

SYLLOGISMS AND EXISTENCE IN ARISTOTLE'S POSTERIOR ANALYTICS*

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Abstract: In this paper I examine how Aristotle thinks syllogisms establish existence. I argue against the traditional "Instantiation" reading and in favor of an alternative "causal" or "structural" account of existential syllogisms. On my interpretation, syllogisms

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establish the existence of kinds by revealing that they are per se unities whose features are causally underwritten by a single cause/essence. They do so by tracing correlations between propria--peculiar, coextensive features--of the kind in question.

In the *Posterior Analytics* Aristotle maintains that existence is an object of scientific investigation (*APo.* II.1, 89b23-5). He thinks that before we set out to discover the essence of a phenomenon we must first establish its existence (*APo.* II.8, 93a19-20). Aristotle never describes at any length the procedures or methods through which existence can be established, but it clearly emerges in *APo.* II.8 that syllogistic reasoning is at least *one* procedure (perhaps among many) that, he thinks, can accomplish that feat:

Moon C, eclipse A, not being able to produce a shadow although nothing visible is between us and it B. If B, not being able to produce a shadow although nothing visible is between us and it, holds of C, and A, being eclipsed, holds of B, then it is plain that it is eclipsed but not yet why; *and we know that eclipse exists (hoti men estin ekleipsis)* but we do not know what it is. (*APo.* II.8, 93a37-b3)

In this passage Aristotle offers a syllogism which establishes a certain fact, viz. that the moon is eclipsed, but does not explain why it is true. Interestingly, he also says that this very same syllogism yields knowledge of *existence*: “we know that eclipse exists”. However, neither here nor anywhere else does he explain *how* this syllogism establishes the existence of the lunar eclipse. That is something his readers are left to decipher for themselves. The goal of this paper is to try to determine how Aristotle thinks syllogisms, like the one above, establish existence in the *Posterior Analytics*.

Some scholars have suggested that syllogisms establish existence by drawing attention to actual instances of the phenomenon in question.¹ This interpretation is quite natural and seemingly coheres with Aristotle's *in re* realism. Nonetheless, I shall contest it. As we will see, that interpretation presupposes a conception of existence with which Aristotle does not operate in the *Posterior Analytics*. For him, at least in the *Posterior Analytics*, existing is *not* simply a matter of having instances. Instead, it is a matter of having a certain kind of causal or explanatory structure. This observation naturally points to an alternative interpretation of existential syllogisms. On this alternative interpretation, syllogisms, like the one in the previous paragraph, establish existence by showing that the phenomenon in question has the requisite sort of causal structure.

That much, I think, is firmly supported by the text. Unfortunately, Aristotle never discusses *how* syllogisms reveal the possession of the requisite causal structure. That remains a matter for speculation. Below I develop a hypothesis on the matter by drawing upon Aristotle's test for identifying *per se* relations in *APo.* I.5 and his more general tendency to use coextensive relations as evidence of *per se* relations. Briefly, I shall suggest that existential syllogisms reveal the possession of the requisite causal structure by highlighting correlations between the peculiar, coextensive features (*propria*) of the kind in question.

¹ The most elaborate defense of this interpretation can be found in Bayer (1995). See also Demoss and Devereux (1988, pp. 143; 145-46).

I. THE INSTANTIATION INTERPRETATION OF EXISTENTIAL SYLLOGISMS

In *APo.* II.1 Aristotle discusses the objects of scientific inquiry. He distinguishes them into two ordered pairs. The second pair is of primary concern for our current purposes:

These things we seek in this way; but certain items we see in another way, e.g., if a centaur or god is or is not. (I mean if it is or is not simpliciter and not if one is white or not.) And having come to know that it is, we seek what it is, e.g. What is a god? Or What is a man? (*APo.* II.1, 89b31-5)

According to Aristotle, we must seek whether something is (*ei estī*) before seeking what it is (*ti estī*). Importantly, he claims that in seeking whether something is we are *not* seeking whether a subject has a certain predicate, e.g. whether or not it is white. Instead, we are asking whether it is without qualification.² Aristotle's examples—in particular, his juxtaposition of fictional (centaur) and real (god) entities—suggest that the question is meant to have existential force. To seek whether something is without qualification is to seek whether it *exists*. This is further corroborated by Aristotle's contention that things that do not exist, like goat-stags and centaurs, do not have essences (*APo.* II.7, 92b5-8). Accordingly, the entire point of seeking whether something is without qualification is ostensibly to ensure that it exists and, hence, has an essence. Once we

² This follows from what it is to ask/say something simpliciter (*baplos*), see *Top.* II.10, 115b29-35. This passage tells against the elliptical incomplete reading of the *ei estin* question in Gomez-Lobo (1980). For additional criticism of Gomez-Lobo's interpretation, see Goldin (1996, pp. 52-8).

know *that*, we can then attempt to discover what its essence is.

Existence, then, is an object of scientific inquiry. But what, in Aristotle's view, is it for something to exist? So posed, this question can easily lead us down several rabbit holes. But we can focus it in a helpful way by noting that scientific inquiry is primarily concerned with kinds or universals. For, scientific inquiry is ultimately oriented toward the acquisition of *epistēmē* (see *APo.* II.1, 89b23-4); and *epistēmē* is primarily concerned with kinds or universals and their interrelations in Aristotle's view (*APo.* I.8, 75b21-6; *NE* VI.3, 1139b22-4).³ The question we need to be asking, then, is: What, according to Aristotle, is it for a kind to exist?

