The *Phainomena* in Aristotle's *De Anima*

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Introduction

Aristotle's *De Anima*, a treatise on the soul, exhibits many of the same methods seen in his other texts. Relatively little literature has examined the extent to which Aristotle privileges observable data in formulating theories. In the philosophy of science community, the term "saving the phenomena" is often used to denote this empirical focus. Many recognize the term from the writings of Bas van Fraassen and Pierre Duhem, who was inspired by the Copernican revolution era debates and the writings of Thomas Aquinas. Substantial evidence suggests that the concept pre-dates Aristotle, particularly in the field of astronomy.

The aims of this paper are twofold. First, I hope to characterize Aristotle's approach to scientific explanation in ontological, epistemological, and logical terms. Second, I examine how Aristotle saves the phenomena in his study of the soul.

I begin with a brief discussion of the history of "saving the phenomena" and Aristotle's ties to this astronomical tradition. Then, I provide an overview of Aristotelian methodology and further develop ideas put forth by Aryeh Kosman. After a brief comment about the roles of inference and direct observation, I proceed to a thorough examination of the methodological positions Aristotle takes in the three books of *De Anima*. Of particular importance are Aristotle's approach to defining the soul, his treatment of his predecessors' views, and the potential-actual distinction as a lens for studying the soul's faculties.

The Astronomical Origins of "Saving the Phenomena"

According to John Cleary, who cites Simplicius, the notion of "saving the phenomena" as it has come to be understood originates in the Platonic tradition of astronomy. These astronomers — Callippus and Eudoxus, for example — aimed to mathematically reproduce the observed movements of celestial bodies. A crucial assumption, inspired by Plato, was that celestial motion must be perfectly circular and uniform to reflect the divinity of heavenly bodies. Given this prior logical commitment or first principle, the crucial task was to apply this assumption in a manner that would be consistent with appearances. To this end, the observation of retrograde motion posed the greatest challenge for Platonic astronomers, as uniform circular motion seemed to do a poor job of accommodating retrogradation. Despite its quantitative indeterminacies, Eudoxus's theory of homocentric circles seemed, for a time, the most plausible solution to this problem, and both Callippus and Aristotle undertook to formalize and refine it. Also noteworthy is that Eudoxus wrote a book that detailed his observations of the heavens, which he titled *Phainomena*. The book described with great specificity the rise and fall of constellations, among other celestial bodies. This context broadly conveys what the method of "saving the phenomena" has been subsequently taken to mean: theory, insofar as it is apt, must fit with what is observed—that which is to be explained.

Aristotle and the Astronomical Tradition

Aristotle's awareness of the methods of astronomers is evidenced in *Metaphysics* XII, 8. When examining the question of how many unmoved movers must exist, Aristotle notes:

> …when we come to the number of these spatial movements, we must investigate it on the basis of the mathematical science that is most akin to philosophy, namely, astronomy. For it is about substance that is perceptible but eternal that this produces theoretical knowledge, whereas the others are not concerned with any substance at all—for example, the one concerned with numbers and geometry.
> (*Metaphysics* XII, 1073b3-8, trans. Reeve)

Here, Aristotle distinguishes astronomy, a science concerned with perceptible substances, from those that are only concerned with abstract intelligible objects—arithmetic and geometry, for instance. Astronomers, unlike arithmeticians, cannot ignore sensory data. Likewise, when attempting to answer the question of how many unmoved movers there must be, Aristotle cannot ignore the relevant perceptible substances: those things that are moved. Further demonstrating Aristotle's familiarity with the methods of astronomical study, Aristotle later cites Eudoxus's theory of homocentric circles and the subsequent work by Callippus (*Metaphysics* XII 1073b17-35).

In *Prior Analytics*, it is further possible to discern Aristotle's understanding of how first principles are obtained given astronomical observations. In Book I, he says, "…it is the business of experience to give principles which belong to each subject. I mean for example that astronomical experience supplies principles of astronomical science; for once phenomena are adequately apprehended, demonstrations were discovered. Similarly with any other art or science" (*Prior Analytics* I, 46a18-26, trans. Jenkinson). Aristotle takes it as a methodological rule that first one must collect appearances and then obtain the first principles. How explanatory principles and observables relate to one another demands further elaboration, which I undertake to do forthwith.

