

# EIRENE

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Centre for Classical Studies  
Institute of Philosophy of the Czech Academy of Sciences, Prague

WHAT REALLY CHARACTERIZES  
EXPLANANDA:  
*PRIOR ANALYTICS*, I,30\*

LUCAS ANGIONI

1. Introduction

In a famous passage from *Prior Analytics*, I,30 in which Aristotle talks about finding out the principles of sciences, he seems to be highly optimistic. For he seems to say that, if our empirical collection of facts in a given domain is exhaustive or sufficient, it will be easy for us to find out the explanatory principles in the domain. However, there is some gap between, on the one hand, gathering true predications and, on the other, finding out the explanatory principles in a given domain. It is far from clear how it could be easy for a scientific researcher to find out the appropriate explanations starting only with the exhaustive collection of facts in the relevant domain. In this paper, I argue that what seems to be a naïve optimism on Aristotle's part is due to an inaccurate interpretation of some key sentences. Actually, my aim is limited to discuss how the key expression in the sentence at 46a25 should be interpreted: "the true characteristics of things" ("τῶν ἀληθῶς ὑπαρχόντων τοῖς πράγμασιν"). It is important to evaluate the role this sentence plays in the overall argumentative context of the chapter.

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But I have a modest aim in this paper. I will mainly focus on a traditional misunderstanding of the sentence itself. The terminology in which that sentence has been phrased deserves more careful consideration: on a different – and, so I hope, more accurate – interpretation, Aristotle’s point would cease to look like a piece of naïve (or even silly) optimism.

## 2. The Passage and the Problem

This is the passage I will focus on, in one of its standard translations, with the most important expressions underlined:

Consequently, if the attributes of the thing are apprehended, our business will then be to exhibit readily the demonstrations. For if none of the true attributes of things had been omitted in the survey, we should be able to discover the proof and demonstrate everything which admitted of proof, and to make that clear, whose nature does not admit of proof (46a22–27, JENKINSON’S translation at ROT).<sup>1</sup>

This is the Greek of the passage (from ROSS 1949):

- [22] ὥστ' ἐὰν ληφθῆ  
[23] τὰ ὑπάρχοντα περὶ ἕκαστον, ἡμέτερον ἤδη τὰς ἀποδείξεις  
[24] ἐτοίμως ἐμφανίξειν. εἰ γὰρ μηδὲν κατὰ τὴν ἱστορίαν παρα-  
[25] λειφθεῖ τῶν ἀληθῶς ὑπαρχόντων τοῖς πράγμασιν, ἔξομεν  
[26] περὶ ἅπαντος οὗ μὲν ἔστιν ἀπόδειξις, ταύτην εὐρεῖν καὶ ἀπο-  
[27] δεικνῦναι, οὗ δὲ μὴ πέφυκεν ἀπόδειξις, τοῦτο ποιεῖν φανερόν.

In what follows, my main focus will be the expression highlighted at 46a25 (and something of what I will say will also apply to the expression at 46a23).

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<sup>1</sup> It is helpful to consider other translations for contrast. Smith’s: “Consequently, if the facts concerning any subject have been grasped, we are already prepared to bring the demonstrations readily to light. For if nothing that truly belongs to the subjects has been left out of our collection of facts, then concerning every fact, if a demonstration for it exists, we will be able to find that demonstration and demonstrate it etc.”; Striker’s: “so once it has been grasped what belongs to each thing, at that point we should be prepared to point out the demonstrations. For if nothing that truly belongs to the things has been left out in our collection of observations, we will be in a position to find the demonstration and demonstrate anything that admits of a demonstration, and where there cannot be demonstration, to make this evident.”

This passage follows a previous remark in which Aristotle stresses the importance of experience in handing down the principles in each scientific domain (46a17–22). I will discuss how these two passages are related, but I start with focusing on the key passage itself. I hope no one would have too much difficulty in accepting that Aristotle’s optimism about finding out the principles of scientific demonstrations sounds a little bit exaggerated – for any interpretation of what “principles” means in this context.<sup>2</sup> Suppose both highlighted expressions – “τὰ ὑπάρχοντα περὶ ἕκαστον” at 46a23 and “τῶν ἀληθῶς ὑπαρχόντων τοῖς πράγμασιν” at 46a25 – just mean “the attributes of the thing” and “the true attributes of the things”, as Jenkinson has translated them.<sup>3</sup> Suppose – as several interpretations are prone to do – that “πράγματα” refers to the basic subjects in the domain, for instance, the Moon, the Sun (if we are talking about astronomy), or points, lines and surfaces (if we are talking about geometry) or animal kinds at any level of generality such as quadrupeds, birds, horses, humans (if we are talking about biology). On these interpretive assumptions, Aristotle would be talking about an amassment of true predications about the basic subjects within the scientific domain at stake – for instance, an amassment of true predications about the Moon, or about quadrupeds etc.

Demonstrations, however, are something further than a mere amassment of predications and, most importantly, are something stronger than sound deductions. Demonstrations depend on explanatory principles: they must tell what is the appropriate explanatory factor that explains why the items expressed in a given conclusion are the way they are. Now, it is clear that finding out the ap-

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<sup>2</sup> “Principles” (ἀρχαί) is used in many ways in Aristotle. Sometimes it refers to *terms*, sometimes to *propositions*. The principles from which one knows a given explanandum *p* in a scientific domain can refer either to the somewhat remote factors from which our knowledge of *p* starts (and on which our knowledge of *p* ultimately depends), or to the proximate factors that appropriately complete the full explanation of *p* (see BARNES 1993, 93 for a similar point: “Aristotle does not distinguish clearly between the principles on which a demonstrated conclusion *ultimately depends* and the premises from which it *immediately derives*”, my italics). The definitions of the primitive items in a given domain are good candidates for the former role, whereas the definition of the subject of a given explanandum is a good candidate for the latter role. But Aristotle sometimes seems to imply that “principles” can cover an articulated series of premises linking those two sorts of definitions. Be it as it may, the difficulty I am highlighting here survives for any interpretation of “principle”. For a view that seems to favor the first kind of principles, see GREGORIC – GRGIC 2006, 20–21.

<sup>3</sup> The same holds for “predicates” (as we find in LENNOX 2010, 70; LENNOX 2001b, 43; LENNOX 2001c, 101), or “facts” (as we find, e.g. in HASPER – YURDIN 2014, 125; IRWIN 1988, 29–30; SMITH 1989, 158). On the other hand, the expression “what (truly) belongs to”, as found in Smith’s and Striker’s translations, is more neutral – and open to be taken in the direction I want to defend in this paper.

propriate explanatory factor for a given explanandum does not depend on mere deductive machinery, even if – as many have rightly highlighted – deductions are very helpful for an accurate mapping of the explananda.<sup>4</sup> Besides other issues, explanatory relations – which are assymetric – might involve propositions that can be deduced from each other, so that the deductive relations between them are unable to track the nature and the direction of the explanation.<sup>5</sup> Therefore, a scientific researcher must also select what is relevant to grasp and explain each explanandum, and this step goes deeper than the logical relations mapped by the method outlined in *Prior Analytics*, I,27–29.<sup>6</sup>

My central point in this paper is to argue that, if the key expressions highlighted above are taken as standard interpretations take them, Aristotle’s optimistic description of the heuristic success – from a mere collection of *huparchonta* to explanatory demonstrations – risks sounding naive and silly. If a different intepretation of the key expressions can avoid that unwelcome result, it is to be preferred. I will argue for an interpretation that delivers a more satisfactory description of the conditions for the scientist’s heuristic success.<sup>7</sup>

### Three Terminological Claims

In order to argue for a different view of the passage, I will dwell on three points, which basically concern how Aristotle’s terminology must be understood in this specific context. I believe that each of my three points stands on its own, independently of the others. But they are strenghtened when taken together in a unified interpretation about the key expression at 46a25. I will argue in detail for each of the three terminological remarks – defending them against the ob-

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<sup>4</sup> For a simple and sharp formulation of the gap between sound deductions and explanatory demonstrations, see STRIKER 2009, 207. A similar point is found in MCKIRAHAN 1992, 262–263. LENNOX 2001 (especially 2001a and 2001b) has done a monumental job in showing how the formal method developed in *Prior Analytics*, I,27–29 is useful for detecting or depurating the right sort of explananda – and, most importantly, he also highlights that the method is helpful for finding A-type explanations (which are preliminary), but not B-type explanations (which are ultimate and fully appropriate). A similar approach about *historia* is found in CHARLES 2000, 328–329.

<sup>5</sup> I have argued for this point in ANGIONI 2018.

<sup>6</sup> Another issue – which I will not discuss in this paper – is whether exhaustiveness of the collection of facts is really helpful for finding out each explanation.

<sup>7</sup> For different approaches, see GREGORIC – GRGIC 2006, 20–21; SMITH 1989, 158–159; MCKIRAHAN 1992, 261–267; BRONSTEIN 2016, 125–126.

jections that will naturally arise, presenting parallel cases etc. But first of all let me just announce them very briefly.

