization that occurs in happiness is not accidental to the person. It is an activity of the soul in accordance with an excellent performance of the function of a human being. This function is the key to the essential nature of being human. Happiness, then, is the perfection of what is most essentially human in us. So the goal of moral action, unlike the goal of building, is not accidental, in the sense that an external form is imposed on the matter. Although there are no doubt many ways to realize the happy life and many accidental differences among happy persons, their happiness itself is not accidental to their humanity as being a table is accidental to wood.

For these two reasons, the moral life is a helpful supplementary analogy to natural teleology. In natural ποίησις, the end is the form of the living creature. The cat’s heart beats to sustain the cat’s existence, in particular to keep the cat’s soul in existence. In moral action, we perform just or courageous or generous acts for the sake of happiness. Yet in neither of these cases are the activities merely instrumental. Having a beating heart is part of being alive; courage and justice are part of happiness. Nor are these ends accidental. Neither cats nor humans possess movers, and they can be characterized as complete at any time during their occurrence, since they represent an event whose nature is to be brought about by an external mover. This is true whether or not they aim at goals, and even if those goals lie outside of them as products. A wave crashing against the shoreline can be characterized as “crashing” at any moment, and “crashing” is a complete event—the water’s motion in response to the pushes and pulling of the tides just is the movement, “crashing.” However, this movement does not have a final cause. Hammering nails might be characterized as part of “building a table,” even though the table is not yet present (and may not be realized). Aristotle’s examples of walking, building, and moving, at Metaphysics IX.6 make it clear what differentiates these things from ἔνέργειαι—“It is a different thing that is being moved and that has been moved, and that is moving and that has moved . . . ” (Metaph. IX.6 1048b33). It is the distinction between mover and moved that makes the difference and makes the event in some sense incomplete, even though as a change or motion, it is complete in the sense of fully occurring at any time during its duration. In ἔνέργειαι by contrast, not only can the activity be characterized accurately from the beginning, but it can only be characterized accurately by pointing to its goal. This is because ἔνέργειαι aim at inborn goals—they represent the actualization of some innate potential. Aristotle describes this by saying that the goal is in a sense being achieved from the very beginning of the action. This makes ἔνέργειαι more complete than κίνησις in the sense of having an inherent limit.
their souls accidentally. And the perfect activity of the human soul that is happiness is not acquired by accident, but by performing the distinctly human function well.

Moreover, the inclusive view of ἐὐδαιμονία urges that the end of ἐὐδαιμονία is a second ἐνέργεια. Since ἐὐδαιμονία is complete, final and self-sufficient, it is more than just an activity or actuality of our soul—it is the perfection or completion of a human life. Moral action, which represents excellent human functioning, is constitutive of this perfection; it is included in it, in the same way that the successful functioning of a plant’s or animal’s organs is not merely instrumental in bringing about its life, but is just what this life consists in. In the same way, the moral life is, in part, what happiness consists in.

In this way, the moral life model succeeds where the artifact analogy fails: it provides a model in which form and final cause converge; in which the form is possessed essentially, rather than accidentally; in which the object possesses a source of motion in itself; and in which the ἐνέργεια that is the form and final cause is also a second ἐνέργεια. In each of these respects, the moral life model more accurately reflects natural teleology.
Chapter Six
Limitations, Objections, and Replies

The moral model I have argued for has some clear limitations as well as possible objections. The moral model does not do all of the work that the artifact model does for us. In particular, we find three limitations. First, the moral life does not present as clear a picture of the matter/form distinction as we find in artifacts. Second, the moral life involves deliberation, while neither nature nor τέχνη do. Finally, the moral life presents a less distinct picture of the four causes individually than artifacts present. These limitations prevent the moral model from being a stand-alone alternative to the artifact model.

Further, one might raise at least two objections to the moral model. First, one might object that πρᾶξις is not an adequate model for natural teleology because natural beings other than the human do not deliberate, and deliberation is integral to πρᾶξις in Aristotle’s presentation of the moral life. One might therefore object that the best analogy for natural ποίησις should be some other kind of ποίησις. Second, one might worry that the moral life actually has an important poietic dimension that my account fails to capture. In this section I will clearly define the limitations of the moral model and address potential objections to it.

I. Limitations of the Moral Model

As we saw in chapter 4, the artifact model has certain benefits that we should not wish to lose. Not all of these benefits are shared equally by the moral life model. First, the analogy with human ποίησις emphasizes that form is nature more than matter is, while still suggesting that the physicist must be concerned with matter as well as form; second, it illustrates each of the four
causes distinctly and separately; third, it emphasizes hypothetical necessity and shows how ordered succession can occur without deliberation. Although the moral life model succeeds in showing the inborn and essential nature of τέλη, it does not fulfill these three criteria as well as the artifact model does.

In *Physics II*, Aristotle considers the question of whether matter or form is more properly the φύσις of a natural object and concludes that form is more properly φύσις, but that matter is also significant and must not be neglected by the natural philosopher. He uses an artifact analogy to make this point (*Ph. II.1, 193a31–b4*). A pile of wood is not yet a bed, and a pile of flesh and bones is not an animal. Both must possess the appropriate form before we would be willing to call them by these names. At the same time, the matter is not negligible. Some materials would be inappropriate. A bed could not be made of cotton balls, an animal could not be made exclusively of hydrogen or chocolate pudding. And so clearly, possessing the form makes the difference between having the nature or not having it. In this case, an artifact like a bed is a good illustration for this feature of the natural world.

The moral life model can also be used to illustrate this feature. One has only to observe that εὐδαιμονία is not achieved merely through performing pre-specified, “correct” actions. Just as a pile of flesh and bones is not an animal, just so, going through the motions of a just or courageous action does not count as moral and will not make us happy. Rather, the proper form must be present. The action must be done knowingly, with correct intention, for the right end, and so on (*EN II.4, 1105a26–30*). It is not merely the content of our actions that leads to happiness; the form is the deciding factor. Nevertheless, the content is a prerequisite—some
actions, such as adulterous or sadistic actions, can never count as moral, just as the form of a cat
cannot be realized in just any matter.