An Overview of Aristotelian Methodology

In examining Aristotle's methodological and epistemological views, it is perhaps useful to evaluate how his rhetoric compares to a variety of contemporary philosophical positions. Aryeh Kosman aims to do so in Chapter 8 of his book *Virtues of Thought: Essays on Plato and Aristotle* by comparing Aristotle's position to scientific realism and instrumentalism. Realism reflects an attitude that scientific theory aims to approximate truth. Instrumentalists, on the other hand, contend that the success of a theory consists only its predictive accuracy and that its exact semantic content—truth-like or wholly unrealistic—is unimportant. It is interesting that Kosman chooses only to discuss these two positions on scientific explanation, as there exist many others that potentially resemble Aristotle's views. For instance, empiricism, logical positivism, structural realism, and constructive empiricism are all differentiable from the two positions Kosman considers. However, for the sake of concision, I omit these comparisons, as they are not necessary to make good sense of Aristotle's position.

Interpreting remarks offered in Book I Chapter 2 of *Posterior Analytics*, Kosman discusses how Aristotle conceives of the relationship between understanding and explanation. For Aristotle, something is understood when its cause—what is responsible for the phenomenon's being the way it is—is known. Given an applicable cause, the explanandum would come about as a matter of necessity. I will later describe in greater depth how Kosman understands Aristotle's conception of causality.

Now, I discuss how explanatory demonstration relates to understanding. Between the two, there exists a bidirectional connection.

Explanatory demonstration is a crucial step in achieving understanding. However, understanding also has a dispositional sense; one who understands something is better disposed to explain it. Explanation proceeds from what is "true… and better known than and prior to the cause of the conclusion" (*Posterior Analytics* 1.2, 71b21-23). Later, Aristotle says, "…we understand something only when we know its cause, prior, insofar as they are causes, and known before it, not only in the other sense of being aware [of what they are] but knowing as well that they are the case" (71b31-34). This final requirement is important. For an explanation to be successful in producing genuine understanding, its premises must be true. A fictionalism, in other words, cannot produce understanding in the Aristotelian sense, as understanding requires that the true causes of a phenomenon are known. As such, an instrumentalist reading of Aristotle appears implausible. Moreover, what Aristotle means by referring to a cause as "prior" is ambiguous. At least two notions of causal priority may be operative. The first is logical causation—the causal relation between a set of premises and its conclusion. The truth of the premises logically entail the truth of the conclusion. The second notion of causation is an ontological one; some events physically necessitate the emergence of other events. Kosman points out, "…Aristotle moves comfortably from one sense to the other, as though here logic and ontology were easy bedfellows" (Kosman, p 141). A third sense of priority is suggested by Aristotle's requirement that a cause be "better known than" the conclusion. This phrasing implies an epistemological sense of priority. I proceed now to a discussion of each of these three notions of priority.

Elaborating on the aforementioned criteria of understanding, Aristotle says, "…'prior' and 'better known' may be understood in two senses, for what is prior by nature is not the same as what is prior to us, nor what is better known without qualification the same as what is better known to us" (*Posterior Analytics* 1.2, 71b33-72a1). He continues, "…things prior and better known without qualification are furthest from sense. Now things most universal are furthest from sense, and particulars nearest to sense, and they are thus exactly opposed to one another" (72a1-6). Through the lens of logic, particulars and universals stand at opposite ends of a two-way street. One uses induction to proceed from observation of particulars to statements about universals. Deduction, on the other hand, proceeds from universal premises to conclusions about particulars. The logical entailment of particulars from universals is true independently of our order of learning, which explains why Aristotle refers to these pro-positions as "prior without qualification", distinguishable from something that is "prior to us". Sense, too, is central to Aristotelian epistemology. Because universals are distant from sense, they can only be evaluated with reference to particulars. For instance, one cannot directly observe that all human beings are mortal. However, one can observe a particular individual's death, which accords with this universal claim about human mortality.

Given this notion of logical priority, one may wonder whether Aristotle thinks understanding is achieved whenever the explanandum are deductively entailed by the explanans—something akin to Hempel's deductive-nomological model of scientific explanation. In other words, is the successful identification of what is logically prior a sufficient condition for scientific explanation? Recall that Aristotle says that in order to understand something, we must not only know what its causes are, but we must know "as well that they are the case" (71b34). Thus, it is not sufficient to conjure up universal premises that logically necessitate the explanandum. Epistemological priority is also crucial to explanatory demonstration.