First, “πράγματα” in this context (46a25) does not stand for the basic subjects within a scientific domain. The word “πρᾶγμα” is highly context-sensitive, but has a core meaning which is preserved in most (if not all) uses even if receiving specific forces according to different contexts: its core meaning is “what one is concerned with”. Now, when it comes to contexts of scientific research, one is ultimately concerned with finding out explanations. Accordingly, in most contexts where Aristotle is talking about scientific knowledge or research, “πρᾶγμα” picks up what one is seeking an explanation for – an explanandum usually formulated in predicative form, like these: triangles have 2R, the Moon is eclipsed, quadrupeds make their progression with alternated movement of their limbs, etc.<sup>8</sup>

Second, what “ὑπάρχοντα” expresses in 46a25 (as well as in many other contexts) does not correspond to the generic notion of *true predications*, or to the generic notion of *bare facts* (expressed as predications). The employment of “ὑπάρχοντα” with dative complement in 46a25 is not equivalent to what is commonly found in the *Prior Analytics* as the standard expression of predicative facts. Rather, “ὑπάρχοντα” in 46a25 has the force of “characteristic features” and picks up a subset of true predicates – namely, those predicates (in the larger domain of predicates that hold of a given item) that are really important to characterise what is peculiar to the item that happens to be in question.

Connected with “πράγμασιν” in 46a25, “ὑπάρχοντα” has the force of picking up those features that are important to characterise a given explanandum as such – for instance, the features (among the features that are true of triangles) that are important for triangles as having 2R; or the features (among the features that are true of quadrupeds) that are important for quadrupeds as having a specific way of progressing with alternated movements of the limbs. And so on.

Third, the adverb “ἀληθῶς” applied to “ὑπάρχοντα” in 46a25 is not marking the truth-value of the predications. Of course, sentences that express the important characteristics (“ὑπάρχοντα”) of explananda are true. But their truth is already encoded in the employment of the expression “ὑπάρχοντα”. The adverb “ἀληθῶς” as modifying “ὑπάρχοντα” has the force of “really”, “deeply”, “most fundamentally”.

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<sup>8</sup> Since I will resort to the last example several times in this paper, it is convenient to make clear that I am talking about the *criss-cross* (κατὰ διάμετρον, 712a25) movement of the limbs, as examined in *Progression of Animals*, 712a24–25ff.

The result of all this is that the whole expression “τὰ ἀληθῶς ὑπάρχοντα τοῖς πράγμασιν” in the context of 46a25 can be adequately paraphrased in the following way: “the features that most fundamentally characterise the explananda as such” or, in a more expanded way, “the features that are really important to characterise each explanandum as the explanandum it is”.

The full details of the story will be fleshed out as I argue more specifically in favour of each of these three terminological remarks. A final summary about what this notion amounts to can be found in Section 8 (with a prelude in Section 5).

### 3. Πρᾶγμα as *explanandum* with Predicative Form

There is no room here to discuss all the uses of “πρᾶγμα” in Aristotle’s works. My purpose is to show that “πρᾶγμα” has the force of *explanandum* (with predicative form) in 46a25. I begin with emphasizing that the different forces the word comes to get in each occurrence preserve a core meaning and stem from the reinterpretation of that core meaning within a particular context. The core meaning of “πρᾶγμα” can be formulated at a very general level as “what exactly one is concerned with”. It is not necessarily inaccurate to translate many occurrences of “πρᾶγμα” with words such as “object” or “thing”. But, in doing so, it is necessary to keep in mind that “object” is actually a good proxy for “what exactly one is concerned with” (e.g., in a forensic sentence such as “the object of this process is the murder etc.”), and the same applies to several occurrences of “thing” (e.g., those in which *things* are opposed to *words*).<sup>9</sup>

However, when it comes to Aristotle’s *Organon*, scholars are sometimes prone to take “πρᾶγμα” either in the sense of *subject-matter* (of a given discipline) or in the sense of *subject of predication*. Of course, I do not deny that “πρᾶγμα” is employed with the force of subject-matter or subject of predication in several contexts. But I resist against the comfortable temptation of taking these two senses or forces of “πρᾶγμα” as if they were the whole story. For the word has different forces stemming from its employment in particular contexts.

Thus, in contexts where Aristotle is discussing definitions, “πρᾶγμα” stands for the definiendum as such (which also *happens* to be the subject of the definitory sentence).<sup>10</sup> In other contexts, the issue is what attributes *of any sort* can be

<sup>9</sup> About πρᾶγμα (although in different contexts), see GREGORIC – GRIGIC 2006, 9.

<sup>10</sup> See e.g. *Topics*, 102a4; 146a3; *Posterior Analytics*, 91b14, 93a13, 97b17; *De Anima*, 403b2. For a more complex case, in which the definiendum has propositional structure and the definiens

predicated of a given subject, and “*πρᾶγμα*” picks up that subject exactly on that aspect. However, there are several contexts in which what exactly one is concerned with has a predicative structure: in these contexts, instead of referring to a subject of predications (or a generic subject-matter), “*πρᾶγμα*” picks up a state of affairs, or a fact, liable to be expressed as a predication. This is conspicuous in *Metaphysics* 1024b17, where “*πρᾶγμα*” stands for the diagonal’s being comensurable or your being seated. But as that passage is controversial in many respects, I point to other occurrences that are more suited for my case.<sup>11</sup>

A particular occurrence that is beyond controversy (at least as for the propositional structure of *πρᾶγμα*) is *Topics*, 112b1: Aristotle talks about “things that are of necessity, or for the most part, or however it may chance”. There are many disputes about the exact meaning of those expressions – “of necessity”, “for the most part”, “however it may chance” – but whatever they happen to refer to in this context has a propositional nature.

Most importantly, in contexts in which Aristotle is discussing scientific explanation, “*πρᾶγμα*” – while preserving the core meaning, *what exactly one is concerned with* – refers to an *explanandum* as such. This is uncontroversially clear in *Posterior Analytics*, 98b30, where “*πρᾶγμα*” is the correlate of “cause” (“*αἴτιον*”) and picks up that of which the cause is the cause. Given Aristotle’s previous examples in the chapter, it is a matter of dispute whether “*πρᾶγμα*” refers to the attribute to be explained (the major term of a demonstrative syllogism, e.g., “being eclipsed”) or to the state of affairs to be explained (expressed as the conclusion of a demonstrative syllogism, e.g., “the Moon undergoes eclipse”). But, in any case, it is uncontroversially clear that “*πρᾶγμα*” in 98b30 cannot be equivalent either to subject of predication (e.g., the Moon) or to the generic notion of subject-matter.

The situation is similar in *Posterior Analytics* 71b11, where “*πρᾶγμα*” is again the correlate of “cause” (“*αἰτία*”). It would hardly make sense to correlate a cause or explanation with a subject-matter or with a bare subject of predication. In fact, a subject of predication cannot be correlated with a cause unless an attribute to be explained is ascribed to it (or is clearly presupposed in the context). But, in that case, it is inaccurate to say that we have a relation between the cause and that subject of predication. It is more accurate to say that we have a relation between a cause and one of the attributes of that subject, or a

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has a causal-triadic structure, see *De Anima*, 413a20, where “*πρᾶγμα*” refers to the definiendum but at the same time is correlated with the “cause” (*αἴτιον*), which points to the term that expresses the explanatory factor in the definiens.

<sup>11</sup> For discussion of *Metaphysics*, 1024b17, see CRIVELLI 2004, 46–50; CHARLES – PERAMATZIS 2016, 106–112.



relation between a cause and the predicative tie involving that attribute and its subject. What is ascribed to a cause is, therefore, an explanandum with predicative form.<sup>12</sup> Being so, it is not a surprise that “conclusion” appears in 71b22 as the correlate of “cause” in the place of “πρᾶγμα”. What exactly a cause is the cause *of* is the predicative tie between the subject and the predicate expressed in the conclusion of a demonstration. Thus, it is clear that “πρᾶγμα”, in 71b11, has the force of picking up *the exact object/target of an explanation*, in other words, an explanandum with predicative form.<sup>13</sup> I submit that “πρᾶγμα” has exactly the same force in 46a25. I will argue for this claim with more detail in the next sections, for my strategy relies on a particular passage in which both “πρᾶγμα” and “ὑπάρχοντα” have been used in the same way as in 46a25.<sup>14</sup>

#### 4. “ὑπάρχει” and “ὑπάρχοντα”

The expressions “ὑπάρχει” and “ὑπάρχοντα” have many uses in Aristotle’s works. A quick survey of some uses might prove helpful, although my purpose is not to furnish an exhaustive (or even a neatly tidy) list.<sup>15</sup>

1) “ὑπάρχει” is used as an absolute verb (with no complement) with the force of *exists, holds, occurs* or *results*. A bunch of examples: *De Somno*, 455b22; *Posterior Analytics*, 95a4; 98a36, 98b2.29–30; *Metaphysics*, 1048a31. It is probably from this use that we should understand the next one.