An enticing answer to this question seems to be readily available. Famously, Aristotle holds an *in re* view of universals. In his view there are no uninstantiated kinds or universals. In fact, he believes that, in some sense, kinds are *in* their tokens or instances; they are not separate from them, as Plato thought:

For example, animal is predicated of man and therefore also of the individual man; for were it predicated of none of the individual men it would not be predicated of man at all. Again, color is in body and therefore also in an individual body; for were it not in some individual body it would not be in body at all. (*Cat.* 5, 2a36-b3)

Color, for example, does not float free of particular bodies in Aristotle's ontology. In order for color to exist at least

³ For further defense and discussion of Aristotle's conception of scientific (better: "philosophical") inquiry and its focus upon achieving *epistēmē* of kinds, see Karbowski (2019, ch.3).

one particular body must be colored. The same is true of animal. It does not exist apart from particular animals.

This observation naturally suggests that kind existence for Aristotle is a matter of instantiation. On this reading, for a kind to exist is just for it to have at least one actual token or instance.⁴ For example, for color to exist just is for some bodies to be colored, and for animal to exist just is for certain living things to be animals. Given this conception of existence, it stands to reason that syllogisms establish the existence of kinds by somehow showing that they are instantiated. I shall call this the “Instantiation Interpretation”.

The Instantiation Interpretation yields a rather straightforward interpretation of our focal text. I will reprint that text for the reader's convenience:

Moon C, eclipse A, not being able to produce a shadow although nothing visible is between us and it B. If B, not being able to produce a shadow although nothing visible is between us and it, holds of C, and A, being eclipsed, holds of B, then it is plain that it is eclipsed but not yet why; and we know that eclipse exists (*hoti men estin ekleipsis*) but we do not know what it is. (*APo.* II.8, 93a37-b3)

An Instantiation Interpretation naturally construes this syllogism as follows:

⁴ This is how Barnes (1993, pg. 203) construes it. Alternative versions of this interpretation are endorsed by Owen (1965, pg. 84) and Goldin (1996, pp. 113-14; 114n.23), who respectively construe the whether it is question as asking about the application of a concept or linguistic term respectively.

Eclipse belongs to (all) inability to produce shadow etc.
Inability to produce shadow etc. belongs to the moon (now).
 Eclipse belongs to the moon (now).

On this reading, the existential force of this syllogism derives from the fact that it draws attention to an actual occurrence of the lunar eclipse.⁵ Its middle term is a *proprium* of the lunar eclipse; and by virtue of the fact that the moon is currently exhibiting that feature we can confidently conclude that it is currently eclipsed.

In Aristotle's ontology the lunar eclipse is an *attribute*. It is something that depends for its existence upon its inherence in a more basic subject, viz. the moon. Since attributes are ontologically dependent upon substances, one who wishes to establish their existence syllogistically, on the current interpretation, will have to do so by showing that they actually inhere in (tokens of) their proper subjects.⁶ Such syllogisms have the following structure:

A belongs to (all) X.
X belongs to s (now).
 A belongs to s (now).

⁵ Compare these remarks of Bayer (1995, pg. 258): "...the final conclusion of the chain—the conclusion of the 'identification' syllogism—would be a statement of *existence*: we identify the fact of an eclipse from the full moon's present inability to cast shadows. Note that as a statement of existence it is asserting existence in a *particular* substratum *at a certain time*: the eclipse 'is presently occurring' in the moon".

⁶ Compare Ross (1949, pg. 612): "since an attribute can exist only in a subject, *ei esti* here reduces itself to *hōti esti*, and A. holds that *ti esti* reduces itself to *diā ti esti*, i.e., that the proper definition of an attribute is a causal definition explaining why the attribute inheres in its subject".

Their major premises universally predicate an attribute kind (A) of one of its *propria* (X). Their minor premises singularly predicate the relevant *proprium* (X) of (a token of) the attribute's proper subject (s). And their conclusions singularly predicate the attribute kind of (a token of) its proper subject (s).

Aristotle only illustrates his views about definition and demonstration in *APo.* II by appeal to attributes. But, importantly, attributes are not the only kind of item in his ontology. Famously, his ontology contains substances as well. Unlike attributes, substances do not inhere in any more basic subjects. There is no more basic subject of which humanity (for example) is an attribute in the way that color is an attribute of body. This fact has often been thought to spell doom for the prospect of establishing the existence of substance kinds syllogistically, at least prior to the development of hylomorphism.⁷ But it need not.⁸

Even though substance kinds do not depend for their existence upon other, more basic *kinds*, Aristotle believes that, like attribute kinds, they must be instantiated if they are to exist (*Cat.* 5, 2a36-b3). Consequently, we should be able to establish their existence in, more or less, the same way that we did with respect to attribute kinds, viz. by showing that they are instantiated. Now, since substance kinds are not attributes of any more basic subjects, we will not be able to show that they are instantiated by proving that they currently

⁷ A compact, yet powerful, statement of the worry can be found in Ross (1949, pg. 612). Bronstein (2016, pg. 82) also shows concern about it.

⁸ I believe the examples at *APo.* II.8, 93a22-4, which include two substances (soul and human being), suggest that Aristotle has every intention of applying syllogisms to substances in the *Posterior Analytics*, even though he gives us no syllogisms involving substances in that treatise, see n.34 below.

inhere in (tokens of) some more basic subject. We can, however, show that substance kinds are instantiated by providing reasons to think that particular substances are members of them.

