Aristotle's *Metaphysics* Z
from the Standpoint of a Theory of Definition

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I certify that all material in this thesis which is not my own work has been identified and that no material has previously been submitted and approved for the award of a degree by this or any other University.

Signature: ……..

Abstract

This thesis is about the problems and the arguments presented in book Z of Aristotle's *Metaphysics.* In Z, Aristotle sets out an enquiry into the first genus of entities: substance. The solution is meant to contribute to the foundation of metaphysics. I suggest that metaphysics is conceived to be a demonstrative science and Z is the enquiry to establish its principle by answering what substance is. Accordingly, the most promising way to engage with Z is to establish a correspondence between substance and definition. Substance is the entity that grounds the existence of the other entities just as a definition is the statement that grounds the demonstrations conducted in a science.

Chapter One and Chapter Two outline a theory of definition for my discussion of Z. In the light of the logical works, I argue that Z's enquiry is concerned with two issues about substance: primacy and unity. Chapter Three and Four are concerned with the primacy of substance. My contention is that Z.4-11 develops a formalist essentialism that is designed to ensure the primacy of substance. If substance is defined as essence and identified with form, then substance turns out to be primary. Chapter Five and Six are concerned with the unity of substance. My contention is that the difficulties raised in Z.13-14 lead to the failure of the enquiry. There is no way to ensure the unity of substance and thus to define it; consequently there is no way to establish the principle of metaphysics. This does not mean that Z fails to contribute to the foundation of the science of being. Its results enable the enquirer to give a derivative definition of some objects of metaphysics: sensible substances. In order to accomplish the project, the enquiry has to focus on some suprasensible substance, whose definition will posit the immediate principle of the totality of entities.

Contents

Abbreviations

Categoriai	*Cat.*
De Interpretatione	*De Int.*
Analytica Priora	*An Pr.*
Analytica Posteriora	*An. Post.*
Topica	*Top.*
Elenchi Sophistici	*Soph. El.*
Physics	*Phys.*
De Caelo	*De Cael.*
De Generatione et Corruptione	*De Gen. et Cor.*
De Anima	*De An.*
Metereologica	*Met.*
De Sensu	*De Sen.*
De Partibus Animalium	*De Part. An.*
De Generatione Animalium	*De Gen. An.*
Metaphysica	*Metaph.*
Ethica Nicomachea	*Eth. Nic.*
Ethica Eudemia	*Eth. Eud.*
Ars Rhetorica	*Rhet.*
Phaedo	*Phaed.*
Respublica	*Resp.*
Parmenides	*Parm.*
Sophista	*Soph.*
Politicus	*Pol.*
Philebus	*Phil.*

καὶ δὴ καὶ τὸ πάλαι τε καὶ νῦν καὶ ἀεὶ ζητούμενον
καὶ ἀεὶ ἀπορούμενον, τί τὸ ὄν,
τοῦτό ἐστι τίς ἡ οὐσία.
Metaphysica, Z.1, 1028b2-4.

ἔδοξε δή μοι
χρῆναι εἰς τοὺς λόγους καταφυγόντα
ἐν ἐκείνοις σκοπεῖν τῶν ὄντων τὴν ἀλήθειαν.
Phaedo, 99e4-6

Introduction

Philosophers are keen on definitions. On the one hand, this interest stems from their engagement in dialectical disputes; a definition represents a thesis to either attack or defend in order to establish cogent points about a certain subject. On the other, it stems from their engagement in the study of reality; a definition is the account of what an object is and, thus, the linguistic form taken by our knowledge of it. This work takes advantage of the philosophical significance of definitions in order to address book Z of Aristotle's *Metaphysics*. In Z, Aristotle sets out an enquiry into the first genus of entities: substance. This enquiry is meant to develop the science of being, which is the most eminent and universal knowledge of entities and traditionally labelled 'metaphysics'. I intend to discuss the problems and the arguments of Z in the light of the views on definition held by Aristotle. The methodological insight behind this project is quite simple: since Z is conceived to establish the principle of a demonstrative science, the enquiry into what substance is corresponds to the enquiry into a definition. For *substance is the entity that grounds the existence of other entities just as a definition is the statement grounding the demonstrations within a science*.