A final criticism of this interpretation concerns its neglect of Aristotle's apparent

emphasis on physical causation. One can deduce the height of a flagpole from the angle of the sun and the length of the flagpole's shadow. But, to say that the sun and the shadow are the *cause* of the flagpole's height does not seem productive of understanding because neither the sun nor the shadow explain why the flagpole possesses the height that it does as a matter of physical necessity. After all, the flagpole is prior in being to its shadow, and the length of the shadow is understandable to us a consequence of the flagpole's height.

As I will demonstrate further, Aristotle in *De Anima* proceeds in a similar way. The nature of visual sense data (color or light) determines how the eye must be in order to perceive it. Therefore, successful causal explanation of sight must "prioritize" light in a manner that is not reducible to logical (deductive) entailment. Ontological priority is relevant as well. But, the task of identifying what is ontologically prior poses an epistemological puzzle: how does one differentiate what is ontologically prior from other features from which one can deduce the explanandum? For instance, how does one learn that the height of a flagpole is prior in existence to its shadow? This is a question that I will set aside for now and revisit later when discussing the importance of collecting a large quantity of appearances.

Expounding upon this notion of ontological priority, Kosman says, "The prior is that which exists without the posterior, but without which the posterior does not exist" (p 143). Generative cause and effect is one example of something that reflects this priority in being. For example, beer requires the preexistence of yeast and the process of fermentation, but neither yeast nor fermentation depend upon the existence of beer. Similarly, light is ontologically prior to sight. Without light, the faculty of sight could not exist, but the existence of light is not preconditioned on a creature's ability to perceive it.

An alternative division of priority is evident in Aristotle's *Metaphysics*. He remarks, "…things that are prior in the order of rational discourse are different from those prior in relation to perception. For in the order of rational discourse universals are prior, whereas in relation to perception individuals are" (*Metaphysics* 5.11, 1018b30-33). Rational discourse is the medium of explanatory demonstration. Moreover, Aristotle thought of science as the power of rational discourse to render nature intelligible. As such, scientific explanation must involve the prioritization of universals over particulars. A further wrinkle is that explanation involves more than identification of a proximate cause and an effect. Rather, explanandum are intelligible in the context of a broader explanatory framework. Something that is prior in rational discourse is "so constituted as to provide the ground of intelligibility for other elements in the system" (Kosman, p 146). Priority in this sense implies that "one thing is intelligible in terms of another, but not vice versa, or not to the same degree" (p 147). This conception of priority is both logical *and* ontological. One thing is intelligible in terms of another if there exists an explanation that successfully proceeds from universals to what is less known by nature (logic). The directionality of this explanation in part depends on what exists prior and what is posterior (ontology). Together, these three facets of Aristotelian priority constrain the directionality of explanation and what are identifiable as causes as opposed to effects. In sum, understanding is not an isolated piece of explanatory demonstration (i.e. identification of a proximate cause). It is dependent on the phenomenon being intelligible in light of the entire body of rational discourse, traceable to primary conditions and first principles (*Physics* 1.1, 184a13). First principles, according to Aristotle, are apprehensible through *nous*, the faculty of intelligence that explains our understanding of imperceptible propositions.

Furthermore, *nous* confers the ability to produce logically connected discourse.

How does epistemological priority factor into Aristotelian explanation? Given that universals are distant from sense, how can one come to know the first principles with which one can explain observed particulars? The answer to this question, in part, depends on Aristotle's account of *nous*, a topic to be discussed later. In the meantime, it is worth examining what else Aristotle says about the apprehension of first principles. In Book I Chapter 1 of *Posterior Analytics*, Aristotle holds that the discovery of first principles proceeds simultaneously alongside the task of explaining particulars—"revealing the general by making clear the particular" (71a8). Kosman characterizes this process as "grasping the phenomena clearly by explaining them, and, in the process, grasping the principles of explanation" (p 149). One who seeks first principles is accountable, first and foremost, to the *phainomena*. How appearances facilitate the discovery of principles is less clear, but one helpful suggestion, defended by Jean De Groot, is that the quantity or breadth of observations are important for this task (De Groot, p 86). Perceptual data is to be used in an inductive manner in producing generalizations to be explained. For inductive science to be dependable, one must have multiple appearances in hand (*Prior Analytics* 1.30). Furthermore, opinions that are widely held reflect a greater diversity of experience, and those opinions held by experts in a certain field are also more trustworthy. Thus, starting with the *phainomena*, for Aristotle, involves two priorities that are important for successful induction: quantity of observation and commonality or authoritativeness of opinion.