Consider the following syllogism⁹:

Human being belongs to (all) animal capable of laughter.
Animal capable of laughter belongs to Socrates (now).
 Human being belongs to Socrates (now).

This syllogism does *not* show that humanity inheres in some more basic subject. For, according to Aristotle, there is no more basic subject in which it inheres. In this respect it is dissimilar to the existential eclipse syllogism presented above. However, like the latter syllogism, it can reasonably be thought to have existential import, because it shows that humanity has at least one member, viz. Socrates.

So construed, existential syllogisms involving substances have the following structure:

S belongs to (all) X.
X belongs to s (now).
 S belongs to s (now).

Their major premises (universally) predicate a substance kind (S) of one of its *propria* (X).¹⁰ Their minor premises (singularly) predicate the relevant *proprium* (X) of a particular

⁹ Gomez-Lobo (1980) construes syllogisms involving substances in the *Posterior Analytics* along similar lines. However, he denies that they are syllogisms of existence.

¹⁰ Strictly speaking, the middle term (X) in this sort of syllogism need not be a *proprium*. But I am emphasizing it, both in order to maintain the parallel with the attribute case and because the interpretation I will go on to develop makes crucial appeal to *propria*. I thank Lucas Angioni for pressing me on this point.

substance (s). And their conclusions, in turn, (singularly) predicate the substance kind (S) of the particular substance (s).

II. TOWARDS AN ALTERNATIVE INTERPRETATION OF EXISTENTIAL SYLLOGISMS

Some version or other of the Instantiation Interpretation is widely held in the literature—and for good reason.¹¹ It gains credence from Aristotle's *in re* realism and, as I tried to show, has explanatory power, because it yields a principled explanation of how syllogisms can establish the existence of attributes *and* substances. In spite of these virtues, however, I believe that we ought to reject the Instantiation Interpretation for a simple yet decisive reason: it presupposes a conception of existence alien to the *Posterior Analytics*.

The Instantiation Interpretation ascribes to Aristotle an *instantiation* interpretation of kind existence:

(*) A kind, K, exists if, and only if it has at least one instance or token.

This is indeed a recognizable and sensible view—its philosophical credentials are not the issue; the problem with attributing it to Aristotle is that he ostensibly conceives kind existence differently in the *Posterior Analytics*:

When we seek the fact or whether it is unqualifiedly (to ei estin haplos), we are seeking whether there is a middle term (meson) for it or not; and whenever, already knowing the fact or whether it is, either partially or unqualifiedly, we seek the cause or

¹¹ For references, see n.1 above.

what it is, we are then seeking what the middle term is. . . . Thus it results that *in all our searches we seek either if there is a middle term or what the middle term is*. For the middle term is the cause, and in all cases it is the cause which is being sought. Is it eclipsed?—Is there some cause for it or not? After that, having come to know that there is one, we seek what it is. (*APo.* II.2, 89b37-90a9).

This passage presents a unified description of scientific inquiry which conceives it as a search for the ingredients of demonstrations. What is most important for our purposes is that he depicts existential inquiry as a search for a middle term (*meson*): “when we seek. . . whether it is unqualifiedly, we are seeking whether there is a middle term for it or not”. Aristotle is clear that by ‘middle term’ he means the true cause or explanation. Consequently, existential inquiry in the *Posterior Analytics* aims at determining whether a kind has a cause, which, we soon learn, is identical to its essence (*APo.* II.2, 90a15).

The foregoing suggests that Aristotle endorses a *causal* or *structural* notion of kind existence in the *Posterior Analytics*.¹²

(**) A kind, K, exists if, and only if, there is a (single, unified) cause/essence underwriting its non-accidental¹³ features.

¹² This is now widely recognized, see Bolton (1987, pp. 133-37); Bronstein (2016, pp. 104-108; 185-87); Charles (2000, pp. 53-6; 69-71); McKirahan (1992, pg. 190). The instantiation interpretation of existence is powerfully criticized in Upton (1991).

¹³ By “non-accidental” features I mean all of the derivative features of a kind that can serve as *explananda* of genuine *epistēmē*-yielding demonstrations. I believe that Aristotle refers to such features as

This may strike us as an odd conception of existence, but it suits Aristotle's purposes perfectly well. In the *Posterior Analytics* he is not just concerned with any old kinds. He is specifically concerned with *scientific* kinds—kinds whose structures make them amenable to *epistēmē*. It is true that scientific kinds have instances, but, emphatically, that is not what makes them special. Some non-scientific kinds, like musical grammarian, have perceptible tokens too, but they are *not* amenable to *epistēmē*, according to Aristotle.¹⁴ Having tokens or instances is merely a *necessary*, but not sufficient, condition for being scientific. What, ultimately, makes scientific kinds special—and separates them from accidental compounds—is their *internal structure*. Scientific kinds are *per se* unities, i.e. entities whose features stand in *per se* relations to one another. Such entities have a unified essence that, directly or indirectly, causally underwrites their other (non-accidental) features. Aristotle's causal or structural notion of existence reflects this special fact about scientific kinds. Accordingly, the purpose of existential inquiry is not merely to discern whether the kind in question is 'there' in the ontology; it is to certify that it is scientific, i.e. amenable to *epistēmē*.

"*per se* accidents". However, as Lucas Angioni reminded me, some scholars distinguish *per se* accidents from derivative features constitutive of a thing's essence. For those who acknowledge such a distinction I mean "non-accidental" features to include both types.