There are two ways to undertake this project. At a general level of analysis, the correspondence obtains between **substance and a general concept of definition**. Substance is the genus of entities grounding the existence of the other entities studied by metaphysics; definition is the statement that grounds the demonstrations conducted in a science. A general concept of definition contributes to our understanding of the principles of every science and, thus, to our understanding of the principle of metaphysics, i.e. what substance is. Since a definition is the linguistic counterpart of the principle of a science, the salient traits of the former can be illustrative of the salient traits of the latter. At a less general level of analysis, the correspondence obtains between **substance and its own definition**. Since substance is an entity and definition is the statement accounting for it, they indicate one single thing: the principle of metaphysics.

Substance is an entity grounding the existence of other entities; its definition is the statement grounding the demonstrations conducted in metaphysics. Likewise, since the definition of substance is the linguistic counterpart of substance itself, the examination of the former contributes to our understanding of the latter.

For my discussion of Z's enquiry, I will rely on the general version of this correspondence. Accordingly, I will address the problems and the arguments about substance on the basis of the concept of definition held by Aristotle and applying to every demonstrative science. In other words, I take definition to be the linguistic counterpart of substance qua genus studied by a science and not qua genus studied by metaphysics. The methodological value of this insight can be appreciated in the light of the structure of Aristotelian science. Every science studies a genus of entities and its demonstrable attributes. The knowledge of the genus of entities consists of the definitions of the primary objects of the science; the knowledge of their attributes consists of the demonstrations about the secondary objects of the science. The principle grounding the science corresponds to the definition of the genus studied.[1] Metaphysics studies the genus of substances and its demonstrable attributes. Namely, substances are the primary objects, while non-substances (i.e. the entities belonging to other genera, such as quality, quantity, etc.) are the secondary objects of the science. Since the principle grounding a science corresponds to a definition accounting for a genus of entities, Z's enquiry amounts to the enquiry into a definition; for it is the enquiry to answer what substance is and, thus, to establish the principle of metaphysics. My work engages with the treatment of substance by looking at the features of the linguistic counterpart of every principle: definition.[2]

This does not mean that the less general version of the correspondence is not relevant to Z's enquiry. In several chapters, Aristotle easily shifts from the

[1] The other principles are axioms and hypotheses. Axioms are general laws applying to every science (e.g. the law of non-contradiction); hypotheses are assumptions of the existence of the subject of demonstration. Cf. Section 1.3.

[2] As will be shown, Aristotle does not separate the use of 'substance' to refer to the genus from the use to refer to the primary objects in metaphysics (e.g. human, horse, etc. Cf. Section 2.2). To preserve this ambiguity, I will not use any article to refer to the substance enquired in Z and, thus, to the definition that corresponds to substance. My use of the article will be limited to the substances encompassed in the first genus of entities, this, however, implies neither that these substances are species (e.g. human, horse) nor that they are individuals (e.g. Socrates, Bucephalus). Accordingly, I will also avoid the use of the article to refer to the genus and to the primary objects studied by any science; for example, I will speak of 'the definitions of celestial body and of moon' rather than 'the definitions of a celestial body and of the moon'.

examination of entities (ὄντα) to the examination of the statements (λόγοι) accounting for them. This tendency is in fact part of a logical strategy to answer what substance is. The key point is that the enquiry involves the examination of the entities belonging to the genus studied, i.e. substances. Since substances are the primary objects of metaphysics and are accounted for as by definitions, much of Z turns out to be an examination of the definitions of substances. In enquiring into the principle of metaphysics, Aristotle finds it reasonable to analyse the definitions of the objects studied by metaphysics. On a first step, his concern is to separate the definitions of substances from the definitions of non-substances. This result is achieved in Z.4-6 by looking at the predicative relations held between these statements and thus corresponding to the relations held between the entities signified. On a second step, his concern is to spell out the parts of the definitions of substances. This mereological analysis is conducted in Z.10-16 and is expected to pave the way toward substance. In a nutshell, Z makes a logical turn in order to reach the definition grounding the whole science; namely to account for the genus grounding the existence of the other entities studied in metaphysics.