2) The participle “ὑπάρχον(τα)” is employed to point to *facts*, or something similar; in this case, “ὑπάρχον(τα)” already encodes the notion of being the case or being true. Some instances: *Posterior Analytics*, 81b23; *Nicomachean Ethics*, 1127a23.25; *Generation and Corruption*, 316a9.

<sup>12</sup> About the triadic structure of explanations, see *Posterior Analytics*, 90a5–14, 94a23–24, 99a16–18; ANGIONI 2018, 160–161.

<sup>13</sup> I have argued for this point in ANGIONI 2016, 142–143 (see also ANGIONI 2018, 161, n. 6). Surprisingly, I have then referred to *APr.* 46a25 as giving an occurrence of “πρᾶγμα” in the sense of subject-matter. But, on this last point, I have changed my mind.

<sup>14</sup> For “πρᾶγμα” correlated with “αἴτιον”, see also *Metaphysics*, 1093a4. Besides, I do claim that some controversial occurrences of “πρᾶγμα” which are normally taken in the sense of *subject-matter* must be taken with the force of *a given explanandum with predicative form*. See *Generation of Animals*, 748a9, *Sophistical Refutations*, 169b23, 171b17–21, 172a24. But there is no room to develop this point here.

<sup>15</sup> I will skip many uses that are not relevant for my purposes in this paper, for instance, the use of “ὑπάρχειν” as one of the modalities (*Prior Analytics*, 29b29), the participle “ὑπάρχοντα” in the sense of “properties”, etc. Section 9 will also highlight a further use (with the force of “apply to”) that is important to answer some objections.

3) “ὑπάρχει” is sometimes used as an absolute verb (with no complement) with the force of *being previously given, previously available*, where “previously” does not need to be taken in a strictly chronological sense. Some examples: *Metaphysics*, 1082b29 (counting as a process of adding a unit to the set of unities previously given); *de Anima*, 417b25; *Parts of Animals*, 640a23; *Generation of Animals*, 730b2. There will be more on this in Section 9, when I discuss an important passage from *Historia Animalium*.

4) The verb “ὑπάρχει” with a dative complement is used in the technical sense of “being attributed to”. This use is expounded and profusely employed in the *Prior Analytics*: putting some intricacies aside (see *Prior Analytics*, 48a40ff.), it is tantamount to “being predicated of” (κατηγορεῖται with genitive complement) and “being said of” (λέγεται with genitive complement). In this case, the verb expresses a relation between a predicate and a subject. I do not need to discuss the details of Aristotle’s notion of predication, such as the distinction between metaphysical predication and linguistic predication, the classification of predicative ties etc. All I need is highlight that the core notion of “being attributed to” can be taken at a high level of generality as equivalent to the notion of “being true of”: saying that *A* is attributed to *B* amounts to saying that *A* is true of *B*.

However, the centrality of the notion of “being true of” in the *Analytics* as a whole (and more especially in the *Prior Analytics*) has overshadowed other uses of the verb “ὑπάρχει” with a dative complement. Some of these neglected uses – which I label (5) and (6) in the ensuing paragraphs – might prove very important to understand Aristotle’s notion of scientific research and demonstration.

5) Sometimes the verb “ὑπάρχει” (or the participle “ὑπάρχοντα”) used with a dative complement has the force of “belongs to” in the stronger sense of “being suited to”, “being appropriate to”, “being fitted to”, “being tailored to”.

Thus, in *Nicomachean Ethics*, 1165a30–33, Aristotle says the following in his discussion of potential conflicts between different kinds of friendship: “to kinsfolk, fellow tribesmen, fellow citizens, and all the rest we should always try to accord what is proper, and should compare what belongs to each [τὰ ἐκάστοις ὑπάρχοντα] as befits closeness of relation, virtue, or usefulness” (IRWIN’S translation).

Now, “belongs to” is also a fair translation for use (4) of “ὑπάρχει”. However, in the passage just quoted, it is clear that “belongs to” in Irwin’s translation has the force of “is appropriate” to each person, considering exactly who they are, their characters, their social relationships etc.<sup>16</sup> This use of “ὑπάρχει”

<sup>16</sup> ROWE’S translation for “τὰ ἐκάστοις ὑπάρχοντα”: “the standing of each”; ROSS/ URMSON’S: “the claims of each”.

– which is not so rare as some would be tempted to believe – is closely connected with the next one.

6) Sometimes the verb “ὑπάρχει” (or the participle “ὑπάρχοντα”) used with a dative complement has the force of “being (most) characteristic of”, “being a feature that is important to characterize something as it is (as to distinguish it from its neighbours)”. This force stems from the notion of being appropriate or peculiar to a given thing, as encoded in the previous use.

Thus – to start with an example far away from the *Analytics* – in the *Nicomachean Ethics* we find Aristotle saying that: “We must not consider a life that is vicious and corrupted, or filled with pains; for such a life lacks definite order, just as *its proper features do*” (1170a22–24, Irwin’s translation, my italics).

The Greek expression for “its proper features” is “τὰ ὑπάρχοντα αὐτῆ”. Now, as is clear from the context, the expression “τὰ ὑπάρχοντα αὐτῆ” is not used to refer to *every attribute that happens to be true* of the vicious life. Aristotle uses the expression to refer to those attributes that are relevantly important to characterise the vicious life *as vicious* and as *lacking definite order*. Actually, a vicious life shares many general attributes with the virtuous life – attributes that have no moral importance at all, or that are important in the practical sphere but do not play any role in distinguishing sorts of ethical behaviour. For instance, it is true of *both* sorts of life that they involve deliberate actions, or that they require using our lungs for breathing, that they are bound to terminate (for we are mortals) etc. Of course, all these attributes turn out to be completely irrelevant for any contrast between the vicious and the virtuous life. But they are true of the vicious life anyway. However, *being true of* is not what is encoded in that occurrence of “τὰ ὑπάρχοντα”. As Irwin has felicitously translated, “τὰ ὑπάρχοντα” encodes the proper features of the vicious life, i.e., those features that are most characteristic of it (and distinguish it from the virtuous life).<sup>17</sup> Thus, “τὰ ὑπάρχοντα” is employed according to use (6) in 1070a24.

Note, however, that, depending on the context, what is expressed in use (6) entails what is expressed in use (5). The context of *Nicomachean Ethics*, 1070a24 does qualify as a context in which the entailment is clear: we might say that a characteristic feature of the vicious life is also *appropriate* to depict it as different from the virtuous life. Even more importantly, what is expressed in use (6)

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<sup>17</sup> Other translations are not necessarily inaccurate, but risk flirting with wrong suggestions. See Ross/Urmson’s: “its attributes”. Rowe’s translation (“the attributes that belong to it”) can presumably be taken in the same direction as Irwin’s, if “belong to” is understood in the sense of “being peculiar to”.

actually entails what is expressed in use (4): a proper feature of the vicious life is also a true attribute (or predicate) of it. But this entailment must not lead us to forget that use (6) is indeed focused on something stronger than merely being true of a subject.

## 5. What Characterises an Explanandum

I argue that, in the expression “τῶν ἀληθῶς ὑπάρχοντων τοῖς πράγμασιν” at 46a25, the participle “ὑπάρχοντα” is employed according to use (6). Before explaining what exactly this claim amounts to, let me address – in a preliminary way – a plausible objection one might raise. It is conspicuous that “ὑπάρχει” has been used in *Prior Analytics* (including chapter I,30) according to use (4), namely, as equivalent to the notion of “being predicated of” or “being true of”. One might argue that it is highly implausible that the same verb shifts from use (4) to use (6) within the same chapter. However, as I will develop in section 9, there are important parallel cases in which the same verb shift from one use to another within a short string of sentences. Furthermore, and more importantly, the shift is completely squared with its context. Scholars have been precipitate when they assume that shifting from one use to another within a short string of sentences is necessarily tantamount to spoiling the validity of an argument. (More on this in Section 9).

As I said, the participle “ὑπάρχοντα” with dative complement in 46a25 is employed according to use (6). If, as I have argued, the dative complement “τοῖς πράγμασιν” refers to explananda in predicative form (instead of referring to mere subjects of predication within the domain), my claim amounts to saying that “τὰ ὑπάρχοντα τοῖς πράγμασιν” in 46a25 should be understood with the force of “proper features of the explananda”. Given that the context of 46a25 is concerned with describing the phenomena in a way that help find explanatory demonstrations, “τὰ ὑπάρχοντα τοῖς πράγμασιν” also encodes the idea of “features that are *appropriate to describe* each explanandum as the explanandum it actually is”. In other words, the notion of being a proper characteristic, as expressed in use (6), entails the notion of being appropriate, as expressed in use (5).

Now, the identity of an explanandum with predicative form depends not only on its subject-component, but also (and more importantly) on its attribute-component. For instance, if what we want to explain is why quadrupeds move their limbs alternately, it is clear that what our explanandum is (in other words, its identity as an explanandum within a given science) depends not only on the fact that *quadrupeds* is its subject-component, but also on the fact that

*moving their limbs alternately* is its attribute-component – and the role played by the attribute-component is the most important. For this attribute-component distinguishes our explanandum from other sorts of explananda we might consider about quadrupeds – for instance, why quadrupeds do not have wings, or why most quadrupeds are able to run etc.