¹⁴ Musical grammarian is an accidental compound whose unity is purely accidental. It is one in virtue of two properties just happening to coincide in the same subject, e.g. a human being (*Metaph.* V.6, 1015b16-23; V.7, 1017a7-19). Since Aristotle denies that there is *epistēmē* of accidental relations, such kinds are not amenable to *epistēmē*.

Since some accidental compounds have perceptible tokens, it is impossible to tell by perception and induction alone whether or not a kind is scientific. The existence of perceptible tokens is sufficient to ensure that the kind in question is not fictional, like centaur or goat-stag. However, it does not guarantee that the kind in question is a scientifically intelligible *per se* unity. In order to certify *that* one must engage in reflection about the structure of the kind itself and, specifically, the relation between its properties. This very likely explains why Aristotle conceives syllogisms—in particular, syllogisms in *Barbara*—as a useful tool for establishing existence. For, they chart relations between kinds and their properties.

The aforementioned causal or structural notion of existence informs Aristotle's presentation of the eclipse syllogisms in *APo.* II.8:¹⁵

When we grasp something of what a thing is, suppose first that it is like this. Eclipse A, moon C, screening by the earth B. To ask whether it [sc. the moon] is eclipsed or not is to seek whether B is or not. This is no different from seeking whether there is an account of it [sc. eclipse¹⁶]; and if there is [sc. an account], we say that it [sc. eclipse] exists...

¹⁵ *APo.* II.8 is a complicated chapter, and many of its details are subject to debate. Suffice it to say that it is beyond the scope of this paper to discuss all of its exegetical difficulties. For a fuller (though still, admittedly, incomplete) treatment of the chapter, see Karbowski (2019, pp. 90-94).

¹⁶ It is also possible to read the 'it' (*autou*) at 93a33 as a reference to eclipse, see Barnes (1993, pg. 57); Pellegrin (2005, pg. 277). But its closest and most natural referent is B, as Pellegrin (2005, pg. 407n.17) admits. For further defense of this interpretation, see Karbowski (2019, pg. 92n.28).

When we discover it [i.e., the account (*logos*) of *eclipse*] we know at the same time the fact (*to hoti*) and the why (*to dihoti*)—if we proceed through middle terms. Otherwise we know the fact (*to hoti*) but not the why (*to dihoti*). Moon C, eclipse A, not being able to produce a shadow although nothing visible is between us and it B. If B, not being able to produce a shadow although nothing visible is between us and it, holds of C, and A, being eclipsed, holds of B, then it is plain that it is eclipsed but not yet why; and we know that eclipse exists (*hoti men estin ekleipsis*) but we do not know what it is. (*APo.* II.8, 93a29-b3)

In keeping with his remarks in *APo.* II.2 Aristotle describes the inquiry into the existence of the lunar eclipse here as a search for a causal ‘account’ (*logos*) which can serve as the middle term for a demonstration. When we determine that there is such an account, we then know that the lunar eclipse exists because we have discovered that it has a cause/essence describable by it (cf. *APo.* II.2 90a26-30). The two syllogisms mentioned in the passage represent different ways in which that existential inquiry might go.

The first paragraph describes the rare case in which someone discovers existence and essence simultaneously. It is represented by a robust demonstration or syllogism “of the why”:¹⁷

¹⁷ On the (*Barbara*) interpretation of these syllogisms that I prefer their minor term (“Moon”) refers, not to the particular celestial body we observe, but rather to the singly instantiated *kind* of which it is an instance, cf. *Metaph.* VII.15, 1039b27-30; 1040a27-b4.

Eclipse belongs to (all) screening by earth.
Screening by earth belongs to (all) Moon.
 Eclipse belongs to (all) Moon.

The middle term of this syllogism reveals the fundamental cause which explains why the fact stated in the conclusion is true. Ultimately, any and all (lunar) eclipses happen because the earth screens the sun's light. This syllogism, trivially, yields knowledge of existence. For, in telling us *what* the fundamental cause/essence of the lunar eclipse is it makes clear *that* it has a cause/essence (and, hence, is a scientific kind amenable to *epistēmē*).

By contrast, the second syllogism in the passage—the one we are currently puzzling over—is a more accurate representative of the typical progression of scientific inquiry. It is a case in which the discovery of existence *precedes* that of essence. It can be depicted as follows:

Eclipse belongs to (all) inability to produce shadow etc.
Inability to produce shadow etc. belongs to (all) Moon.
 Eclipse belongs to (all) Moon.

The major premise of this syllogism does not state the fundamental cause of the lunar eclipse. Instead, it states a *proprium* or derivative coextensive feature of it.¹⁸ For this reason it is not a robust demonstration or syllogism of the why. It is merely a syllogism of fact. Nonetheless, Aristotle explicitly says that it yields knowledge of existence; and we are now in a better position to understand why he thinks that.

In keeping with his causal or structural notion of existence Aristotle must think that this syllogism reveals that

¹⁸ For a plausible defense of the claim that the middle term of this (non-explanatory) syllogism is a *proprium*, see Bayer (1995, pp. 251-52).

the lunar eclipse exists by establishing that it has a cause/essence, even though it does not say what it is. Bolton (1987, pg. 136), then, was on the right track when he claimed:

When we know that the full moon is unable to cast shadows, and thereby that there is an eclipse, we do not take the failure as a mere happenstance. We take it, rightly, as a phenomenon with a cause where that cause is in fact the essence of eclipse. So we are aware of the essence of eclipse here—as we must be since we know *that* there is such an essence—but only as the cause of a certain phenomenon.