Terence Irwin in *Aristotle's First Principles* further discusses how Aristotle proceeds from what is better known to us (appearances) to what is better known without qualification (first principles). In Chapter 2 Section 12, Irwin interprets Aristotle's approach to science as something similar to the puzzle-solving enterprise that Thomas Kuhn puts forth in *The Structure of Scientific Revolutions*. One begins by surmising general laws from observation. Then, using these laws (first principles), one attempts to solve the puzzles generated by the *phainomena*: those appearances and common opinions that have yet to be explained. If the difficulties are resolved and the *phainomena* are successfully demonstrated, the first principles are confirmed.

Returning to Kosman's original question, it is clear that Aristotle's views cannot be characterized as purely realist and certainly not as instrumentalist. Instrumentalists would disagree with Aristotle that successful explanations must have true premises. However, Aristotle diverges from realism insofar as he believes that first principles are inaccessible to sense and therefore are not necessarily veridical. Only pure appearances can be infallibly known, but truthful explanations can be reliably approached through diligent observation and a persistent effort to synthesize appearances and first principles.

The Objectivity of Sensible *Phainomena*

Another possibility that must be considered is that observation or predication itself may be fallible. Pure sensory data can be distinguished from propositional knowledge, which requires cognitive judgment. For example, the color red is directly perceived and, therefore, veridical, but the judgment of a red object as a cardinal is not. A fundamental question, then, is which qualities are sensible and reliably true and which are intuited via something other than pure sense.

In Book II, Aristotle admits of the possibility of being deceived by one's perception. In Chapter 6, he delineates three categories of sense-objects: proper objects, common objects, and incidental objects. This first category, proper objects, can only be perceived by one sense and not by others. For instance, hearing is connected with sound, sight with color, and taste with flavor. Aristotle notes, furthermore, that it is

impossible to be deceived in one's direct perception of a proper object. However, one can be mistaken about the identity or location of substances that transmit sense data (418a11-13). Common objects of perception are those qualities that not particular to one sense: movement, number, size, and shape. The size of a substance, for example, can be sensed via either touch or sight. A final category is of those objects that are only incidental to their substances—not inherent to their physical composition. The example given is of a white thing that happens to be the son of Diares (the incidental object). That the white thing is the son of Diares is merely incidental to what is sensed: its color (418a20-24). In other words, having a white color does not logically entail that it must be the son of Diares. Like with common objects, one can be incorrect in judging incidental characteristics of a thing, but the proper objects of perception (i.e. whiteness) are undeceiving.

A methodological question follows: how does this categorical scheme influence what *phainomena* are considered veridical as opposed to inference-dependent? After all, only proper objects of perception are reliable and directly knowable. Aristotle's investigative approach to the study of homoiomerous bodies (bodies that are uniform in structure) in *Meteorology* sheds light on this question. As previously mentioned, Aristotelian epistemology tends to proceed from what is better known to us to what is ontologically prior. Even his efforts to interpret perceptible objects proceeds in his way. In Book IV Chapter 8 of *Meteorology*, Aristotle says:

> All these bodies differ from each other, firstly, in the particular ways in which they can act on the senses (for a thing is white, fragrant,… hot or cold in virtue of the way it acts on sensation), and, secondly, in other more intrinsic qualities commonly classified as passive—I mean solubility, solidification, flexibility, and the like…. It is by these passive qualities that bone, flesh,… stone and all the other natural homoiomerous bodies are differentiated. (385a1-11)

This passage suggests that truths about investigative objects are not confined to the realm of sensible qualities but also include passive qualities that do not act on the senses, such as solubility or flexibility. However, only that which is directly sensed can be reliably known, and passive qualities—while no less real—must be inferred. The definition of a natural body, however, is dependent on both sensible and passive qualities, both reflective of the body's *dunameis* or characteristic function, which cannot be reduced to the *dunameis* of its material constituents. In order to interpret what something is, therefore, one must infer its additional qualities from its sensible features.