Thus, the features that are important to characterise each explanandum as the explanandum it exactly is do not coincide with the notion of true attributes of the basic subjects of the domain. Consider, just for the sake of argument, that “quadrupeds” names a group of basic subjects in the domain of the science of animal locomotion. Many attributes are true of quadrupeds – including attributes that are completely irrelevant for the science of animal locomotion.<sup>18</sup> But even if we confine ourselves to the subset of attributes that are in general relevant for the science of animal locomotion (i.e., the attributes that are appropriate to the subject-matter), it is not the case that *any chance attribute* from that subset qualifies as important to characterise the explanandum in question. In order to attain the features that are important to characterise our explanandum as the explanandum it actually is, we must be very selective: we must focus on the attribute to be explained (namely, moving their limbs alternately in progressing) and select from the set of true attributes of quadrupeds those that turn out to be important to characterise quadrupeds *as moving their limbs alternately*. In a context like this, it would not be a good idea to pay attention to the fact that quadrupeds are blooded animals or have head and tail located at the opposite limits of the body. These two attributes, even being important in the overall science of animal locomotion, will not help the researcher to fix the exact identity of the explanandum in question. The former is important to explain why quadrupeds have exactly four limbs (cf. 707a19–23), whereas the latter might be important to explain why quadrupeds’ standard movement is forward but not backwards (cf. 706b28–32). But they will not play any decisive role in understanding what is most characteristic of the explanandum in question (viz., alternate movement of the limbs in progressing).

Thus, the research procedure Aristotle suggests at the end of *Prior Analytics*, I,30 is far from being a mere exhaustive inventory of true predications about the basic subjects in the relevant domain. Of course, such an inventory will be very helpful (or even absolutely necessary in some cases) for the success of the

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<sup>18</sup> It is necessarily true of quadrupeds, for instance, that they are different from circles. Of course, being different from circles is not relevant for the science of animal locomotion, but it is important to keep in mind that it is necessarily true of quadrupeds any way.

research. But Aristotle is pointing to a more advanced step in the scientific research. Aristotle is pointing to the explanatorily-sensitive selection of features that turn out to be really important to characterise each explanandum as the explanandum it is. There will be more on this below. But first I will support my point by examining a passage from *Rhetoric*, II,22 in which a similar move is made with strikingly similar terminology.

#### 6. “Τὰ ὑπάρχοντα” in *Rhetoric*, II,22

*Rhetoric*, II,22 is about how to look for enthymemes – more precisely, how to select premises for the three sorts of enthymemes.<sup>19</sup> The key expression “τὰ ὑπάρχοντα” appears first in 1396a6: Aristotle says that one who looks for rhetorical arguments of any kind must know (and have ready at hand) τὰ ὑπάρχοντα concerning the item the argument is targeting (1396a4–6). The expression has been translated as “facts”.<sup>20</sup> There is nothing wrong with τὰ ὑπάρχοντα being facts – for use (6) of the expression entails what is encoded in use (1) and (2). But the translation is not accurate enough. For, when Aristotle develops what he exactly means, it becomes clear that he is talking about *those facts that turn out to be relevant or important for the target* envisaged in the argument. For instance, if we are going to advise the Athenians on whether they must engage in a war or not, we must know *relevant* facts such as what is the real power of Athens’ military forces (e.g., navy, infantry etc.), who are their enemies and allies, what wars they have fought previously etc. (1396a7–12). Now, relevant facts are indeed facts. But the stress is not on their being facts (as opposed to fictions, or to false opinions etc.), but on their being *relevant* for the target in question.

Note that it is possible to present the target of the rhetorical argument as a problem in subject-predicate form: “whether Athenians must engage in this war or not?” Note that Aristotle’s examples of ὑπάρχοντα are not whatsoever facts about Athenians, but those facts that turn out to be relevant for the problem in question, whether they must fight this war or not. Aristotle does not recommend to select general facts such as that Athenians are Greeks, or that Athenians are human beings, or how many temples they have built in the last decade. Aristotle is prescribing a problem-sensitive selection of attributes.

<sup>19</sup> I do not need to discuss what exactly an enthymeme is: I will rest on the minimal assumption that an enthymeme is an argument. For discussion, see BURNYEAT 1996; RAPP 2016.

<sup>20</sup> See Roberts’ translation in the Revised Oxford Translation.

This becomes even more clear in a passage further ahead (1396b3–18). Aristotle’s example is an eulogy to Achilles. If one should praise Achilles, one must not concentrate on facts that Achilles shares in common with other heroes or even with other humans. For instance, one must not build her eulogy with saying that Achilles is a human being, or that Achilles is a demi-god, or that Achilles was involved in the Troy expedition, for he shares all those attributes with Diomedes and, presumably, many others (1396b10–18). The passage makes it clear that “τὰ ὑπάρχοντα” refers to features that are appropriately relevant for the target in question – instead of referring to facts in general or to every attribute that belongs to the subject-term at stake.

Aristotle’s employment of “τὰ ὑπάρχοντα” is consistent throughout the chapter – from its first part (cf. 1396a6.15.22) to the section that ends with the case of Achilles’ eulogy (cf. 1396a27.32; b2.7.9). In all those occurrences, the force of “τὰ ὑπάρχοντα” is more accurate than “facts” or “things that are true of the subject-term” of the target of the argument: “τὰ ὑπάρχοντα” refers to those facts that, being indeed true of the subject-term targeted in the argument, have additionally some important connection with the *predicate* targeted in the argument and thereby turn out to be relevant for settling the problem (or being successful in the eulogy).<sup>21</sup>

Now, one might be tempted to resist against these claims due to well-entrenched prejudices about some key expressions, such as “πρᾶγμα” and “περὶ ὧν ὁ λόγος” (“what the argument is about”) in 1396b7: one might be inclined to take for granted that those expressions refer to the subject-term of the problems in question – for instance, to the Athenians – instead of referring to the question whether Athenians must engage in this war or not.<sup>22</sup> However, if we are discussing whether Athenians must engage in this war or not, we are allowed to say that this question is *the very thing our argument is about*. By the same reason, this question is *what we are exactly concerned with* in the argument – this question is our πρᾶγμα.

<sup>21</sup> In the case of eulogies, the target does not seem to have a clear-cut predicative structure as in the other cases. Forensic rhetoric discusses (e.g.) whether this man has killed or not (or whether his killing another man was just or not); deliberative rhetoric discusses whether Athenians must fight this war or not. It is true that eulogies does not start with a target so clear as this one. But Aristotle’s point presupposes that an eulogy, focused on an individual, is going to praise that individual’s deeds and qualities and, therefore, will have an aim that clearly has a subject-predicate structure.

<sup>22</sup> And one might support her objection by pointing to *Posterior Analytics*, 76b22 and 77a78, where “περὶ” (either with accusative or genitive complement) seems to indicate the minor term of demonstrations.



Thus, Aristotle says that being successful in every sort of rhetorical argument requires a target-sensitive attitude in selecting our premises:

One must not keep an eye on items of an indefinite sort [ἀόριστα],<sup>23</sup> but on features that characterise [or are suited to] the problem the argument is about [τὰ ὑπάρχοντα περὶ ὧν ὁ λόγος]; one must select the largest number of these characteristic features, and those which are nearest to what one is exactly concerned with [ἐγγύτατα τοῦ πράγματος] (1396b6–8, my translation).

I take the expression “τὰ ὑπάρχοντα” (in 1396b7) as having an implied dative complement (see explicit complements at 1396a17.21.32) – and this complement is the implied antecedent of the relative pronoun in the clause “περὶ ὧν ὁ λόγος”, so that the full syntax can be represented as “τὰ ὑπάρχοντα [τούτοις] περὶ ὧν ὁ λόγος”. And presumably the expression “τοῖς πράγμασιν” is what Aristotle would have employed to make explicit what is implied as the dative complement of “τὰ ὑπάρχοντα”, for it is not by chance that “πράγματος” pops up in 1396b9. As we all know, this is natural Greek. Thus, the expression “τὰ ὑπάρχοντα περὶ ὧν ὁ λόγος” picks up those features that are important for the *problem* or the *target* of the argument – features that thereby turn out to be suited to settle the question (whether Athenians must engage in this war or not, whether justice is good or not) or to build the appropriate eulogy.<sup>24</sup>

Actually, Aristotle has made his point very clearly just some lines before the passage quoted above, although the editor’s punctuation can mislead the reader (1396a31). Aristotle said that it makes no difference whether we are discussing Athenians or Spartans, humans or gods. The same recommendation holds: we must take τὰ ὑπάρχοντα as premises (1396a26–27), for any of the three sorts of rhetorical argument. He then proceeds to an overarching remark:

The point holds similarly for *whatsoever issue we are concerned with* [περὶ πράγματος ὅτουοῦν] – for instance, one must argue about *whether justice is good or not good* from the relevant features of justice and from the relevant features of the good [ἐκ τῶν ὑπαρχόντων τῆ δικαιοσύνη καὶ τῷ ἀγαθῷ] (1396a30–33, my translation).