So, the moral life does offer an illustration of the primacy of form while maintaining a
sense of the importance of matter. However, the analogy with artifacts is, I think, more clear and
easier to grasp. The matter/form distinction in a table is very much like the matter/form
distinction in a cat, in the sense that we have concrete material (wood and nails, flesh and bones)
on the one hand, and a certain arrangement and functionality on the other. The matter of moral
actions is, of course, not concrete material, nor is its form an arrangement of concrete stuff. This
makes the matter/form distinction harder for a student to grasp in its application to the moral life.
However, one might argue that although there are pedagogical difficulties here, it is worthwhile
to try to overcome them, since the understanding that results from the moral life model is, in one
sense, superior. The form of a table is a ἔξις, and its relationship to its matter is one of
arrangement and functionality. But the forms of natural objects are ἐνέργεια; plant and animal
souls are actualities and feature a convergence of causes. This aspect of the form/matter
distinction is better modeled by the moral life, in which actions are already part of the activity of
happiness, much as the “functions” of natural objects are part of the ἐνέργεια that are their final
ends. But the artifact model does offer a greater ease and immediacy of use.

The second benefit of the artifact model reflects another drawback of the moral life
model, one that is also pedagogical in nature. We can grant to the artifact model that it illustrates
the four causes more distinctly than they actually appear in nature. This is a paradoxical benefit,
since in another sense it actually represents a drawback. Final cause is opaque in nature because
it converges with form and often with efficient cause as well. The artifact analogy is in one sense
a poor analogy precisely because it does not reflect this convergence. Yet, in another way, the fact that it displays the four causes so distinctly and separately makes it a useful teaching tool. A student who would be hard put to recognize the four causes in a cat can easily see them in a table. However, in defense of the moral life model, I want to suggest that, although it does not display the four causes quite so distinctly as the artifact analogy does, it nevertheless displays them more thoroughly than the artifact model does, or than they are initially displayed to us in nature.

The individual causes are easier to identify in the moral life than they are in nature, simply because the moral life is more familiar to us. In living the moral life, agents are aware of themselves as agents, and are generally aware that it is their minds or souls whose agency is most vital in moral actions, rather than their bodies. Moral agents are also aware that they aim at ἔνδομονία as a goal and that this ἔνδομονία will be some activity of their souls. They are aware, too, that it is the soul that gives them their essence, their identity, in short makes them to be who they are. Finally, agents are, of course, able to distinguish their bodies and the various motions they must go through to accomplish moral actions as a material cause. So although the four causes are not quite so distinct in the moral life as they are in the artifact analogy, they are more distinct in the former than they are in nature simply because we have a more up-close and personal perspective on them. Natural objects are like houses without windows. The causal convergence that lies inside is obscured from our view. In the moral life, however, we stand inside the house at the very center of the causal convergence.

The puzzle that arises from the opacity of final cause in nature was articulated clearly by Ackrill when he suggested that it is difficult to see what a dog “is for.” The problem is that, in
the end, a dog is for being a dog, that is, for actualizing dog form. And this actualization is accomplished primarily by the dog itself, by exercising the capacities entailed by the possession of its form. In this way, formal, final, and efficient cause all converge in the dog. A similar situation holds with respect to the moral life. The moral life is for the sake of εὐδαιμονία. And yet εὐδαιμονία is not a goal external to the actions through which it is achieved. Rather, it is an ἔνεργεια, a goal that is achieved in activity. Moral actions, also ἔνεργειαι, are part of εὐδαιμονία itself. So, in the moral life, the formal and final causes converge—they are an activity of the soul. Moreover, it is the human being, and primarily his or her soul, that is also the agent. So all three non-material causes seem to converge in the moral life. This convergence, also found in natural objects, is what makes their teleology hard to grasp.

This observation, however, leads me to the final limitation of the moral-life model. It also may be the most obvious. In order for the moral-life model to have any pedagogical use, the student must grasp Aristotelian ethics. This is perhaps so obvious as to be unremarkable, but it creates a serious practical limitation. The use of the moral-life model entails a thorough grasp of Aristotelian ethics, an acceptance of the inclusivist interpretation of εὐδαιμονία, and a solid understanding of Aristotle’s concept of ἔνεργεια. None of these are generally presented to beginning students of philosophy, whose exposure to ethics is often limited to modern deontology and utilitarianism or includes only a brief discussion of virtue ethics as a theory that is more of historical interest than contemporary usefulness. The theory is seldom presented thoroughly in general college-level texts on ethics, where discussion of virtue ethics is often limited to the need for moral training and the use of role models. When Aristotle’s ethics is presented in a more thorough way, it is usually in the context of the history of philosophy, where
it is presented concurrently with his philosophy of nature, so that the student learns both at the same time and does not have the benefit of using greater knowledge of one to interpret the other. For this reason alone, the artifact model continues to have the greatest pedagogical value for illustrating the place of causality in Aristotle’s philosophy of nature.

The two limitations we have discussed thus far are basically pedagogical in nature. Such difficulties are not limited to philosophical models, but also appear in the sciences. For example, the Schroedinger model of the atom, which treats electrons as waves, acknowledges that we cannot predict an electron’s position until it is actually measured, and that we can therefore only know its past and future positions with probability. In that model, the probable positions of electrons appear as clouds of possible locations. In terms of what we know about quantum physics, Schroedinger’s model is more accurate than the older Bohr model, which treats electrons as particles orbiting the nucleus in shells. The “orbits” of the Bohr model are misleading, because they imply spatial location when in fact we cannot predict the future or past locations of electrons with certainty. However, if Bohr’s orbits are interpreted as measurements of the energy of electrons rather than their location, his model is useful. Thus, Schroedinger’s model is more accurate in terms of helping us conceptualize location, while Bohr’s model is useful in that it helps us conceptualize energy levels. Both models have distinct uses.

In general, the artifact model of natural objects has the benefit of illustrating the four causes in a clear and distinct way. It helps us to conceptualize each cause separately. However, it fails to get at the relations between—relations which, in nature, often involve an overlap of the formal, final, and efficient causes. The formal and final cause are different aspects of the same whole. In an animal, the formal cause is the soul as the principle that gives the animal its unity
and makes it a member of a species with distinct functions and capacities. The final cause is the soul as the thing that the animal’s behavior and functioning is aimed at preserving. But these are aspects of one and the same thing. Likewise, the efficient cause of the animal’s motions and its continued existence is also the soul—it is through the exercise of its functions and capacities that the animal lives. The artifact model is beneficial in that it shows each of these aspects—formal, final, and efficient—distinctly. But it does not show that they are aspects of the same thing. Instead, it treats them as separate objects. Just as the Bohr model is more visually useful in that it shows the separateness of the levels of energy that electrons in an atom have, the artifact model is more conceptually useful in that it shows the separateness of the roles that causes play. But just as the Schroedinger model is more accurate, although visually less helpful, the moral life model is more accurate in terms of describing the relations among causes, although it is less helpful in conceptualizing the causes individually.