The need to interpret sensory data helps to explain, therefore, the importance of common opinion to Aristotle's *phainomena*. Only direct sensation of proper objects is veridical. This category of objects is bleak as an investigative starting point; colors, tactile qualities, smell, and taste alone yield only very crude investigative queries. For this reason, interpretation must take place in if meaningful insights are to be gleaned. Accordingly, the *phainomena* to be explained must include not only the proper objects of perception but also the functional and physical interpretations that all can agree on—those that are beyond doubt. When examining Book III of *De Anima*, I will offer an additional explanation of this interpretative process by examining its parallel in the soul.

The Declared Methodology of *De Anima* in Book I

Aristotle in Book I offers a general overview how he will approach his investigation of the soul. At numerous points, his rhetoric is consistent with Kosman's account of Aristotelian explanatory priority.

In Chapter 1, Aristotle considers the appropriate starting point of an investigation of the soul. He notes that different fields rely on different principles (402a21-22). The soul's

genus—the kind of thing it is—determines what domain of rational discourse is appropriate to explain it; if the soul is one kind of thing, it falls within the proper domain of the natural philosopher, and if it is another, a metaphysician is better suited to study it. Each field entails a different web of ontological, logical, and epistemological starting points, and different universal premises would be required to explain the soul's activities.

To choose an appropriate starting point and realm of inquiry, Aristotle must first determine what the soul is — its definition. Beginning with appearances (*phainomena*) first, Aristotle endeavors to discern which attributes are essential from those that are merely accidental to the soul. To illustrate, consider how one might define a human. While humans may have hair of a certain color, the possession of hair of a particular color is not essential to one's humanity but only accidental; simple observation reveals that humans can be bald or have red rather than brown hair (Hahmann, p 8). In the same way, by examining appearances of ensouled and lifeless bodies, Aristotle hopes to clarify the soul's substance (402b25-26). This task of defining the soul does not quite characterize Aristotle's approach to scientific explanation, as it is not an explanatory step but a descriptive one. Successful identification of the soul's substance is not a manifestation of demonstrative knowledge, as it does not serve to explain the faculties of the soul in causal terms. At this stage, Aristotle aims only to identify, given certain observable facts, some attributes that are essential to the soul. However, it is later evident that the definition of the soul ultimately guides the search for explanatory first principles and provides grounds for inferring other essential qualities. In this sense, one might say that the *phainomena* determine which explanations are adequate and which are not.

How Aristotle evaluates the views of his predecessors (*endoxa*) in Book I reveals his methodological commitments. As such, I offer Aristotle's treatment of Democritus's views as an illustration of how Aristotle views the relationship between appearances and explanation. Aristotle begins by summarizing Democritus's position. Unlike bodies that are not ensouled, ensouled bodies are capable of motion. An adequate account of the soul should explain how it initiates motion in the body. Democritus reasons that the soul must be in motion, as that which is not in motion cannot move something else. The soul, he supposes, must be a sort of fire or heat—composed of infinitely small, round particles. The ever-moving soul draws the body along with it and, in doing so, sets the body in motion. Aristotle dismisses Democritus's view on account of the following observation: ensouled bodies both move and rest. If a soul is in motion by its internal principle, then how could ensouled beings rest? The explanation given by Democritus, therefore, is empirically inadequate (406b20-26). It does not save the phenomena. Throughout the remainder of the text, Aristotle proceeds in similar fashion. He consistently dismisses views that contradict appearances and uses the appearances to justify alternate theories.

The Soul in Terms of Potentiality and Actuality

In discussing Book II, I focus on those parts that are relevant to understanding Aristotle's approach to analyzing the faculties of the soul and offer two examples of this approach manifested: nutrition and sight.