<sup>23</sup> See the analogy with 46a12–15. However, in 46a12–15 Aristotle recapitulates the precepts of the topic-neutral method developed in *Prior Analytics*, I,26–28. In *Rhetoric*, II,22, as well as in the second part of *Prior Analytics*, I,30, Aristotle recommends to go further into the specificities of the *problem* in question.

<sup>24</sup> Aristotle *presupposes* a distinction between common and specific *topoi* (see BOLTON 1994, 128), but his point goes further than that.



Now, the comma between “περὶ δικαιοσύνης” and “εἰ ἀγαθὸν” in 1396a32 (as found in Ross’, Kassel’s and Bekker’s edition) can mislead the reader into thinking that the *pragma* is the bare subject-term involved in the problem, or is the generic notion of subject-matter – namely, justice (or, for the other examples, Athenians, Achilles, and so on) – instead of being the problem itself, namely *whether justice is good or not good*. But it is only entrenched prejudices about Aristotle’s terminology that can (mis)lead us into taking for granted that “πρᾶγμα” always (and independently of context) refers to the bare subject-term of a predication or to the generic notion of subject-matter. Actually, “πρᾶγμα” in 1396a31 clearly picks up the question “whether justice is good or not good”, which has a predicative structure (“περὶ δικαιοσύνης” being the prosleptic formulation of the subject of the question “εἰ ἀγαθὸν”). This question, after all, is what one is exactly concerned with, and what exactly the argument is about. It is similarly clear that “ὑπάρχοντα” – which refers to what Aristotle recommends to select as premises – ranges over *both* terms of the predicative question: τὰ ὑπάρχοντα are not only features of the subject-term, justice, but also features of the predicate-term, good. And this is exactly what we should expect, if “πρᾶγμα” stands for the *problem* we are exactly concerned with.

This survey of *Rhetoric* II,22 shows that Aristotle employs the expression “τὰ ὑπάρχοντα” with dative complement in a very specific way. His claim does not embrace all the features that are true of the subject-term involved in the problem (or of the subject-matter of the eulogy). Aristotle is pinpointing those features that, having a relevant connection with the predicate-component of the problem, thereby turn out to be suited for handling the problem. As for eulogies, Aristotle is referring to those characteristics that (i) belong to a set of true attributes of the targeted subject, e.g., Achilles, (ii) but, differently from several other attributes within that set, are not shared with other subjects – so, extensionally, are peculiar to the subject at stake (cf. ἴδια, 1396b14); (iii) and really promote the specific target of the desired speech.

In sum, “ὑπάρχοντα” (with dative complement) in *Rhetoric* II,22 is employed according to uses (6) and (5) and, most importantly, its (explicit or implied) dative complements stand for problems with subject-predicate structure. Having such and such allies is a characteristic feature of Athenians, of course – but, more specifically, of Athenians *inasmuch as they are considered as the subject of that particular problem*. What makes the feature *properly characteristic* and *appropriate* is the fact that Athenians are being considered in this particular way – which depends on the predicate-component of the problem. If the context were different, that true attribute of Athenians’ would turn out to be irrelevant. For instance, if one were interested in the question whether Athenians must build a monument in honour of Plato, the feature of having this or that military ally would become irrelevant.

Having such and such allies is a *true* attribute of Athenians. But it only turns out to be a *characteristic* one in the context of the problem in question, namely, when Athenians are regarded in the light of the predicate targeted in the problem. Importantly, being a characteristic feature of Athenians inasmuch as they are considered in the light of that particular problem implies *being appropriate for dealing with that problem*. And this is exactly what Aristotle means in *Rhetoric* II,22, where “ὑπάρχοντα” is, therefore, employed according to uses (6) and (5).

Note, however, that uses (6) and (5) entail what is expressed in uses (4), (1) and (2). If *A* is a characteristic feature of Athenians that turns out to be specifically relevant and important for settling the problem the argument is about, then it follows that *A* is a predicate that holds of Athenians, and it also follows that *A* can be depicted as a *fact* about Athenians. These entailment relations might have misled scholars into thinking that Aristotle was primarily focused on uses (1), (2) and – especially important for *Prior Analytics* I,30 – use (4).<sup>25</sup> Now, it is important to stress these entailments, for, in claiming that Aristotle employs the expression “τὰ ὑπάρχοντα ἀληθῶς τοῖς πράγμασιν” according to uses (6) and (5), I am not thereby denying that the same expression *does indeed* pick up true attributes of their subjects and facts about their subjects. What I do claim is that those weaker forces of “τὰ ὑπάρχοντα” cannot make good sense of Aristotle’s point in *Prior Analytics* I,30, for they make Aristotle’s optimistic remark sound exaggerated, naïve or even silly.

## 7. The Adverb “ἀληθῶς” in 46a25

There is still one terminological issue to address: the force of the adverb “ἀληθῶς” in the key expression “τὰ ἀληθῶς ὑπάρχοντα τοῖς πράγμασιν” in 46a25. We find several uses of the adverb “ἀληθῶς” and cognate words in Aristotle’s treatises. These uses can be helpfully classified into two main groups. I do not intend to offer an exhaustive and tidy classification, but only one that suits my limited purposes here.<sup>26</sup>

<sup>25</sup> Ross 1949, 396, talks in terms of “premisses suitable to each subject”, which could be interpreted as equivalent to “explanatory factors appropriate to each explanandum”; but, as Ross proceeds, it becomes clear that he was thinking in “facts”, and that “premisses suitable to each subject” is taken by him as equivalent to premisses that “state attributes peculiar to the science in question”.

<sup>26</sup> In order to concentrate on what is important here, I will skip the use of these words to refer to sincerity or veracity as an ethical phenomenon. See *Nicomachean Ethics*, 1108a20, and IV,7 (especially 1127a23–26.30ff.).

The first group is organised around the employment of “ἀληθής, ἔς” as a mark of the *truth of sentences or propositions*. As is well known, there is one use of “true” in Aristotle’s works in which the notion is applied to propositions or sentences that say “that what is *is* or that what is not *is not*”.<sup>27</sup> The paradigmatic case in Aristotle’s theory of truth is the predicative proposition. It is presumably from this case that those adjectives are also applied to mental states (or propositional attitudes) that have propositions as (at least part of) their objects. So, Aristotle speaks of beliefs and opinions as being true, and he does the same with other higher cognitive states such as practical wisdom (φρόνησις), scientific knowledge (ἐπιστήμη), intelligence (νοῦς) and even productive competence (τέχνη).<sup>28</sup> I need not discuss whether “true” has exactly the same force when applied to bare propositions (like the one expressed in “Socrates is seated”) and when applied to a cognitive achievement such as demonstrative knowledge. All I need here is highlight that the application of “true” to scientific knowledge (and other cognitive states) presumably stems from the application of “true” to propositions, even if it is not reducible to that.

Another group of uses of “ἀληθής, ἔς” and related words can be more easily understood if taken together with its opposite, “ψευδής, ἔς” (false). Aristotle follows common usage when he applies the adjective “ψευδής, ἔς” to things such as fake gold. It is possible to relate this use to the previous one, of course: the point of calling fake gold *false* probably derives from the fact that the proposition saying that this is gold is false. But the way of employing the terminology is different. Importantly, Aristotle applies this second use to things like arguments that produce a false appearance of being successful (i.e., valid, sound, convincing or explanatorily appropriate).<sup>29</sup> By contrast, the adjective “ἀληθής, ἔς” applied to a given argument (or argumentative move) *S* means that *S* is really successful in delivering its appropriate result (instead of only appearing so without being so).<sup>30</sup>

However, there is still room for a further distinction within this group. I have started with a picture in which “true” is applied to genuine cases of *F* in contrast with “false” applied to counterfeits – without there being any sort

<sup>27</sup> See *Metaphysics*, 1011b27. For an extensive study, see CRIVELLI 2004.

<sup>28</sup> See, e.g., *Posterior Analytics*, 88b37–89a2, 100b5–8; *Nicomachean Ethics*, 1139b15–17, 1140b5.20–21.

<sup>29</sup> See *Topics*, 162b3–15 (for a useful survey, see SMITH 1997, 147–148), and also 160b30.

<sup>30</sup> In this sense, Aristotle talks of “true syllogism (or deduction)” (*Sophistical Refutations*, 171a11), “true solutions” (176a22, cf. 1402b23) and “true refutations” (175b2) – “genuine” being a good equivalent for this use of “true”.

of gradation in the intensity of being *F*. But there are cases in which the adjective “ἀληθής, ἔς” (and cognate expressions) works as a sort of intensifier. Thus, someone employs “ἀληθής, ἔς” to mean that a given *S* is a *real* (or *most fundamental*) *F* without implying that the cases to which “ἀληθής, ἔς” is not applied are mere counterfeits. There are plenty of parallel cases in modern languages. In Portuguese, particularly, the adjective “verdadeiro (a)”, which is a straightforward translation of “ἀληθής, ἔς”, can work exactly in the same way. In English, the story probably runs better with “real, really” (if not with “true”, “truly”): saying that the *real* samba is found in Rio de Janeiro means that Rio’s samba is the sort of samba that is most fundamentally samba – without implying that the samba found in other Brazilian places are mere counterfeits (jokes apart): they are, instead, instances of samba of an inferior rank. It is the same story when we apply those expressions to a beer, a delicacy etc. When we say “this is really beer”, we are praising the high qualities of that beer and thereby putting it in the higher ranks without implying that other beers which are not so good as that one are not beer at all but a different drink (again, jokes apart).