So far, so good. Notice, however, that Bolton does not explain here *why* we do not take the inability of the moon to cast a shadow in clear conditions as a mere happenstance. *That*, I submit, is the more pressing question. How, according to Aristotle, does the aforementioned syllogism of fact, whose middle term cites that inability, reveal that the lunar eclipse has a cause/essence? More generally, how do non-explanatory syllogisms reveal the existence of underlying causes/essences? Those are the questions that I shall now attempt to address.

III. ARISTOTLE ON THE DISCOVERY OF *PER SE* RELATIONS

Unfortunately, Aristotle never elaborates upon the non-explanatory eclipse syllogism in *APo.* II.8. Nor does he ever discuss at length how we can determine that a kind has a cause/essence. Some speculation is required in order to come up with an answer to the questions posed at the end of the previous section. However, we are not entirely in the dark. Aristotle does make certain remarks about the discovery of *per se* relations; and I submit that we can gain insight into how he thinks syllogisms establish existence by examining them. For, as we saw above, existential inquiries

aim to determine whether or not a putative kind is scientific; and scientific kinds, as Aristotle construes them, are *per se* unities.

Aristotle describes one strategy for identifying *per se* relations in *APo.* I.5:¹⁹

Does it [having two right angles] hold of them as triangles or as isosceles? And when does it hold of something *per se* and primitively?..It is clear that [the property] belongs primitively to a term when the others have been removed. E.g. two right angles will hold of bronze isosceles triangles—and also when being bronze and being isosceles have been removed. But not when figure or limit have been. But they are not first. Then what is first? If triangle, then it is in virtue of this that it holds of the other items, and it is to this that the demonstration applies universally. (*APo.* I.5, 74a.35-b4)

The method described in this passage involves identifying an increasingly general sequence of possible subjects of a certain property, e.g. {bronze, isosceles, triangle, figure, limit}; abstracting each of the subjects away in thought; and then

¹⁹ Barnes (1993, pg. 9) inserts a negative and translates the lines before the example “Plainly, to the first item after the removal of which it does NOT hold”. But there is no manuscript support for the negative. His motivation stems from his presumption that those lines mention a definition or clarification of the primary subject. However, we can make sense of the manuscripts without Barnes’ emendation if we don’t take those lines as a definition of the first subject but instead as a factual statement that the first thing will become clear after the others have been removed.

discerning whether the property in question (e.g. having angles that sum up to two right angles) still applies after each subject has been abstracted away.²⁰ The first subject after whose abstraction or removal the attribute fails to hold, e.g. triangle, is the proper subject of the relevant property, the one to which it belongs *per se* and primitively.

This abstraction test may strike us as odd or *ad hoc*. But it is really nothing more than a way of determining the extensional boundaries of properties. Aristotle assumes that the fact that a property still holds even after a certain subject has been abstracted away implies that that subject is not the only thing to which that property belongs and, consequently, that it cannot be due to or explained by the essence of that subject.²¹ For instance, the fact that isosceles triangles are not the only figures whose interior angles sum to two right angles (i.e. that we can abstract away isosceles and the feature still holds of some triangles) indicates that that feature does not belong to them in virtue of their nature as isosceles, because then other figures would not exhibit that feature. By contrast, the fact that a feature first fails to hold after removing a certain subject is an indication that it belongs to that subject *per se*, because it entails that it belongs to all and only instances of that subject, which, in turn, suggests that it is due to its peculiar nature or essence.

The foregoing is of particular importance, because it reveals that Aristotle uses extensional relations as evidence

²⁰ Cf. Inwood (1979, pg. 322), though he presents the sequence as decreasing. See also Hasper (2006). Admittedly, the appearance of bronze in the sequence is perplexing, but Aristotle is probably conceiving of it as a specific (accidental) determination of isosceles. In any case, he frequently thinks of sensible shapes as being instantiated in bronze.

²¹ Section III of Lucas Angioni's contribution to this volume discusses some of the surrounding passages.

of scientifically interesting *per se* relations. In particular, he thinks that the presence or absence of a coextensive relation between a subject and attribute reliably tells in favor of or against its *per se* status respectively.²² This presumption is not a one-off; it is prevalent throughout the Aristotelian corpus. For example, it underwrites Aristotle's concern with commensurate universals in the *Posterior Analytics*:²³

E.g. shedding leaves both follows vine and exceeds it, and it follows fig and exceeds it—but it does not exceed all of them [sc. taken together]: rather, it is equal to them. If you take the primitive middle term, it is an account of shedding leaves. For there will be first a middle term in the one direction (that all are such-and-such); and then a middle term for this (that the sap solidifies, or something of the sort). What is shedding leaves?—The solidifying of the sap at the connection of the seed. (*APo.* II.17, 99a22-9)

The fact that vines are not the only trees that shed leaves—that shedding leaves “follows and exceeds” the vine—indicates that this is not a feature that belongs to vines *per se*

²² Angioni (2018) further supports this point. For, he argues that coextensiveness between the major and middle terms of a demonstration is a formal (necessary) requirement in the *Posterior Analytics* for a syllogism to count as an appropriate explanation of its *explanandum* (and, hence, to count as a genuine demonstration).