Leaving behind the views of his predecessors, Aristotle begins Chapter 1 of Book II by offering a conceptual scheme through which the soul can be defined. He briefly considers the category of substances, which contains three subcategories: matter, form—both simple substances—and composites of matter and form. Every object in the world is a composite of matter and form. Aristotle gives the example of a wax candle. The object is composed of material that has the function of a candle. But, the matter can be conceptually distinguished from form. Imagine if the characteristic features

of a candle—presumably, its function as something to carry a flame and provide light—were separated from the matter. While conceptually distinct, form cannot exist in the physical world but in matter, and matter cannot be formless, but the distinction is still meaningful. Because Aristotle concludes that the soul *is* a substance—the form of a living body—the notions of mater and form and, relatedly, potentiality and actuality will be helpful in understanding his approach. Evidently, Aristotle's search for a definition is entangled with his quest for explanatory first principles.

The soul's definition, according to Aristotle, is that which explains the difference between living bodies, which are ensouled, and non-living ones, which are soulless. The soul, therefore, is the actuality of life in a body that is potentially alive. It is necessary to pay particular attention to this principle that guides much of the analysis in *De Anima*: to know what is potential, one must first examine what is actual. When discussing Chapter 4, I will return to this topic and explain it in terms of explanatory priority.

Bodies that are potentially alive are those that possess organs. This is an inductive claim supported by the following observations, among many others: "…even the parts of plants are organs, although altogether simple ones. For example, the leaf is a shelter of the outer covering, and the outer covering of the fruit; and the roots are analogous to the mouth, since both draw in nourishment" (412b1-5). Here, Aristotle demonstrates a commitment to the *phainomena*. An organ-focused explanation of the soul must account for plants, which are also living. Because what distinguishes an ensouled from a non-ensouled body is life, in characterizing the soul, one must first answer the question of what it means to be living—the focus of Chapter 2.

In Chapter 2, Aristotle identifies a number of activities characteristic of living bodies. Again, in doing so, he begins with the *phainomena*. One can observe that plants, if nourished, grow (413a26-31). In addition to this faculty, animals also have perception and movement. Perception can be subdivided into touch, sight, hearing, and taste. Finally, humans alone have the capacity for intellection or thought. The question then arises of whether the soul is divisible according to these various functions. Because the soul is defined as the first actuality of these faculties characteristic of living bodies, it *is* conceptually partitioned. The vegetative soul consists only in a nutritive part. Animals additionally have perception: sight, touch, etc. Humans must have an intellectual soul in addition to their perceptual, nutritive, and appetitive souls. Clearly, Aristotle has no *a priori* commitment to a monopartite soul. Rather, his conceptual divisions are rooted in *observable* divisions; a creature can have the capacity for sight without the capacity for hearing. A creature's faculties are divisible, so the soul, too, must be divisible (413a11-28). Before analyzing the senses, Aristotle notes that many of these faculties are only actualities of a potentially living body. Perception cannot exist without a body that can potentially perceive. Therefore, most of the soul's parts can only inhere in the body and must be investigated with this relationship in mind.

Aristotle in Chapter 3 admits of a hierarchy of souls, rooted in the observable hierarchies of living beings. Because plants have the least living functions, they are at the bottom of the hierarchy, and principal soul of plant life must also be at the bottom—namely, the nutritive soul. Next, the animal soul additionally has locomotive, perceptive, and appetitive parts. The reason animals must have desire is that touch and other forms of perception involve pleasure and pain, which, by necessity, are tied to appetite or desire. Animals are drawn to what is pleasurable and repelled by what is painful. Again, the *phainomena* (observed behavior of animals) require this appetitive faculty to be existent. Finally, the contemplative soul *nous* is only present in the beings at the top of this

hierarchy. Because thought does not observably or necessarily inhere in any anatomical part, a non-organic account may be necessary, as we see in Book III.

Chapter 4 offers the most penetrating insights into how Aristotle's potential-actual distinction is bound up with three different kinds of priority: epistemological, ontological, and logical priority. In explaining his approach, I intend to provide a lens through which the rest of Book II can be understood.