Third, Aristotle uses the artifact analogy to emphasize the importance of hypothetical necessity in nature and to point out the absurdity of thinking that things that are clearly end-directed could be governed merely by simple necessity (Ph. II.9, 200a1–14). A house does not just fall together because of the properties of the material—rather, the foundations, walls, and roof will be built in a certain manner and order if the house is to stand. Thus, in house-building, hypothetical necessity reigns—given a certain goal, certain actions must be taken. Aristotle urges that since goals are also so evident in nature, we should look for hypothetical necessity there as well, and he makes extensive use of this principle in his biological works. The point is that in both nature and art, if we assume the presence of teleology, we should look for the presence of hypothetical necessity.
The moral life, too, clearly features hypothetical rather than simple necessity. \( \varepsilon\nu\delta\alpha\iota\mu\omicron\nu\acute{\iota} \) does not come about as the end of a chain of mechanical actions and reactions. Indeed, it is not (simply) necessary that one achieve \( \varepsilon\nu\delta\alpha\iota\mu\omicron\nu\acute{\iota} \) at all, and many—perhaps most—people clearly do not achieve it. The sort of necessity at work in the moral life is hypothetical rather than simple. If we want to be happy, then there are certain actions we must take, and certain virtues we must cultivate. This necessity is quite real and ethics is the (somewhat imprecise) science of determining just what actions and virtues are necessary, since clearly not just any will do. In a sense, the whole possibility of ethics, for Aristotle, hinges on the fact that there is hypothetical necessity in the moral life. Once we take \( \varepsilon\nu\delta\alpha\iota\mu\omicron\nu\acute{\iota} \) as our goal, there are certain, fairly definite things that we must do and become, and a knowledge of these things is of paramount importance. In this way, hypothetical necessity is just as much at work in the moral life as it is in the natural world.

However, the relationship between means and ends is not quite the same in the material world as it is in the moral world. In particular, as I have tried to show, moral action is not simply a means to an end. Although practical syllogisms do seem to feature means/end reasoning, the actions that are the means to virtue are not merely instrumental, nor are the virtues exercised instrumental. In short, the case/rule distinction and means/end distinction seem to overlap in the moral life. But this is not so in craft. Most craft actions (hammering nails, planing boards, etc.) are straightforward examples of means to ends and are purely instrumental. For this reason, the hypothetical necessity at work in the moral life is slightly different from that in the crafts. The craftsman thinks, “I need a table. A table must have a flat surface. Planing creates flat surfaces. [I

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308 See chapter 5, section I.2, above.
plane.]” The moral agent thinks, “I should be virtuous. Courage is a virtue. In this case, not running away is courageous. [I do not run away.]” The craft syllogism is a clear-cut case of means/end reasoning. A flat surface is simply a pre-requisite for a table, and planing is simply the way to get a flat surface. The moral syllogism, on the other hand, is a combination of rule/case reasoning and means/end reasoning, and even the final resulting action is not merely a means to an end, but already contains the end of virtue (and the further end of happiness) within it. I wonder, however, if the natural world is more like craft or more like moral action in this respect. One might urge that much of what nature does is just straightforwardly ποίησις—from obvious activities such as nest- and hive-building, to the reproduction and growth of animals and plants. Yet, it still seems that the hypothetical necessity in nature is more like the hypothetical necessity in the moral life than in that of the crafts.

If there is to be a cat, then certain things will be necessary—fur, bones, flesh, and so on. And if there are to be these things, then there will have to be certain combinations of the elements, etc. In certain respects, this seems much like the table—if there is to be a table, there must be wood and nails, and if there is to be wood and nails, they must be cut and forged, etc. The hypothetical necessity of materials and processes in nature seems perfectly illustrated by the artifact analogy. Yet once the living creature exists and it is no longer a question of its coming into being, but instead of its survival and health, then things begin to be more complicated, and the artifact analogy ceases to capture the teleology so well.

For if the cat is to survive and thrive, there must be certain things—hunting, sleeping, digesting food, etc. And, as we have already observed, such things are not straightforwardly means to the cat’s survival and health so much as they are the cat’s survival and health. The
crafts, which result in ἥξεις, not in ἐνέργειας, have no analogy to this. Tables do not survive and thrive, and the means/end structure of the hypothetical necessity at work in bringing them into being does not reflect the structure of the hypothetical necessity at work in maintaining the already existing cat. For to plane or hammer is not to be, or even to have, a table. It is a purely instrumental, subordinate activity, of no inherent value in itself, whose only reason for existing is to produce a table. But the activities of the cat, although subordinate in a way to the cat’s survival and health, are not simply means to that end, but constitute it. In this respect, again, the moral life model more accurately reflects the workings of nature. Moral actions are, in a way, subordinate to the virtues and to happiness itself, yet they are not purely instrumental—they are already part of the goals toward which they strive.

But here we come to one of the most serious limitations of the moral model—the problem of deliberation. For the hypothetical necessity in nature results in an orderly succession of events without any agent to deliberate about them, and this is a fact that is reflected in τεχνη, but less so in the moral life. As we just observed, part of the formal requirement for an action to be moral is that it be chosen for its own sake. Now, choosing is always the result of deliberation—of a rational process of thought that applies rules and chooses means to ends. An agent behaving in a purely automatic way, or in ignorance of the ends, or on someone else’s command, is not really engaging in moral action. Craft, on the other hand, Aristotle tells us, does not deliberate (Ph. II.8, 199b28). Indeed, the craft syllogism suggested above is merely an illustration of how hypothetical necessity works in craft—it is, presumably, not an argument that actually goes through the mind of the craftsman as he works. Likewise, the “this after this” in
nature has no agent to deliberate about it. The ordered succession of natural events and processes occurs without deliberation, just as it occurs in craft.

Thus, the final limitations of the model I am proposing is that, unless explained very carefully, the model runs the risk of implying that there is some conscious, rational agent at work in nature, an implication that would be a serious misunderstanding of Aristotle’s theory. Such limitations should not be overlooked, and I want to emphasize again that I am not suggesting any kind of replacement of the artifact model. However, I think I have shown that the benefits of the moral life model outweigh the limitations.