²³ For further discussion of Aristotle's treatment of commensurate universals in the *Posterior Analytics*, see Lennox (1987). As far as I know, Lennox (1987, pg. 92) was the first to point out that Aristotle uses extensional “markers” as evidence of *intensional* (*per se*) relations.

or as such but rather in virtue of the fact that they fall under a wider kind. Aristotle does not say what the wider kind is in this passage. But, interestingly, he implies that its identity can be determined by considering what vines, figs, and other botanical kinds that lose their leaves have in common (being broad leaved).²⁴

The presumption that coextensive relations provide evidence of scientifically interesting *per se* relations is also prevalent throughout the scientific works. One finds scattered remarks to that effect, for example:²⁵

...the existence and formation of the eye is for the sake of something, but its being blue is not—
except whenever this is a peculiar (*idion*) property of the kind. (*GA* V.1, 778a33-4)

Aristotle implies here that the fact that a feature is peculiar to (*idion*) a certain kind, i.e. belongs to all and only its members, is an indication that it has a (final) cause. For example, the fact that all and only birds of a certain sort have blue eyes suggests that there is something in their nature as birds of that sort which explains why they, and only they, have that feature. To be sure, the mere identification of these coextensive correlations does not tell you *what it is* about a subject's nature or essence that explains the distinctive feature in question. However, according to Aristotle, the fact that a certain feature belongs coextensively to a certain kind suggests that the kind in question has a

²⁴ See also *APo.* II.16, 98b5-10. For further discussion of how Aristotle thinks we can pass from non-commensurate to commensurate universals, see Lennox (2014). Zuppolini (2018) also contains discussion of this matter.

²⁵ See also the passages quoted in the final paragraph of this section.

distinctive nature or essence and that it somehow underwrites the coextensive relation in question.

This presumption also arguably informs Aristotle's strategy for identifying the "greatest kinds" (*megista genè*) in the *History of Animals*. As Lennox (2005) has powerfully argued, Aristotle identifies the greatest zoological kinds through the discovery of various networks of coextensive differentiae:

The first step in such an activity will be to establish the links among universal or general differentiae. This will gradually move you towards what I will call a *predicate profile*, which grounds strong claims regarding the existence of a kind, i.e. a group of animals with a common nature, but only weak claims regarding what the kind is. (Lennox 2005, pg. 92)

Aristotle begins to create what Lennox calls a "predicate profile" of birds when he points out that they uniquely possess feathered wings (*HA* II.11, 503b35), long haunches (*HA* II.12, 504a1), beaks (*HA* II.12, 504a21), and feathers with quills (*HA* II.12, 504a31-2). This predicate profile does not merely pave the way for the search for causes in the *PA* and *GA*; it arguably grounds belief in the existence of a scientific kind (Bird). The fact that all and only bird species possess the identified differentiae suggests that those species fall under a broader kind with a cause/essence which explains why they, and only they, exhibit that package of features—as Lennox (2005, pg. 91) puts it: "behind the common attributes there is a common nature".

Lennox's interpretation of the *History of Animals* is, admittedly, controversial.²⁶ Nonetheless, it is tolerably clear that Aristotle tends to use coextensive relations as evidence of underlying *per se* relations. This procedure is of a piece with his highly regular conception of nature. In his view naturalness does not merely imply regularity; regularity implies naturalness. That is why he says the following:²⁷

...one should study nature looking to the many; for it is what happens either in every case or for the most part that is in accordance with nature (*PA* III.2, 663b27-9).

...the nature of things is that which most of them possess for most of the time (*DC* III.2, 301a6-11).

Propria—and coextensive relations, more generally—are a manifestation of regularity in nature, and so that is presumably why Aristotle thinks they are indicative of scientifically interesting *per se* relations. On that note we may return to our focal passage.

IV. HOW SYLLOGISMS ESTABLISH EXISTENCE

Here again is the syllogism that has been puzzling us:

²⁶ For a different interpretation of what Aristotle is doing in the *History of Animals*, see Charles (2000, pp. 316-26).

²⁷ Also note that his treatment of luck and chance implies that such events are not regular, i.e. do not happen “always or for the most part”; and Aristotle relies crucially upon that presumption in his defense of teleology at *Phys.* II.8, 198b34-6.

Eclipse belongs to (all) **inability to produce shadow etc.**
Inability to produce shadow etc. belongs to (all) Moon.
 Eclipse belongs to (all) Moon.

The first step to understanding how this syllogism establishes the existence of the lunar eclipse, i.e. that it is a genuine scientific kind, is to note that its middle term—the one in bold—is a *proprium* or peculiar coextensive feature of eclipsed moons. As we all know, clouds or dense fog sometimes prevent the moon’s reflected light from casting shadows of things on earth, but these events are not eclipses. Strikingly, during a lunar eclipse, and only during a lunar eclipse, the moon is unable to produce shadows of things on earth, even though the night sky is perfectly clear. To be sure, this feature of the lunar eclipse is not causal bedrock. In fact, it is a consequence of the characteristic light loss suffered by eclipsed moons. That is why this is merely a syllogism of fact. Nonetheless, it is a distinctive and peculiar feature of eclipsed moons, which contributes to our knowledge of the lunar eclipse as an existing scientific kind.