The actualization of a faculty (i.e. seeing something, digesting something, or cognizing something) are epistemological inroads to the nature of the faculty. For instance, only in studying *what* is seen and *how* these objects can be seen can one properly characterize the faculty of vision. In other words, first, we observe the actuality of the sense. Then, we know what potentially senses. Moreover, the objects of a faculty are ontologically prior to the faculty in that the objects determine the faculty. If colors were by nature different than they are, vision, too, would have to be different. Some notion of logical priority is also operative in Aristotle's framework. The nature of faculties or potentialities are inferable from the nature of their objects. This multifaceted notion of conceptual priority is substantiated in Chapter 4 before Aristotle discusses the nutritive soul: "…if one ought to say what each of these [faculties] is…, then one should first say what reasoning is and what perceiving is, since actualities and actions are prior in account to potentialities. But… it would for the same reason be necessary to make some determinations about… nourishment and the objects of perception and reasoning" (415a15-25). Here, "prior in account" presumably refers to what is prior in rational discourse—that which is logically prior. One can gather from the objects how the faculty must be in potentiality.

Aristotle later discusses the soul in causal terms. He says, "The soul is the cause and principle of the living body… in the three of the ways delineated; for the soul is a cause as the source of motion, as that for the sake of which, and as the substance of ensouled bodies" (415b5-15). The first way refers to the soul as the "efficient cause" of motion—that which generates motion. Efficient causality reflects ontological priority, as the soul is prior in being to motion; the soul must exist first for motion to be generated. The second way the soul is the principle of the living body is as the body's "final cause". The soul represents the telos or purposive end of the body in that the body exists in order to carry out the soul's functional purposes. In observing the body's behavior, therefore, one can understand what purposes it is designed for and thus gain insights about the soul. Finally, the soul as the substance of ensouled bodies refers to "formal causality"; the living body's form depends on the kind of soul it has. An ensouled body with a vegetative soul would have the form of a plant. This, too, implies a kind of epistemological priority that is related to telos. Form, for Aristotle, has a functional character. The formal substance of an axe consists in its aptitude as a tool for cutting. If this property were separated from the object, "it would no longer be an axe, aside from homonymously" (412b10-15). Thus, the functions of the body characterize its soul—the form of the body. As noted, a body has the form it does because of its telos. These notions of causality and priority are seen throughout Aristotle's investigations of the various souls.

I now offer Aristotle's accounts of nutrition and sight as illustrations of his signature approach to studying the soul's functions. Beginning with nutrition in Chapter 4, Aristotle divides the process of nourishment into three: "what is nourished, that by which it is nourished, and what nourishes—that which nourishes is the primary soul; that which is nourished is the body which has the primary soul; and the nourishment is that by which it is nourished" (416b20-26). Noting that the purposive end of nourishment is growth, he begins with the *endoxa*—how his predecessors accounted for the growth of living

beings through nutrition. Empedocles does not treat the soul as the efficient cause of growth. Rather, he attributes growth to the elements that inhere in living beings. For plants, the presence of earth causes downward growth of the roots, and fire promotes upward growth of the rest of the organism. Aristotle rejects this account on the grounds that fire's limitless upward motion and earth's limitless downward motion would cause plants to tear apart (416a5-9). The *phainomena* contradict this implication. Thus, something else must explain plant growth. The other position that Aristotle rejects is that fire alone is responsible for growth. Unlike the body, however, fire can grow in an unlimited and unsystematic manner. Aristotle concludes that the soul is needed to explain the organized growth process of the body. From his treatment of the *endoxa*, it is clear that the *phainomena* come first. Subsequently, Aristotle turns his attention to food—that which nourishes—and discusses two positions. The first is that like nourishes like, and the other is that unlike nourishes unlike (416a29-32). Can both of these views be accommodated? Aristotle responds affirmatively. While food is unlike the body pre-digestion, it becomes like the body post-digestion. Both views can be maintained. Heat is the process by which food is digested, and the soul is both the formal and efficient cause of the structured nutriment and growth that ensues. The presence of heat also accounts for the fact that all ensouled bodies are warm (416b28-30). Throughout this inquiry, Aristotle focuses first on the actuality of nourishment: food intake and growth. By observing this process, one can infer what qualities must exist in the soul—what nourishes. Two aspects of the actuality of nourishment stand out to Aristotle. First, he notes the organized growth process of the body and concludes that the soul must account for this structure. Second, he observes that undigested food is unlike the body, and, heat, therefore, must make it alike. In characteristic fashion, Aristotle proceeds from the object and activity to the faculty itself—potential to actual.