II. Natural \( \Pi \rho \alpha \xi \varsigma \)?

Bearing the above limitations in mind, I want to address two possible objections to the moral model: first that, even if we set aside the issue of deliberation, it will still be impossible to conceive natural processes and activities as a kind of \( \Pi \rho \alpha \xi \varsigma \) since they so obviously have products outside of the “agents” that are acting; second, that the view of the moral life that I have been assuming fails to take into account the fact that morality itself is, in important ways, poietic.

First, one might seriously worry that the moral life, based as it is on the notion of \( \Pi \rho \alpha \xi \varsigma \), can simply never adequately mirror the causality of natural processes, which are so frequently poietic in the most obvious ways. In general, nature produces a great many things, from rocks and rain showers to ducks and daffodils, not to mention the obvious products of animal efforts—hives and nests, burrows and dams. The productivity of nature is one of its most marvelous and fascinating features. If so much of what nature does is so clearly \( \pi \o \iota \varsigma \varsigma \varsigma \varsigma \), can it be illustrated by means of a model that is so obviously based on \( \Pi \rho \alpha \xi \varsigma \)?
I have already argued that the moral life model is analogous to nature in several key respects; in particular that, like natural processes, moral actions are ends in themselves by being part of the very end that they aim at achieving. However, it is clear that the end of moral action, **εὐδαιμονία**, is not a new substance, while the ends of nature frequently are. Here I want to address the different kinds of activities that are found in nature and show how these different activities, including ones that are clearly poietic, can be illustrated by reference to the moral life.

First, let us observe that nothing a plant or animal does can be **πρᾶξις**, as it is described in the *Nicomachean Ethics*, since **πρᾶξις** involves deliberation, and plants and animals do not participate in reason. However, plants and animals do engage in some activities that are more or less obviously **ποίησις**:

1. nest-building and other activities with a tangible, external product
2. reproduction
3. growth
4. other animal behavior, including hunting, grooming, etc.

All of these activities are poietic, and I have arranged them in order of most poietic to least.

Nest-building is almost completely parallel to human **τέχνη**; reproduction, too, has a tangible,

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309 In *Metaphysics* IX, the discussion of **πρᾶξις** is broader and includes processes that lack deliberation: “[I]n a sense, the potentiality of acting and of being acted on [τὸν ποιεῖν καὶ πάσας εἶν] is one . . . but in a sense the potentialities are different. For the one is in the thing acted on; it is because it contains a certain motive principle . . . for that which is oily is inflammable . . . .” (*Metaph. XI.1*, 1046a19–25). The example of oily substances catching fire is clearly a **πρᾶξις** that does not include deliberation. However, Aristotle later makes it clear that at least some of these **πρᾶξεις** only count as actions in a secondary sense: “Since of the actions [τῶν πρᾶξεων] which have a limit none is an end but all are relative to the end, e.g. the process of making thin is of this sort . . ., this is not an action [πρᾶξις] or at least not a complete one (for it is not an end); but that in which the end is present is an action” (*Metaph. X.6*, 1048b18–23). Nonetheless, Aristotle in this passage seems to include many natural processes that have ends but lack deliberation (e.g. maturation) as actions in the proper sense.
external product, albeit one that is the same in form as its efficient cause; growth aims at alteration, much as medicine does; and other animal behaviors also seem to have alteration as their goal. All of these examples have clear analogues in craft. How does πρᾶξις offer an analogue to them?

As we have seen, there is one feature of πρᾶξις that picks out something of vital importance in natural activities, a feature that the artifact analogy misses entirely: the notion that things are goals in themselves. Consider the wolf that hunts. The hunting, on the face of it, does not seem to be an end in itself. It is clearly goal oriented. And yet, ultimately the hunting is for the sake of the wolf’s life, and its life is characterized by—one might say inseparable from—just such activities. A wolf that does not hunt cannot really be said to thrive, even if it is provided with another means of sustenance. Animals in captivity may be healthy and may even experience a fair amount of pleasure, but they cannot really be said to thrive, since they are not living up to their natural potentials. Similar points might be made about nest-building, reproduction, and growth—they are all part and parcel of the very lives to which they are in service, in spite of the fact that they are also clearly productive. It is right, of course, to focus sometimes on their productive aspects and to view them through the lens of the artifact analogy. I am only suggesting that the moral life analogy illustrates an additional dimension that is present in those activities. For even something so obviously productive as nest-building occurs in the context of an over-arching goal of survival and health. Nest-building is not only for the sake of the nest, but for the sake of the bird as beneficiary, and what it is to be a bird is, in part, to build nests. It is precisely this curious circularity in the teleology of nature that requires a model, and the moral model captures this circularity well.
Now, one might object that the same could be said about τέχνη, and this objection would be well founded, but it is not, I think, damaging to my thesis. That is, doctoring and shipbuilding are characteristic of human life in much the same way that hunting and nest-building are characteristic of animal life. These crafts are poietic because they aim at goals outside of themselves (health and ships, respectively), but one might also urge that their exercise is part of human flourishing. After all, τέχνη is a distinctly human endeavor, and for a human life to be fully human it must to some extent be characterized by τέχνη. A life devoid of τέχνη—if we can even imagine such a life—would be a strange, truncated sort of existence, and the person who led it would not be fulfilling his or her human potential. There is, of course, an important difference between craft and nature in this instance. Crafts do not unambiguously serve the human good in the way that the activities and processes of plants and animals serve their survival and health. Consider the “crafts” of the counterfeiter, the propagandist, the bomb-maker, which are perversions of true crafts—printmaking, journalism, and chemical engineering. Unlike natural processes, the techniques of craft can be used for moral or immoral ends and for the promotion or destruction of life. This is where deliberation comes in, in relation to craft. Although a craft has an essential orientation toward some good, its techniques, once developed, can be used in a variety of ways, and we must choose how to use those techniques or whether to preserve the integrity of the craft at all. Animals do not make such choices, but the end result is that in both cases, ποίησις occurs within a larger context of survival and health.

We can express this by saying that in the human realm, τέχνη never exists in a moral vacuum, but arises in the context of human life, which is by nature oriented toward εὐδαιμονία. It is πρᾶξις, however, and its defining activity of deliberation, and not ποίησις, that enables us
to achieve εὐδαιμονία. In this sense, all τέχνη must ultimately be governed by πρᾶξις, and when viewed from the right perspective can even be read as πρᾶξις.