Sometimes it is difficult to find the border between these two uses of “ἀληθής, ἔς”. For instance, when Aristotle says that friendship based on the goodness of character is the *true* (or *real*) *friendship*, it is a matter of dispute whether he implies that the other forms of friendship are so called only by homonymy or by being inferior kinds of friendship.<sup>31</sup> But there are cases in which the use of the expressions as intensifiers (not opposed to mere counterfeits or homonyms) is clear enough.<sup>32</sup> And I argue that the occurrence of “ἀληθῶς” in 46a25 is one of the latter cases.

## 8. What Really Characterizes an Explanandum (And Is Appropriate to Grasping it as the Explanandum it Is)

I have previously argued that, in the expression “τὰ ἀληθῶς ὑπάρχοντα τοῖς πράγμασιν” in 46a25, (i) the word “πράγματα” picks out *explananda with predicative form*, (ii) the participle “ὑπάρχοντα” with dative complement is employed according to use (6) (with an implied hue of use [5]), namely, as pinpointing the proper features that are important to characterise the explananda as such.

<sup>31</sup> See *Eudemian Ethics*, 1236a15–22.b21–26; *Nicomachean Ethics*, 1157a25–36.

<sup>32</sup> See, for instance, *Nicomachean Ethics*, 1123b29; *Eudemian Ethics*, 1217b9.

Given this, if the adverb “ἀληθῶς” works as an intensifier in the way I have described above, it results that the whole expression “τὰ ἀληθῶς ὑπάρχοντα τοῖς πράγμασιν” picks out those features that, within a given discipline, are *most fundamentally* important to characterise each explanandum as the exact explanandum it is.

A helpful clarification can result from one example previously given: why do quadrupeds move their limbs alternately (712a24ff.)? This explanandum has a predicative structure: *quadrupeds* is its subject-component, *moving their limbs alternately* is its predicate-component. Its identity as the explanandum it is depends both on its subject-component and on its predicate-component. In scientific research, there is a stage in which the researcher attains a better grasp of this identity – previously to the discovery of the appropriate causes that make it what it is.<sup>33</sup> Now, in order to attain this better grasp of the explanandum as such, it is not good enough to amass the attributes that are true of quadrupeds (although this amassment might be useful). For some attributes that are true of quadrupeds might turn out to be unhelpful to attain a more accurate grasp of what the explanandum is – for instance, that quadrupeds are classified into oviparous and viviparous, that quadrupeds have lungs, that quadrupeds have a mouth etc. The researcher should seek for the attributes that, being true of the subject-term of the explanandum, have also some relevant connection with its predicate-component.<sup>34</sup>

It is not easy to specify what a relevant connection amounts to, but this does not modify the story. The examples previously given (i.e., being classified into oviparous and viviparous, having lungs, having a mouth) do not qualify as relevantly connected to the predicate-component of the explanandum. In order to sort out relevant connections, one important factor is presumably to understand the context in which the predicate-component of the explanandum raises as one determinate option among others. This involves understanding that what we wish to explain is (or at least includes), e.g., why quadrupeds *do not* progress by moving first their front limbs together, then their rear limbs together (or by moving first their right limbs together, then their left limbs together).<sup>35</sup> Attrib-

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<sup>33</sup> CHARLES 2000 has advocated a three-stage view about Aristotle’s scientific method. I do not need to discuss it, but my view is that, when we examine the details, we find that Aristotle’s scientific method involves more than three stages (each stage in Charles’ original story admits a filling up with details and subdivisions).

<sup>34</sup> There is a striking similarity with the method prescribed by Galen, see HAVRDA (forth.)

<sup>35</sup> See *Progression of Animals*, 712a24–b13. As for the methodological point, see *Posterior Analytics*, II,8 93a33–35.

utes that are not only true of quadrupeds but also contribute to understand why those options would be worse for animal progression will be much more helpful to grasp what exactly is the explanandum in question.

Furthermore, among the attributes that contribute to attain a better grasp of what exactly is the explanandum in question, some might give a greater contribution than others. Two attributes can be enlightening about the nature of the explanandum, but being enlightening can come in gradations: one of those attributes can be more enlightening than the other. Thus, what Aristotle stresses with the adverb “ἀληθῶς” in 46a25 is that the success in finding out demonstrations depends on those attributes that are *really* (or *most fundamentally*) enlightening about the nature of the explanandum, in other words, those attributes that are *really* important to characterise the explanandum in question as the explanandum it is.<sup>36</sup>

One might still say that Aristotle is too optimistic when he thinks that, if the researcher has identified attributes of this kind, it is easy to find out the explanatory factors on which appropriate demonstrations depend. However, it is clear that one will not be allowed to say that Aristotle’s optimism is naive or even silly. On the traditional interpretation of 46a22–27, the gap between gathering true predications and finding out the explanatory principles in a given domain risks to become a precipice – and the bridge over it seems to rest on an exaggerated trust in the powers of the deductive machinery. On my interpretation, the gap turns out to be a manageable distance, involving some difficulties of course, but in no way a mysterious gulf.

## 9. Responding some Objections

One might be tempted to raise the following objection. On my interpretation, the use of the expression “ὑπάρχοντα” shifts within the same chapter I,30, and that sounds “unnatural” and implausible. Indeed, at the beginning of the chapter (46a5), “ὑπάρχει” and “ὑπάρχοντα” are used in the technical sense of “being attributed to”, and this sense plays an important part in the heuristic method

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<sup>36</sup> A possible objection: the selection of the relevant features to characterise each explanandum seems to be a stage *posterior to the* “collection of facts” (ἱστορία). There is no room to discuss this point here, but I do not see any evidence to exclude such a selection from the ἱστορία. Besides, the expression “κατὰ τὴν ἱστορίαν” in 46a24 does not need to be taken in the sense of “*in* the investigation”: it can perfectly well be taken in the sense of “*based on* the investigation”.

delineated in the previous chapters. Thus – one might argue – it is highly implausible that Aristotle would have employed “ὑπάρχοντα” just a few lines further ahead (46a23, 25) in a different way, with the force of “characteristic features”.

Against this objection, I have three points. First, I respond that there is some confusion between two different things: on the one hand, the dodgy trick of slipping to different meanings of the same expression in order to dupe, on the other hand, the shift in the use of an expression within a short sequence of sentences. Secondly, against the claim that shifts are implausible or unnatural “in principle”, I present a list of actual cases in which Aristotle does indeed shift the use of expressions within a short string of sentences. Thirdly, I argue that the shift in the use of “ὑπάρχοντα” in *Prior Analytics* I,30 is actually well fitted into the context of Aristotle’s discussion – to the point of being a welcome move. The first two points will be developed in this section, whereas section 10 will discuss how Aristotle’s shift is appropriate in its context.

First, it is indeed not difficult to find in the literature some conflation between, on the one hand, the mere shift in the use of a term within a short sequence of sentences and, on the other hand, a specific kind of shifting that, occurring within the same argument, spoils its validity. The latter case can be intentional or not. It can be the sophistical trick of smuggling different meanings of the same term into different premises of the same argument in order to produce a false semblance of validity, or it can be just the mistake of someone who does not detect the different meanings of the same expression in different premises and so “paralogizes” himself (cf. 175a10–12; 156a29).

An easy example of the sophistical trick is the case that depends on two different meanings of “κύκλος”, namely, geometrical figure and epic cycle. The sophist proposes the question “is the circle [κύκλος] a geometrical figure?”, and the answer is easily “yes”; then (after a while), the sophist proposes the question “is the *Iliad* a κύκλος?” The answerer will say “yes”, based on the fact that the *Iliad* is an epic cycle. But then the sophist constrains the answerer to accept the (invalid) conclusion that “the *Iliad* is a geometrical figure”.<sup>37</sup>

Of course, no serious discussion that depends on valid arguments can accept procedures of this sort, even when they are not intentionally produced. However, scholars sometimes are precipitate in conflating this unacceptable procedure and something that might look similar, but is different: the mere shift in the force (or meaning) of the same expression within a short string of sentences. Scholars are inclined to take for granted that, if an expression shifts

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<sup>37</sup> See *Sophistical Refutations*, 171a9–11; *Posterior Analytics*, 77b31–33.



its meaning (or its referent, or its force) within a short string of sentences, then the validity and even the seriousness of the passage is damaged. However, what they forget to discuss (let alone to prove) is whether “a short string of sentences” is tantamount to “one and the same argument” – whether the two contexts in which the same expression occurs with different forces are actually premises of one and the same argument. Now, if we look closer to shifting occurrences in Aristotle’s works, we can see that most of the times the answer is negative: “a short string of sentences” is *not* tantamount to “one and the same argument”, and the two contexts in which the same expression occurs with different forces are *not* premises of one and the same argument.