On the basis of the foregoing we may hypothesize that Aristotle thinks the distinctive inability mentioned above contributes to our existential knowledge of the lunar eclipse by providing evidence of an underlying cause/essence for it. According to him, the fact that all and only eclipsed moons exhibit the inability to cast a shadow in clear conditions indicates that they belong to a kind—the lunar eclipse—with a common nature or essence that explains why they, and only they, exhibit that inability. This is the same rationale that, on Lennox’s interpretation, Aristotle uses to identify and establish the existence of the greatest kinds in the *History of Animals*. The only difference is that, in the eclipse case, it is used to establish the existence of an indivisible kind, whereas in the biological case it is used to establish the existence of broadly encompassing genera.

One might worry that this hypothesis makes syllogisms otiose in existential inquiry. The guiding insight highlighted in the previous section implies that the discovery of a single (empirically grounded, non-conjunctive, non-temporary)²⁸ *proprium* already is sufficient to provide evidence of an underlying cause and, in turn, the existence of a scientific kind (cf. *GA* V.1, 778a33-4, quoted above). But if that is the case, then it becomes puzzling why Aristotle would use syllogisms to illustrate the non-accidental mode of grasping existence in *APo.* II.8. For, *propria* can be discovered and presented in the absence of syllogistic reasoning, e.g. simply by perception and induction.

The first thing to say in response to this objection is that there is no reason to think that Aristotle believes that there is only *one* tool or method for establishing existence. It is true that there is a single *condition* that must be met in order to establish existence: one must provide evidence that the kind in question has an underlying cause/essence. But this does not entail that Aristotle thinks that this condition can be shown to be met in only one *way* or through only one *method*. For all we know Aristotle might be a pluralist about the methods for establishing existence. If he were, then he could have also thought that some methods provide better evidence of existence than others. I submit that Aristotle is, in fact, a pluralist about the methods for establishing existence and that, while he does believe that the discovery of isolated *propria* by perception and induction provides preliminary evidence of an underlying cause/essence, he also thinks that the ability to incorporate *propria* into syllogisms

²⁸ Though Aristotle does not mention it, there clearly must be certain constraints imposed upon the *propria* that are to serve as evidence of *per se* relations. For example, fictional, gerrymandered, and merely temporary *propria* have to be ruled out. It is, admittedly, a shame that Aristotle does not say more about this, because it is really the crucial part of existential inquiry.

provides *further* evidence of an underlying cause/essence over and above that furnished by perception and induction alone. That hypothesis is worth taking seriously, because it explains why he illustrates the non-accidental mode of grasping existence by appeal to syllogisms in *APo.* II.8.

Assume, for the sake of argument, that my suggestion is correct. We should still like to know *why* Aristotle thinks the ability to incorporate *propria* into syllogisms yields further evidence of existence than the discovery of isolated *propria*. In order to explain this let us return to our focal syllogism:

Eclipse belongs to (all) inability to produce shadow etc.
Inability to produce shadow etc. belongs to (all) Moon.
Eclipse belongs to (all) Moon.

At first glance, its major term—the one in bold—signifies the kind in question: the lunar eclipse. I do not want to contest that. But it is worth drawing attention to the fact that in the corresponding syllogism involving thunder in *APo.* II.8 Aristotle freely substitutes “noise” for “thunder” (*APo.* II.8, 93b11-12). This move is presumably warranted because his preliminary (“nominal”) account of thunder identifies it as a kind of noise.²⁹ Well, similarly, his preliminary (“nominal”) account of the lunar eclipse would identify it as a kind of deprivation of light. Consequently, it is highly likely that Aristotle thinks that the aforementioned eclipse syllogism is informationally equivalent to this one:

Deprivation of light belongs to (all) inability to produce shadow etc.
Inability to produce shadow etc. belongs to (all) Moon.
 Deprivation of light belongs to (all) Moon.

²⁹ Cf. Bolton (1987, pg. 137n.31).

This reformulated version of the syllogism appeals to a *proprium* of the lunar eclipse in its middle term, but that is not all that it does. It additionally displays a *correlation* between that *proprium* and another feature of eclipsed moons, viz. their deprivation of light. To be sure, this syllogism, on its own, does not say what precisely the relation between these two features is (Is one the cause of the other? Are they both explained by some more fundamental cause?). But the fact that there is *some* regular connection between them is scientifically relevant, because, at least from Aristotle's point of view, it suggests that there is something in the nature of eclipsed moons that underwrites it. That, I think, is why Aristotle believes that this syllogism reveals that the lunar eclipse has a cause/essence and, hence, exists as a scientific kind, even though it does not say what its cause/essence is.

These observations suggest a more general explanation for how Aristotle thinks syllogisms establish the existence of scientific kinds. Syllogisms by their very nature purport to show that subjects have certain properties by appeal to other properties.³⁰ Those that have existential import acquire their existential import from the fact that they display correlations between *propria* or peculiar, coextensive features of kinds. To be sure, such features can be discovered by perception and induction; and the discovery of (non-fictional, non-gerrymandered, non-temporary, etc.) *propria* already provides evidence of the existence of an underlying cause. However, the evidence provided by isolated *propria* is *augmented* by the discovery of correlations between them; and syllogisms are

³⁰ I am ignoring negative syllogisms, because Aristotle believes that universal affirmative syllogisms in Barbara are the ones most pertinent to science (*APo.* I.14).

the vehicles through which such correlations are discovered and displayed.³¹

It is worth noting that, on this interpretation, the existential force of a syllogism does not derive from just one part of it, viz. the conclusion. It derives from the *whole* syllogism. Each part of the syllogism plays an integral role in establishing the existence of a scientific kind. Consider again the previous syllogism:

Deprivation of light belongs to (all) inability to produce shadow etc.