Consider again the man who mends a fence to repay a debt. As we saw, this is a moral action as well as a poietic one. But this example is not a special case, as if most acts of τέχνη were isolated productions, devoid of moral value or implications. Most, if not all, τέχναι occur in a moral context. One never simply bakes a cake, but bakes this cake at this time, for this reason and instead of doing this other activity that might have been done instead. All of these thises form the practical context in which ποίησις necessarily takes place. So, even within human life, ποίησις always occurs within a context of πρᾶξις.

What I am suggesting is that if we are searching for a model for natural teleology, and if we must look to human life for such a model because human life is what is clearest and best known to us, then we must see human life in both its poietic and practical dimensions in order to get a clear picture of natural teleology. For, just as τέχνη does not occur outside of the context of moral action, so too natural ποίησις does not occur outside of the context of survival and health, so that in both cases even poietic activities can be said in an extended sense to be ends in themselves. It is because of this causal structure that the activities of nature resemble πρᾶξις, although they cannot be strictly said to be πρᾶξις, since they lack deliberation.

So, in response to the first objection, we can answer that while there is no natural πρᾶξις, strictly speaking, the productions of nature do occur within a causal framework that has more in common with πρᾶξις than with ποίησις. In both nature and human life we find that causality has a nested structure—τέχνη occurs within the framework of the moral life, and the
productions of animals and plants are also subordinate to the overarching goals of survival and health. This is why the artifact analogy cannot simply be abandoned. For in addition to the benefits that we have emphasized, there is the fact that natural activities are clearly poietic and that there is no need to deny or overlook this in order to find a model. All that is needed is an expansion of the model to include the practical context in which it does actually exist. This practical context has an important parallel in nature—the dimension of for-itself-ness in which plant and animal ποίησις occurs.

A converse objection may arise from observations about the moral life itself. If ποίησις can, in some sense, be viewed as practical, can the moral life also be viewed in a way as poietic?

III. Morality as Poietic

In certain key ways, the moral life can be viewed as poietic. We will examine two issues here. First, we can observe that within Aristotle’s texts themselves, morality seems to produce action and character. Second, several contemporary Aristotelians have profitably viewed morality as poietic. We will briefly examine their views at the end of this section.

We have already seen that ποίησις and πράξεις admit of overlapping usages, much as “making” and “doing” do in English.310 In at least one passage in the Nicomachean Ethics, Aristotle seems to imply that actions can be considered things made (EN V.9, 1136b29–31), and he also draws a parallel between τέχνη and moral deliberation when he refers to the political scientist as the “architect of the end” (EN VII.11, 1152b2); he notes that both τέχνη and ethics

admit of less exactness than other subject matters (EN II.2, 1104a7–9); and further parallels between technical and moral reasoning can be made based on the fact that both are concerned with a mean: “[B]oth excessive and defective exercise destroys the strength, and similarly drink or food. . . while that which is proportionate both produces and increases and preserves it. So too is it, then, in the case of temperance and courage and the other excellences” (EN II.2, 1104a15–18). Also, in both cases the mean is relative to the agent or the circumstances (EN II.6, 1106a35–6) and Aristotle seems to think that τέχνη makes use of the practical syllogism (or is at any rate reflected by the practical syllogism) just as πρᾶξις is. In short, one finds throughout the Nicomachean Ethics that τέχνη provides convenient illustrations of and parallels to moral reasoning.

Nevertheless, moral agents are not productive of their actions in the way that carpenters are producers of tables, for the tables remain, but the actions are over. This points up the fundamental distinction between πρᾶξις and ποίησις that Aristotle himself makes and that I discussed above: πρᾶξις is an activity complete in itself, while ποίησις is a movement done for the sake of some resulting object and is hence incomplete.

However, moral action is also like ποίησις in another important respect: the moral agent is producer of his own character. Although moral actions are chosen for their own sake, they are also chosen for further ends—namely, character and, ultimately, happiness. Here again an analogy with τέχνη is appropriate, not only because our characters are in a sense productions, but also because both τέχνη and moral virtue require practice. Further, both moral actions and technically correct productions can occur, by accident as it were, without the requisite virtue, but in neither case does this constitute “real” moral or technical action:
The question might be asked what we mean by saying that we must become just by doing just acts, and temperate by doing temperate acts; for if men do just and temperate acts, they are already just and temperate, exactly as, if they do what is grammatical or musical they are proficient in grammar and music. Or is this not true even of the arts? It is possible to do something grammatical either by chance or under the guidance of another. \(EN \ II.4, 1105a18–23\)

Here we find an interesting possible parallel between \(\tau\varepsilon\chi\nu\eta\) and moral action. If I give money to a charity for the sake of a tax deduction rather than from the virtue of generosity, my action is not truly generous. Likewise, if I utter a grammatical sentence in Japanese because I have learned the sounds by rote, but have no idea what I am saying, the sentence is, in a sense, not really grammatical, since my utterance is not a reflection of my mastery of Japanese grammar. Yet this observation seems to be focusing on the practical aspects of \(\pi\omicron\omicron\nu\sigmai\varsigma\), aspects we saw in the last section. From the point of view of \(\pi\omicron\omicron\nu\sigmai\varsigma\) alone, there is no important difference—taken as a product, my grammatical Japanese sentence is still grammatical. But from the point of view of my own abilities and virtues, there is something lacking. Both \(\tau\varepsilon\chi\nu\eta\) and moral action change the character of the soul—one intellectually and the other morally. In this sense, human \(\pi\omicron\omicron\nu\sigmai\varsigma\) is not only productive of external products, but practiced properly it also produces the virtue of \(\tau\varepsilon\chi\nu\eta\). Likewise, moral actions produce moral virtues.

So the moral life can be viewed as poietic in the sense that it produces moral action and character. For this and other reasons, various contemporary philosophers, including phenomenologists like Paul Ricoeur and Aristotelians such as Martha Nussbaum and Alasdair MacIntyre, have viewed the moral life as poietic. John Wall has discussed this contemporary phenomenon at length. MacIntyre, he suggests, sees ethics as “the production of shared
Although he agrees that MacIntyre “does not explicitly put it this way,” he sees in MacIntyre’s ethics a kind of ποίησις in which communities build interpretations of the good, and thus ethical traditions, over time. Martha Nussbaum, too, makes an important, and more explicit, place for ποίησις in her ethics. According to Nussbaum, art—in particular, literature—is an important component of developing our “moral attention.” Because literature is focused on the concrete and particular, it helps develop our ability to perceive and react to situational differences that are of moral significance and also helps us to avoid a sort of natural “obtuseness” that stands in the way of our understanding the predicaments of other moral agents. However, there is an important difference between Nussbaum and MacIntyre with respect to ποίησις. The former sees ποίησις as basically a pedagogical tool for the moral life—one that is intimately bound up with it, but probably a tool nonetheless; the latter, on the other hand, seems to see ποίησις as part of the moral task itself—the task of creating a moral tradition.