A bunch of examples will prove helpful. Remember that, in *Prior Analytics* I,30, the occurrences of “ὑπάρχοντα” with different forces are separated by an interval of eighteen lines (46a5, then 46a23, 25). It is convenient to start with other cases involving the same verb “ὑπάρχει”.

It is well known that “ὑπάρχει” with dative complement according to use (4), namely, in the technical sense of “being attributed to”, is profusely found in both *Prior* and *Posterior Analytics*. Take *Posterior Analytics*, I,4–5: Aristotle has resorted to use (4) of “ὑπάρχει” to characterise the notion of *per se predication* in 73a34.37.39; 73b4.10.19.30; 74a1.5.17.24.25.35.36.38.39; 74b3. Even if some of these seventeen occurrences might be controversial, my point is that the profuse employment of “ὑπάρχει” according to use (4) in *Posterior Analytics*, I,4–5 has not prevented Aristotle from using “ὑπάρχει” with dative complement in a different way in 74a10: “τοῖς γὰρ ἐν μέρει ὑπάρξει μὲν ἢ ἀπόδειξις”, which Barnes has translated as “the demonstration will indeed *apply* to the items etc.”. I believe it is beyond dispute that this occurrence of “ὑπάρξει” with dative complement does not even involve the typical relata of use (4), namely, subjects and predicates, and must be translated as something like “apply”.<sup>38</sup>

One might be tempted to protest that “this mess is not usual in Aristotle”. But I am afraid it is usual (although I do not think it deserves to be called a mess), as I will try to show with continuing the list. Another case with “ὑπάρχει” comes in due order. In *Historia Animalium*, I,6, there is a shift in two occurrences of the participle of “ὑπάρχειν” in an interval of *three* lines. In 491a9, “ὑπαρχούσας” modifies “διαφοράς”, and it is reasonable to take the dative “πᾶσι” as complementing not only “συμβεβεκότα” but also “ὑπαρχούσας”. It might be disputed whether “ὑπαρχούσας” in 491a9 occurs according to use (6) – this is my view –

<sup>38</sup> See other translations (Mignucci’s: “sarà delle cose”; Pellegrin’s: “portera sur”) and the paraphrasis in Ross 1949, 523. For similar occurrences of “ὑπάρχει” with dative complement with the force of “apply”, see *Metaphysics*, 1088a8, 1030a21.



or according to use (4), or even use (1). Thus, it might mean either “[differences] that are characteristic” (my view), or “[differences] that are true of their subjects”, or simply “[differences] that are real”.<sup>39</sup> But the fact is that, just three lines further ahead, “ὑπαρχούσης” in the expression “ὑπαρχούσης τῆς ἱστορίας” in 491a12 is employed according to use (3), which Thompson’s translation attempted to encode with this: “when the investigation is *complete*.”<sup>40</sup> Aristotle’s point is that the results of the investigation (ἱστορία) must be *previously available* for the method to follow its natural order. This is a different use of the same expression, but the competent reader reads them smoothly: there is no validity-spoiling shift.<sup>41</sup>

It would be boring to pursue this list too long. However, the opinion that shifting the use of an expression is unnatural (or sophistic) “in principle” is so entrenched that a few more examples will be useful (even if they do not give any decisive proof about *Prior Analytics*, I,30). In *Prior Analytics* I,32 Aristotle employs the word “ἀναγκαῖον” several times to mean something like “necessary consequence” (see 47a23.26.32.33.34.35). But this has not prevented him from using “ἀναγκαῖων” in a different way just four lines before, in 47a19: namely, as an adjective qualifying the premises of an argument, with the force of “needed or required for the targeted conclusion” – which is actually how he has used the adjective “ἀναγκαῖα” in *Topics*, 155b19.20.29.36 ff.<sup>42</sup>

In *Posterior Analytics*, 79a18, “ἐπιστήμια” was used with the force of *scientific disciplines* (such as geometry, arithmetic etc.), but just six lines ahead, in 79a24, “ἐπιστήμη” has the force of “cognition or grasp [of the definiens account of something]”.

In *Sophistical Refutations*, 179a37, “πράγμα” occurs as the correlate of “συμβεβηκός” in Aristotle’s discussion of the fallacy dependent on the *sumbebe-*

<sup>39</sup> CHARLES 2000, 315, understands *historia* as aimed at detecting “the relevant differentiating characteristics”, but prefers to take “ὑπαρχούσας” in 491a9 merely in the sense of “that exist”. Similarly, see LENNOX 2001b, 45, who translates “ὑπαρχούσας” as “present”.

<sup>40</sup> I guess this is also what LENNOX 2001a, 17, attempted to encode with “once” (“once there is an investigation etc.”).

<sup>41</sup> The occurrence of “ὑπαρχούσας” in 491a9 is a good reply to another possible objection, namely, that Aristotle does not seem to employ the expressions “ὑπάρχει” / “τὰ ὑπάρχοντα” with dative complement according to use (6) when conducting his own researches in the scientific treatises. But, actually, Aristotle has indeed resorted to use (6) when conducting his own investigations (besides 491a9): see *Generation of Animals*, 748a15; *De Anima*, 403b25 (a possible parallel: *Metaphysics*, 1028b8); a similar case can be made for *Physics*, 208a34 (if a dative is implicit, Aristotle is talking about the *features that properly characterize* place), as well as for *Parts of Animals*, 644b30.

<sup>42</sup> This shift is not controversial. See Smith’s and Striker’s translations. I am developing this point in a draft.

*kos*. It does not matter whether the force of “*πρᾶγμα*” is exactly “subject of predication” or “the object we are concerned with as the target of the paralogism”, for it is anyway different from the force of “*πρᾶγμα*” just seven lines ahead, in 179b5, where the word is applied to a statue and is equivalent to “*κτῆμα*” – to tell that it was not sculpted but only purchased by the answerer. (HASPER 2013 translates “object” and “possession”, respectively).

Finally, in *Metaphysics*, X,2 1054a10, we have two occurrences of “*φύσις*” in the same line, but with different forces: (i) the first occurrence has the force of something like *underlying thing*, as is clear from other occurrences in the previous discussion in the same chapter (1053b26), (ii) but the second occurrence has the force of *nature* as equivalent to *essence* or *essential being* of something, as again is clear from the previous discussion in the same chapter (see 1053b35–1054a1).

Now, in this case, the shift scandalizes purists so much that they tend to deny it. But actually the shift is *part of the argument* and sounds like a *pun against some version of Platonism*, which has claimed that (i) the One is a self-subsistent entity by being just this, One, and (ii) that the One is also the *essential being* of other things. Against the first point, Aristotle argues that we always say “one” of an underlying thing (i.e., *φύσις*, in 1053b26, cf. 1052b12), so that anything that is called “one” is inevitably called “one *F*” (where “*F*” is the sortal for the underlying thing): the one is not an underlying *φύσις* itself but always presupposes an underlying *φύσις*. This has a further consequence which becomes an objection against the second Platonist claim: the One, not being a self-subsistent thing by itself, cannot be the *essential being* (*οὐσία* in 1053b36, 1054a8, but *φύσις* in 1053b28 and indeed in 1054a10) of anything, including itself. In 1054a9–10, Aristotle recapitulates these two points: (i) what we take as *one* in any domain is actually *one F* (one *φύσις*), and (ii) the One itself cannot be the essence (*φύσις*) of anything. The fact that Aristotle uses the same word “*φύσις*” to make both points – to refer to the notion of an underlying thing *F*, and to refer to the notion of essential being of something – has a special flavour as a pun against his Platonic adversaries: “the One is not a *φύσις* by itself (rather, it always presupposes a *φύσις* different from itself), nor can it be the *φύσις* of anything!” Why would we believe, instead, that such a shift in the two occurrences of the same word is validity-spoiling? Quite to the contrary, each occurrence within the same line is retrieving and recapitulating different arguments, against Platonic claims (i) and (ii), respectively. And, even if there is some important connection between the two forces of “*φύσις*”, they are still distinct from each other.

## 10. Concluding Remarks: Fitting the Passage into Its Context

In *Prior Analytics* I,30, there is no pun against adversaries. But the shift in the use of “ὑπάρχει” and “ὑπάρχοντα” is more than welcome in its context: it is actually well motivated by Aristotle’s discussion.