Inability to produce shadow etc. belongs to (all) Moon.

Deprivation of light belongs to (all) Moon.

The conclusion of the syllogism presents a *proprium* of eclipsed moons.³² The minor premise presents another

³¹ In claiming that syllogisms are the vehicles through which scientifically relevant correlations are “discovered and displayed” I am assuming that Aristotle does not merely think of syllogisms as the vehicles for the presentation of antecedent scientific discoveries, but that he also views them as vehicles of scientific discovery. Though I cannot argue for this here, I think Aristotle believes that we evaluate possible correlations between properties by formulating possible syllogisms involving them and considering their merits. This proposal is of a piece with Bronstein (2016, ch.2)’s claim that Aristotle thinks we can acquire *epistēmē* by demonstration. I am simply extending his point to non-explanatory syllogisms and knowledge of existence. This view is, of course, controversial. As Lucas Angioni reminds me, an alternative, more “deflationary” view of existential syllogisms, construes them, not as a consciously applied tool of inquiry, but rather as a way of representing the information pertinent to existential inquiry.

³² I construe the conclusion as a very strong statement to the effect that “All (eclipsed) moons exhibit a *certain, peculiar* deprivation of

proprium of them. But if they were all we had, we would only know that the lunar eclipse has two, distinct features. The major premise adds something new to our knowledge of eclipsed moons, viz. it tells us that there is a correlation between two of its *propria*. On my interpretation, this premise is the most important, precisely because it presents the correlation. However, it is not enough, because it fails to mention *the subject* to which the features belong. The minor premise does that, and, in doing so, ties the correlation mentioned in the major premise to the pertinent subject.³³

A benefit of this interpretation is that it leaves room for syllogisms to be used to establish the existence of substance kinds.³⁴ Substance kinds, no less than attribute kinds, are *per*

light”, not the weaker “All (eclipsed) moons exhibit deprivation of light”. I think the stronger interpretation is required to make sense of the syllogism as establishing existence in the causal or structural sense; and it also jives with my interpretation of the force of the indefinite article (*tis*) in the examples at *APo.* II.8, 93a22-4, see Karbowski (2019, pg. 91n.26).

³³ Note that the kind whose existence is at issue (e.g. “Eclipse”) may not be the subject mentioned in the minor term of the syllogism (e.g. “Moon”). Nonetheless, the latter will still play a role in the identity of the kind, e.g. because it is the proper subject in which the attribute kind inheres.

³⁴ One might wonder whether this is a genuine virtue of this interpretation, since Aristotle gives us a fully worked out syllogism or demonstration involving a substance kind in the *Posterior Analytics*; we have to wait until *Metaphysics* VII.17 for such a demonstration. However, I believe that by presenting human being and soul right next to thunder and eclipse at *APo.* II.8, 93a22-4 Aristotle is in fact inviting us to *extend* the lessons about definition, demonstration, and inquiry in the chapter to substances. Why would he present examples of substances there if he did not think that they could be captured in syllogisms?

se unities with multiple non-accidentally related features. Consequently, it stands to reason that syllogisms establish the existence of substance kinds in the very same way that they establish the existence of attribute kinds: by displaying a correlation between their peculiar, coextensive features. Consider the following syllogism:

Capable of laughter belongs to (all) linguistic (animals).
Linguistic (animal) belongs to (all) Human.
 Capable of laughter belongs to (all) Human.

This syllogism has, more or less, the same structure as the non-explanatory eclipse syllogism printed above.³⁵ Its minor premise and conclusion present distinct *propria* of the human species, and its major premise depicts a correlation between them. Neither of the stated features constitutes the ultimate cause of the human species in Aristotle's view (rationality, let us assume). Nonetheless, the fact that there is a correlation between them is evidence of the existence of an underlying cause/essence, which explains that correlation, at least on the interpretation I have been defending in this paper.

V. CONCLUSION

Aristotle's conception of existence, at least in the *Posterior Analytics*, is influenced by his view of the structure of the kinds that are pertinent to science. Scientific kinds are *per se* unities whose (non-accidental) features derive, directly or indirectly, from their peculiar causes/essences. Consequently, he presumes that in order to show that a

³⁵ In this case the kind whose existence is at issue *is* mentioned as the minor term (subject) of the syllogism. This reflects the fact that, in Aristotle's view, substance kinds do not inhere in more basic subject kinds.

certain kind exists (and, hence, is scientific) one must show that it has a cause/essence.

Emphatically, this is not something that (typically) happens early on in scientific inquiry. In cases where a kind's existence is a genuine question—not something that we already know and can take for granted—the matter cannot be settled by perception and induction alone for the simple reason that those mechanisms cannot reliably distinguish scientific kinds from accidental compounds (since the latter may have perceptible tokens). In order to determine that a putative kind is scientific one must reflect about its structure and, in particular, consider how its various features hang together.

Syllogisms are a suitable tool for this type of reflection precisely because they analyze the relations between the features of kinds. Those that yield knowledge of existence and effectively show that the kind in question is scientific display real, mind-independent correlations among its unique, coextensive features (*propria*). Aristotle assumes that such correlations cannot be a fluke (a matter of happenstance, as Bolton put it earlier); they must have a cause. We may not know at the time what the underlying cause is, but, he thinks, we can be confident that there is one. This presumption is, no doubt, controversial. But it is at least intelligible from the vantage point of Aristotle's highly regular conception of nature, not to mention his essentialism.

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