I think we can safely acknowledge that the moral life is in several respects poietic without doing damage to my overall thesis. In a way, the observation that morality is poietic is the flipside of my own observation that at least with respect to causal structure natural activities resemble πρᾶξις. The overall conclusion should perhaps be that the line between ποίησις and πρᾶξις is simply not so sharply defined as we might like. That is, the activities of nature, so clearly productive, so clearly lacking in deliberation, nevertheless share some of the salient causal features of πρᾶξις. They are ends in themselves, and they enjoy a convergence of formal,

311 Wall, “Phronesis as Poetic,” 319.
312 Ibid., 319.
313 Nussbaum, Love’s Knowledge, 162.
314 Ibid., 154.
final, and efficient causes that is not exhibited in human production. On the other hand, moral action, which is clearly done for its own sake and has all the salient causal features of πράξις, is nevertheless productive in an extended sense. It is through deliberation and moral action that we “create” our characters and our happiness, and that we develop our moral traditions.

However, I want to point out that the causal structure of “moral ποίησις” is still essentially praxitic. Characters and moral traditions are aimed at because they are necessary parts of flourishing, and flourishing is a good in itself. Thus, characters and moral traditions are not products in the way that tables and chairs are. They are not external, instrumental goods. From a causal point of view, “moral ποίησις” is still πράξις.
Conclusion

This dissertation has developed a supplementary model for Aristotle’s natural teleology based on the moral life. The model emphasizes two aspects of natural teleology that the artifact model does not reflect: causal convergence and ἐνέργεια.

To develop this model, I first explored the obscurity of final cause as it is reflected in the current debate on teleology and mechanism, and then inquired into the necessary obscurity of causation in nature. I noted that since causes tend to converge in natural objects, it is challenging to develop a clear philosophical account of natural causation. I concluded that a more robust understanding of ἐνέργεια, which seems to lie conceptually at the center of natural causal convergence, would be helpful in clearing up the obscurity.

Having stated the problem, I then proceeded to consider whether an appropriate model for natural causation could be found. I considered Aristotle’s own artifact model and explored its strengths and weaknesses, finding that although the benefits of the artifact model are substantial, it does not address the obscurity discussed in the first three chapters. Because the artifact model tends to address the four causes separately—which is in one sense a clear benefit of this model—it does not reflect the causal convergence or ἐνέργεια in natural objects.

I then turned from ποίησις to πρᾶξις, to consider whether it might be a supplemental model for natural causation. I described the teleology of the moral life and found that it reflects, in some key respects, causation in natural objects. In particular, the same causal convergence is present, and the final cause and form involved in moral action is an ἐνέργεια. I concluded that on that basis, the moral-life model is a useful supplement to the artifact model.
I would like to note at this point that this model is in keeping with Aristotle’s idea that we begin our studies with what is more knowable to us. And we ourselves—our goals, appetites, habits, thought processes, and actions, are perhaps most knowable to us of all. The model that I have presented begins at precisely this point, with our experience of the moral life. We proceed in this way from what is most knowable to us (our own life, insofar as it is a life of experience and action) toward what is most knowable in itself (the causes and essences of natural objects, including ourselves as natural objects). The inside view that we have on our own moral life has the potential to change how we view natural objects—not only in the sense that we can better see the reality of natural goods and goals, but in the sense that we are given a glimpse of the internal causal structure of natural objects, a structure that is inborn and centered around these goals. The ability to see the internal causal structure brings us closer to the Aristotelian goal of science—the knowledge of what is more knowable in itself.

I. Old Debates

Before closing the dissertation, I want to make a few comments on how the moral model can both shed light on old debates and also point in new directions of research. To begin, I return to two standard debates that showed up at the outset of the dissertation: the status of αὐτίκα as explanations or causes, and the tension between teleology and mechanism.

I.1 Αὐτίκα: Explanations or Causes?

Part of the debate over whether αὐτίκα should be understood as causes or explanations or both hinges on a confusion over what a cause is. If by “cause” we mean something efficient or
motive, then certainly we will not countenance all four of Aristotle’s αἰτία as causes. However, one of the benefits of the moral life model is that by disclosing the convergence of the four causes, we see more clearly how efficient cause does not operate on its own, but is informed by final and formal causes. This is easier to see in the moral life than it is in nature.

For example, someone who takes a just action acts in a way that reflects his virtuous character and contributes to the εὐδαιμονία. Clearly he is the author—the efficient cause—of the action. Yet it is also clear that simply pointing to him as a man is not sufficient to explain the action—for example, it does not explain why he took *that* action rather than another one. To do that, we can point to his character—to formal qualities that make him the sort of person he is and his habits of decision-making, emotion, and action. This leads naturally to a consideration of motive or intention. Just men tend to have different motives than unjust ones, and considering these motives leads to a consideration of ends. To what purpose did the man take the action? In part, he recognized its inherent value as part of a larger picture of the good life. These teleological causes—his character, motives, and the goal of his action—are not merely explanatory. In ordinary discourse about morality, we take intentions, character traits, and goals to be explanatory precisely because we take them to be real—we are aware of their influence on us and impute them just as surely to other people. At the same time, it is clear that they are intimately related—the man as an agent, his character, his motives, his goals are all centered around his identity. They converge at a conceptual center—the actuality and activity that are his life.

In this way, the moral life model illustrates how the four causes can be construed as genuine causes as well as explanations in at least one case. And, since the moral life reflects both
the causal convergence and ἔνεργεια we find in natural objects, the analogy is worth taking seriously, for here is at least one way in which all four causes can be understood as real.

I.2 The Compatibility of Teleological and Non-Teleological Causation

Toward the end of chapter 1, I argued that causation in nature is best viewed in layers determined by proximate matter. Although within an isolated layer, non-teleological causation occurs, one always finds teleological causation present at a deeper layer. This is because in the natural world, every level of matter is informed. Prime matter is a concept for the metaphysician. If prime matter exists (and Aristotle does, I think, provide a reasonable argument), it cannot be sensed as prime matter, since sensation itself is reception of form. Form is, therefore, always present in our experiences of the natural world. However, the local formal cause does not always converge with other causes on that level.