Aristotle's approach to sight is similar. He begins with the object of sight: color. The transparent is the medium of color, and it inheres in air and water. Light activates the transparent as a medium, and, when illuminated, color can be perceived through it. The transparent then affects the eye and allows color to be perceived. Aristotle explains why the transparent is necessary as a medium for color to be perceived: "if someone should place what has colour upon the eye itself, it will not be seen. Rather, colour moves the transparent… and the sensory organ is moved by this" (419a12-14). What the eye receives is the form of the perceived color, not the actual composite being observed (424a17-20). But, the eye alone is not sufficient to explain sight because an eye in a non-living creature does not perceive color. The soul, therefore, is the first actuality of eyesight for an eye that can potentially see, and the second actuality is realized when color affects the eye. Again, Aristotle begins with the actuality of vision and the object of eyesight—color—and proceeds to an account of the faculty of vision. Aristotle's approach to each sense throughout Book II reflects the aforementioned notions of priority, which are built into his potentiality-actuality framework.

Aristotelian Epistemology and *Nous*

Because much of Book III is not concerned with external objects and appearances, it is best to focus on that part of Book III that speaks to a previous question: how does one acquire first principles? Chapter 8 discusses the relationship between imagination (*phantasia*), reason (*nous*), and perception. What is said on this matter directly parallels Aristotle's stance regarding the determination of first principles. Aristotle suggests that the only forms that can be contemplated are those that inhere in the objects of perception (432a5-10). A person who does not perceive anything could not learn or contemplate

anything. Accordingly, the objects of contemplation involve images, apprehended by *nous* as forms of perceptible objects without the matter. However, Aristotle then ponders what distinguishes images from first thoughts (432a10-15). Forms cannot be contemplated unless one has prior assumptions that allow the apprehension of form from images. Without these prior assumptions or first thoughts, there is nothing other than images and *phantasia*, and contemplation cannot take place. First thoughts, therefore, are not images even though they are actualized only with images; these objects are proper to *nous*. Aristotle does not elaborate about how these first thoughts originate, but it is clear that they cannot be learned through observation. They are prior to the interpretation of sense data.

The relationship between *nous* and *phantasia* is instructive with regards to a question discussed earlier: how can *phainomena* as pure sense data translate into propositional knowledge to be explained in terms of first principles? Recall the earlier example of a red cardinal. In order to issue any explanations of the behavior or biological traits of a cardinal, one must first interpret the colors received by the senses as those of a cardinal. This step requires a first thought—an interpretative assumption about what a cardinal is and what a cardinal is not. Whether this preconceived notion of a cardinal is a kind of "first principle" is unclear because Aristotle does not explicitly equate first thoughts and first principles in *De Anima*. However, it is clear that the two are similar.

This analogy between first principles in Aristotelian philosophy of science and first thoughts in the soul is also helpful in clarifying the nature of first principles. Like first thoughts, first principles, too, must be postulated before explanation can take place. In other words, first principles cannot be discovered in the *phainomena*. As such, first principles are prior without qualification although they are not prior to us. However, some first principles may be rejected because they fail to explain any *phainomena* of interest. If one assumes that all celestial bodies must move triangularly but never observes a celestial body that does so, the first principle fails to explain any of the relevant *phainomena*. It is an open question whether Aristotle believes that first thoughts can have no viable objects in the same sense. In any case, it is clear that first principles cannot be proven or deduced from observation.

Conclusion

"Saving the phenomena" is an apt characterization of Aristotle's approach to scientific explanation for several reasons. A valid explanation for Aristotle begins with what is "prior and better known without qualification". I purport to show that this sense of priority is both ontological and logical. Furthermore, he consistently demonstrates a concern for theory's consistency with appearances. In fact, throughout *De Anima*, Aristotle starts with what can be known through observation. In studying the senses, he begins with the objects of perception, better known to us, and from these infers how these faculties must exist in potentiality in order to be actualized. Aristotle holds the *endoxa* to the same standards; he dismisses those views that are contradicted by the phenomena and retains those that are empirically adequate. Finally, a suitable analogy can be made between first thoughts in the *nous* and first principles in scientific explanation. In drawing this analogy, it becomes clear why first principles cannot be abstracted from the phenomena. Rather, they must be formulated first before explanation can be attempted.

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