The chapter is divided into two main parts. The first part (46a3–17) recapitulates Aristotle’s heuristic recommendations for finding the principles of syllogisms *in general* (cf. 46a10–11). These recommendations refer back to the method depicted in I,28 and, in general, depend on the notion of a middle term, as developed in I,26. I do not need to discuss the details of that method.<sup>43</sup> It is enough for me to say that it is natural for Aristotle to employ “ὑπάρχει” and “ὑπάρχοντα” in this context according to use (4), namely, with the force of “being attributed to a subject in a predication”, for this part of the chapter is exclusively concerned with a deductive method for predicative relations.<sup>44</sup> However, the second part of the chapter (46a17–30) moves to a different point and deals with a more delicate matter. Aristotle is not any more considering the general principles of syllogisms from a formal, abstract and, most importantly, topic-neutral viewpoint. His new issue is how to find out the appropriate principles of explanatory demonstrations within scientific disciplines. But instead of giving us a full-fledged account of the heuristic methodology for those explanatory principles, Aristotle confines himself to a few points.

Actually, the second part of the chapter starts with a straightforward and compressed point (46a17). Aristotle stresses that, in most cases, the explanatory principles of scientific demonstrations must conform to each explanandum – that is, they must be sensitive to, and respond to, what exactly each explanandum is. I take this to be the meaning of Aristotle’s key sentence at 46a17, which I read with Bekker: “ἰδίᾳ δὲ καθ’ ἕκαστον εἰσὶν αἱ πλεῖστα.” Aristotle employs the term “ἕκαστον” to refer to each explanandum within a given discipline, so that the expression “καθ’ ἕκαστον” is a predicate with the force of “in strict

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<sup>43</sup> For such a discussion, see STRIKER 2009, 195–201.

<sup>44</sup> In general lines, the method expounded in *Prior Analytics* I,26–29 follows the deductive machinery based on the categorical forms of Aristotle’s syllogistic. In *Prior Analytics* I,27 43b1–11, Aristotle adds predicative relations that go a little bit further, namely, the definitions and the propria. However, definitions and propria might still be insufficient to settle the appropriate principles for a given explanandum. If one is to explain (e.g.) why quadrupeds are long-lived, it would be helpful to collect their propria and to identify their definitions, but even so there might be something decisively missing in the explanatory story. See ANGIONI 2016, 152–161.

conformity to each [explanandum]” or “on the basis of each [explanandum]”.<sup>45</sup> Thus, this is my translation with paraphrasis of Aristotle’s compressed point: “particularly [i.e., within a particular domain], most of the [explanatory] principles conform to each explanandum.” It is this point that will be substantiated in the key passage I started with, 46a22–27. But before arriving at that passage, Aristotle develops a consequence of his compressed point – in the famous passage about astronomical experience (46a17–22).

Differently from standard interpretations, I do not take this famous passage (46a17–22) as making exactly the same point made in 46a22–27. On my view, Aristotle is just developing a consequence of his remark that explanatory principles must conform to each explanandum. Given his point, it follows that explanatory principles of scientific demonstrations are not a topic-neutral issue.<sup>46</sup> Inasmuch as they must conform to each explanandum, explanatory principles depend on the nature of the subject-matter – and this dependence is enough to settle that empirical acquaintance with the appropriate domain is required to attain them. This is what Aristotle is emphasising when he says that *empeiria* is in charge of handing down the principles to the scientist (in the sense of bringing the principles to the science’s court).<sup>47</sup> In order to attain the explanatory principles, it is not enough to rely on the abstract and general method portrayed in the previous chapters and resumed in the first part of I,30 – a method which is basically a topic-neutral deductive machinery. But this remark – that a scientist must have empirical acquaintance with a particular domain, besides mastering the deductive method – does not imply that *empeiria* is able to do all that is needed to attain the explanatory principles on which demonstrations depend.<sup>48</sup>

<sup>45</sup> Unfortunately, the full discussion of this interpretation would require a different paper.

<sup>46</sup> As highlighted by LENNOX 2011, 28.

<sup>47</sup> The verb “παροδοῦναι” need not be taken in the sense of “furnish”, “provide”. The same verb covers (e.g.) the action of delivering a prisoner to the court – and Aristotle seems to be resorting to a similar force of the verb. This interpretation is compatible with the epistemic reach Aristotle usually attributes to *empeiria*. Far from being able to *establish* the principles, *empeiria* just collect the *phainomena* and is not able to tell the causes (see HASPER – YURDIN 2014, 125–126). Even if the *phainomena* can include what seems to be an explanatory principle at that stage, whether those *phainomena* are the appropriate principles is an issue to be settled in a higher court of scientific expertise.

<sup>48</sup> Contrary to standard interpretations, I do not take Aristotle’s remarks at 46a20–21 as equivalent to his claim at 46a22–27. There is no room to discuss whether “φαινόμενα” (46a20) is equivalent to “ὑπάρχοντα” (46a23.25). Unfortunately, I must skip this issue. It is enough for me to argue that the whole message of 46a20–21 is simple: Aristotle just says that a satisfactory

Thus, in my initial passage (46a22–27), Aristotle is going further than this – resuming the main point announced in 46a17. Explanatory principles within each discipline are those that stick to what each explanandum is. Consequently, in order to attain them, the researcher must aim at identifying those attributes that are really important to characterise each explanandum as the explanandum it is. Now, this is a more exacting step in scientific research, which goes further than having *empeiria* with the appropriate domain.

This surveying of the overall structure of the chapter helps us understand how Aristotle’s shifting language is suited to its context. The passage (46a5) in which “ὑπάρχει” and “ὑπάρχοντα” were employed according to use (4) belongs to a part of the discussion that has terminated in 46a17. Thus, Aristotle can feel perfectly comfortable to employ “ὑπάρχοντα” according to use (6) in 46a23.25. But there is more than mere comfort. It is somehow convenient for Aristotle to phrase his point in 46a22–27 in the way he has phrased it. He starts with an expression (“τὰ ὑπάρχοντα περὶ ἕκαστον”, 46a23) which resembles the one employed in the beginning of the chapter (“τὰ ὑπάρχοντα περὶ ἑκάτερον”, 46a5), when he recapitulated the abstract method for finding the principles of syllogisms. But the resemblance of the expressions is superficial. There, “ἑκάτερον” was referring to the terms (both subject and predicate) of a problem within the framework of the general method developed in the previous chapters. On its turn, “ἕκαστον” in 46a23 refers to the notion of an explanandum with predicative form.<sup>49</sup> There, Aristotle was only concerned with finding middle terms for deductions. But from 46a17, Aristotle is concerned with explanations – which are deductions in which the middle term must capture what is appropriately explanatory of the conclusion. Thus, in order to make his point clearer, Aristotle rephrases it, in 46a24–25, with a more emphatic language: “πράγματα” replaces “ἕκαστον”, and the key expression “ὑπάρχοντα”, employed according

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collection of *phainomena* is a *sine qua non* condition for finding out explanatory demonstrations – but this does not imply that a satisfactory collection of *phainomena* would be sufficient to attain the explanatory demonstrations. I thank an anonymous referee, István Bodnar and François Nolle for stressing this issue.

<sup>49</sup> There is a further objection against the traditional way of taking “πράγματα” (46a25) and “ἕκαστον” (46a23) in the sense of subject of predication (or subject-matter): not even in the topic-neutral deductive method recapitulated at 46a3–17 one should focus *only* on the subject of predication. As Aristotle makes clear, the method is *problem-sensitive*, so that one must collect list of terms connected with the predicate of the problem too – and this is encoded in the use of “ἑκάτερον” (i.e., each of the two terms of the problem, the subject and the predicate) at 46a5. Now, if one must pay attention to *both* terms of the problem even in the topic-neutral deductive method, why one should limit herself to “the attributes of the subject” when the issue is the more complicated task of finding explanations?

to uses (6) and (5), is modified with the intensifier “ἄλληθῶς”. Aristotle attempts to clarify that his point is not focused on all the predicates that are merely true of their subjects: he is now talking about the most important subset of them, namely, those predicates that introduce features really important to characterise each explanandum as the exact explanandum it is.

In this picture, it is fair to say that, if our investigation collects a sufficient number of features of that kind, our path towards the explanatory principles will be easier.

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## Summary

In *Prior Analytics*, I,30, Aristotle seems much too optimistic about finding out the scientific principles. He seems to say that, if our empirical collection of facts in a given domain is exhaustive or sufficient, it will be easy for us to discover the explanatory principles in the domain. However, there is a distance between collecting facts and finding out the explanatory principles in a given domain. In this paper, I discuss how the key expression in the sentence at 46a25 should be interpreted: “the true characteristics of things” (τῶν ἀληθῶς ὑπαρχόντων τοῖς πράγμασιν). I argue that, on a more accurate interpretation of the expression, Aristotle’s point would cease to look like a piece of naïve or even silly optimism.

Keywords: Aristotle; scientific explanation; scientific method

LUCAS ANGIONI  
University of Campinas  
Department of Philosophy  
Rua Cora Coralina, 100  
Cidade Universitária Zeferino Vaz, Barão Geraldo  
Campinas-SP, 13083-896  
Brazil  
angioni.lucas@gmail.com



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Centre for Classical Studies at the Institute of Philosophy of the  
Czech Academy of Sciences

Na Florenci 3

110 00 Prague 1

Czech Republic

tel.: +420 234 612 330

fax: +420 222 828 305

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