For example, eye color is arguably non-teleologically determined. It depends on genetic factors that have no direct bearing on the function or form of the eye. At one level, we have the matter of the eye being determined by genetic efficient causes. Yet form is not absent in this—color itself is a formal property. However, color does not stand as the final cause of anything at this level. But if we move up a level and consider causation in the eye as a whole, it is clear that the form of the eye does play a functional role and is necessary for achieving the final cause of seeing. And if the eye is to have this form, it must have an iris and that iris must necessarily be some color. Thus, the eye color, at one level apparently determined by purely efficient and material causes, nonetheless serves the overall teleology of the eye.
This sort of multi-level structure is also clearly evident in the moral life. Human actions are often complex, made of smaller actions that sometimes serve proximate goals and sometimes—taken in isolation—serve no goal at all. Yet in observing human actions, one is seldom puzzled by this. For example, in delivering a message, a man moves his lips and tongue, his vocal chords vibrate, he blinks his eyes, and so on. No one is puzzled as to how these apparently mechanical events fit into a larger teleological structure. Certainly, material and efficient causes operate on a level that can be viewed in isolation (by, for example, an anatomist or neurologist). But there is no difficulty in seeing that the mechanical account is incomplete—in order to understand the man’s action, we must move up a level and examine his character, goals, and motives. In this way, the moral life illustrates the way in which apparently mechanical processes can fit into an overall teleological structure.

II. New Directions

In addition to addressing some long-standing debates about Aristotle’s philosophy of nature, the moral life model also opens some new questions or adds different emphasis to old ones and thus suggests new avenues for research. In particular, it raises questions about the metaphysics of natural objects, naturalism in ethics, and the relationship between ποίησις and πρᾶξις.

II.1 The Metaphysics of Natural Objects

In the course of writing the dissertation, two puzzles disturbed me. I do not know the answer to either of them, but I mention them here as examples of how the moral-life model can provoke puzzles.
Natural objects are more fully disclosed when considered in their teleological dimension, and the moral model attempts to disclose just that. If the model is actually valuable, then it would be worthwhile to revisit the metaphysics of natural objects to see if new light can be shed in this area. In particular, it seems to me that there is a difficulty concerning value. Normally, final causes are taken to imply some sort of good or value at which structures and processes aim. But precisely what is the nature of that value in natural objects? Some commentators, using the famous passage in the Politics, have suggested that natural objects have extrinsic or instrumental value for Aristotle. However, the model I am suggesting emphasizes that the end of natural objects coincides with their form. Thus, their value appears to be intrinsic, rather than extrinsic, but what sort of intrinsic value is it? It might be, for example, aesthetic or moral, which could have implications for an aesthetics of nature or for environmental ethics. In any case, for Aristotle natural objects are (at least in part) ends in themselves, and their causal structure reflects this view, which is markedly different from modern views of nature, in which natural objects are conceived more along the lines of things that only have value insofar as they may be subordinated to human ends. The analogy between nature and the moral life serves to remind the contemporary reader how different Aristotle’s vision of nature is from the modern one.

In particular, Aristotle’s view is neither mechanistic nor completely anthropocentric. It thus gives us a view of nature that is markedly different from those offered by modern philosophy. The moral life model highlights the key difference between Aristotle’s philosophy of nature and that of modern philosophers—that just as each human being experiences himself as an

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315 Of course, there are well-known contemporary philosophies that turn away from this modern tendency, such as Tom Regan’s animal ethics or Arne Naess’s deep ecology, both of which treat at least some natural objects as possessing a type of intrinsic value. (See Regan, The Case for Animal Rights, esp. chapter 7, section 5; and Naess, Ecology, Community, and Lifestyle, esp. chapter 1, section 4.)
end in himself in his moral life, so are natural objects ends in themselves, although they may not all have the experience of being such. They have their own goods and goals at which they aim, and these goods are real and outside of the sphere of human concern. As Johnson has observed, “Aristotle’s teleology can change the way we relate to other natural entities. Aristotle defines nature as an internal principle of change, and as an end. . . . Aristotle thus provides us with a way to think about goods as natural phenomena, as objective causes out there in the world, and not merely as products of the human mind.”\(^{316}\) Nature is not driven merely by forces that are external to natural objects, and normative evaluation is not merely a matter of human needs and desires.

Another puzzle arises concerning the role of the prime mover. As we noted in the introduction, Aristotle does appear to countenance an over-arching final cause for nature, which perhaps acts as an indirect final cause for sublunary objects. (The prime mover is only a direct final cause for the celestial spheres, but those spheres then act as efficient causes for sublunary objects.) In this dissertation, I purposely focused only on the inborn teleology of natural objects, but could the moral-life model shed light on the relationship of natural objects to the prime mover? Again, the answer to this question is not clear to me. However, it is clear that the moral-life model would have to be made consistent with such an over-arching teleology, an interesting project that lies outside the scope of this dissertation.

II.2 The Problem of Naturalism in Ethics

I am here using “naturalism” to refer to the metaethical view that “good” or “right” will have to be defined by appealing to facts, objects, or properties in nature. On the face of it, Aristotle appears to be a naturalist about ethics—he defines moral qualities by appealing to the natural

human goal of εὐδαιμονία and the natural human function of practical reasoning. The moral
model that I propose then turns backward, and uses Aristotle’s naturalistic system of ethics to
eulucidate certain teleological features of natural objects. This backward turn might be accused of
incoherence, since the model itself (the moral life) appeals ultimately to natural properties, while
the things being modeled (natural objects) are then elucidated by the very model they were used
to develop. So, not only does the moral model implicitly commit the so-called “naturalistic
fallacy,” but it is also circular.

Although this objection raises difficulties, I don’t think that it is entirely accurate, and for
two reasons. First, I would take the side of neo-Aristotelians such as Anscombe, Foot,
Hursthouse, and Thomson, and argue that the “naturalistic fallacy” is not a logical fallacy, but
presupposes a questionable metaphysics that distinguishes too sharply between fact and value.
Some facts (such as physical health, pleasure, or temperate actions) are valuable, and although an
account can be given of their value (for example, by saying that they contribute to εὐδαιμονία),
that value need not be conceived as a non-natural property distinct from natural ones that they
possess. 317 In my understanding of Aristotle’s ethics, value is explicated in terms of the quality
of functioning—specifically, the quality of habits of practical reasoning as partly constitutive of
εὐδαιμονία. I emphasized that these habits already constitute a kind of ἔνεργεια or
ἐντελέχεια, since they are part of εὐδαιμονία. What makes them excellent is their being the

317 Geach and Thomson, for example, argue that moral properties are given by attributive, rather than
predicative adjectives. For example, a “good human being” is not an object that is both good and also
human, but rather something that is good in the context of being human, or good at being human.
Goodness, then, modifies “human” rather than the particular human being to which the sentence refers.
This removes the need to explain goodness as a distinct property of individuals and instead makes it
context-dependent. See Peter Geach, “Good and Evil,” Analysis 17 (1956): 23–42 and Judith Jarvis
actuality of a distinct natural potential. They are, therefore, both fact and value—it is a fact whether an object is a potential or actual X, but potentiality and actuality already contain normative implications. To be actually X is (in some sense) better than to be potentially X—it is to be more real, or true, or (in this case) good. Thus, perhaps the moral life, as I have described it in this model, can help to shed light on Aristotle’s naturalism by focusing on ἐνέργεια and offering a clearer picture of what sorts of facts are being picked out by moral language.

Second, the moral model need not be viciously circular. Although recent neo-Aristotelianism has made much of the biological motivations purported to underly Aristotle’s ethics, and although it is surely important to view the corpus as largely self-consistent, we must remember that Aristotle himself does not make much use of biological concepts in the Nicomachean Ethics. He does not open the Nicomachean Ethics with a discussion of the teleology of nature or of the τέλος/ἐργον structure found in natural objects. He opens, instead, with a discussion of the hierarchical structure of human activities—in particular, the developed arts and crafts as they are found in more or less sophisticated societies. It is not the natural world, in which living things strive for survival, flourishing, and reproduction, that forms the backdrop to his discussion of εὐδαίμονία and ἀρετή. Rather, it is human society, in which human beings act and produce for a variety of inter-related ends, and, caught up in the midst of this, are perhaps only dimly aware of a final goal (certainly, the disagreement over what constitutes εὐδαίμονία indicates that we are confused as to the nature of this goal). In other words, although Aristotle’s account of human τέλος and ἐργον is compatible with—and can be helpfully informed by—his biological work, we need not look to his biology to understand his virtue ethics. His argument in
the *Nicomachean Ethics* is still naturalistic, of course—but his appeal here is specifically to human nature, not to natural objects and properties in general.

The moral model then attempts to use the picture of the moral life developed in the *Nicomachean Ethics* to shed light on nature in a more general way. Thus the usefulness in the model lies in its relationship to other members of its class. It is something like saying, “I don’t understand plants very well, so I will examine trees and then try to apply my findings to plants in general.” This will no doubt yield imperfect results, but one can hope that at least some features of the model will be relevant. The challenge, of course, is the same as with any analogy—to find exactly which features are relevant or not. I have argued that the central similarity is the role that ἐνέργεια plays in nature and the moral life, and that certain dissimilarities are also clear—in particular, that humans deliberate, while other natural objects do not. One direction for future research would be to detail further similarities and differences. This would help to shed light on exactly what it means for a natural fact to have value. For example, there is some similarity between moral virtue and the health of plants and animals. Each is a state, habit, or settled disposition, and each represents a kind of excellence because of its contribution to the overall final cause of the organism. However, virtue involves reason, while health does not (or, not of necessity). More detailed treatment should be given of such parallels between the two models.

II.3 Ποίησις and Πράξις in Natural and Human Contexts

This area seems to me the most interesting possibility for future research. As we saw in chapter 4, the overlap between ποίησις and πράξις in both nature and human life is considerable. The two types of action (broadly construed) are not mutually exclusive in either realm, nor do they
model one another between realms in a straightforward way. For example, the growth of plants is clearly poietic, and yet it can also be understood to reflect a teleology that is remarkably similar to \(\pi\rho\alpha\xi\iota\varsigma\), since its final cause is inborn and converges with formal and efficient causes.

Likewise, a woodworker who constructs a table is obviously engaging in \(\pi\omicron\iota\nu\sigma\iota\varsigma\), yet he almost inevitably subsumes this activity under \(\pi\rho\alpha\xi\iota\varsigma\), since the table will be of a certain quality, intended for a certain customer, and sold at a certain price, and therefore its finished state will be partly determined by \(\tau\acute{e}\chi\nu\eta\), and partly by moral considerations such as justice, decency, or integrity. So, \(\pi\omicron\iota\nu\sigma\iota\varsigma\) and \(\pi\rho\alpha\xi\iota\varsigma\) are not mutually exclusive of one another, either in nature or human affairs.

Likewise, neither \(\pi\omicron\iota\nu\sigma\iota\varsigma\) nor \(\pi\rho\alpha\xi\iota\varsigma\) is quite the same thing in nature as it is in human life. In the latter context, man always acts as a rational deliberator, planner, or designer. Man determines whether there should be a table and what shape it should take, using both craft knowledge and moral habits. In nature, both production and the teleological dimension that makes natural processes similar to actions, appear to occur without a rational deliberator, although they do occur in an intelligible way. A plant does not decide to grow as a man decides to build a table, and yet there is an intelligible causal structure to the plant’s growth—one that depends similarly on function and end.

These observations about \(\pi\omicron\iota\nu\sigma\iota\varsigma\) and \(\pi\rho\alpha\xi\iota\varsigma\) are hardly unknown, but the moral life model introduces some new questions about them. If the moral life—with its characteristically human combination of \(\pi\omicron\iota\nu\sigma\iota\varsigma\) and \(\pi\rho\alpha\xi\iota\varsigma\)—is to model natural teleology—which has its own characteristic combination of \(\pi\omicron\iota\nu\sigma\iota\varsigma\) and \(\pi\rho\alpha\xi\iota\varsigma\)—then it will be even more important to work
out the precise relationships between these two sorts of activity, so as to draw the proper analogies between human and natural contexts. A further challenge would be to add the artifact model into this equation, with its own description of ποίησις and πρᾶξις in human life.

The moral life provides a supplementary model, alongside the artifact model, for understanding Aristotle’s natural teleology. It can help to shed some light on both the debate of aitia as explanation or causes and the debate over teleology and mechanism. It also opens up some new areas for consideration and brings a new emphasis to old ones, including the metaphysics of nature, naturalism in ethics, and the relationship between ποίησις and πρᾶξις.
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