Therefore, whereas my strategy to engage with Z's enquiry is to rely on the correspondence between substance and the concept of definition, Aristotle's own strategy–in large portions of the book–is to rely on the correspondence between substance and its own definition. What is remarkable is that these strategies turn out to overlap. Indeed, since the definition of a substance not only does account for but also signifies the substance defined, the problems about definitions are the linguistic counterparts of the problems about substances. The treatment of unity is extremely illustrative of how the correspondence takes place. In order to explain why every substance is one entity and not a plurality of constitutive parts, Aristotle simultaneously attempts to explain why every definition is one statement and not a plurality of predicates, i.e. genus and differentia; despite consisting of many terms, a definition must be one statement as it signifies one object.[3] In enquiring into the principle of metaphysics, Aristotle is then after the primary substance and the statement signifying it; the former grounding the existence of the other entities, the latter grounding the relevant demonstrations.

[3] See my treatment of Z.12 and H.6 in Section 6.2.

In order to undertake this project, it is then essential to acknowledge the demonstrative character of the science of being. *Metaphysics is a demonstrative science that articulates into principles and demonstrations*. According to the guidelines of the *Analytics*, every science is demonstrative in that it studies a genus of entities, which is the subject of some demonstrable attributes. Arithmetic, for example, studies the genus of numbers (which is a sub-genus of quantity) and its demonstrable attributes (e.g. odd/even). Within a science, the demonstrations prove the belonging of the relevant attributes to the subject (i.e. that the subject is so-and-so characterized) on the basis of the principles concerning the subject: the hypothesis of its existence and its definition.[4] To illustrate, within astronomy the demonstration of eclipse proves the belonging of being eclipsed to the moon (which is encompassed by the genus of celestial bodies) on the basis of the hypothesis that moon exists and the statement of what moon is. At a general level, the subject-matter of metaphysics is being, which encompasses the totality of the genera to which entities belong: the genus of substances (e.g. animal, human), the genus of quantities (e.g. number, three), the genus of qualities (e.g. colour, white), etc. At a less general level, the subject-matter of metaphysics is substance, which is the first genus of being (i.e. the genus of substances); for non-substances ontologically depend upon substances. Accordingly, metaphysics is demonstrative in that it studies substance, which is the subject of the relevant demonstrations, and the other genera of entities, which are the demonstrable attributes of substance. Within metaphysics, the demonstrations prove the belonging of non-substances to substances (i.e. that a substance is so-and-so characterized) on the basis of the principles concerning substance: the hypothesis that substance exists and the statement of what substance is.

The key point is that the object of a science can be specified in terms of either its principle, or its subject, or the relevant demonstrable attributes. Physics is the science of nature (φύσις), which is the principle of its demonstrative knowledge. Besides, physics is the science of bodies, which are the subjects of the demonstrative knowledge and are encompassed by a sub-genus of substance. Finally, physics is the science of motion, that is of every demonstrable attribute characterizing natural bodies. Broadly, the term being (τὸ ὄν) indicates the

[4] Demonstrations are also grounded in axioms, the general laws applying to every science. See Section 1.3.

subject and the demonstrable attributes studied in metaphysics; the term substance (οὐσία), instead indicates both the subject and the principle.[5] Like any other science, metaphysics consists of hypotheses and definitions about the genus of substances and of the demonstrations about the remaining genera. Remarkably, the primacy of the principles grounding the demonstrations perfectly corresponds to the primacy of substance grounding the existence of other entities. To illustrate, the existence of a quality is grounded in a substance just as the demonstration that there is such-and-such a quality is grounded in the hypothesis and definition of a substance. Indeed, the demonstration does prove that there is such-and-such a qualified substance. Z's enquiry attempts to establish the principle of metaphysics by answering the question 'What is substance?'. The solution will lead Aristotle to account for the entity grounding the existence of other entities and thus to accomplish the foundation of the demonstrative science of being.[6]

Given that, the most promising source to engage with Z's enquiry is Aristotle's *Organon*. *The logical works provide us with the theoretical basis to exploit the correspondence between substance and definition*. This collection of treatises is concerned with the formal features of statements and arguments about any object. Since substance is the object of a demonstrative science, and since definition is the statement accounting for the object of demonstrative sciences, the logical works are likely to outline the 'theory of definition' against which to address Z's enquiry. Rather than a coherent system of ideas, they offer an overview of Aristotle's concept of definition; each methodological context is indeed illustrative of some features and functions that pertain to definitions. If my approach is sound, the logical works can give us an insight into those issues that are central in Z's enquiry. That is, the problems about substances in Z can be discussed by looking at the problems about their linguistic counterparts.

Two contexts, I contend, are salient for my project: dialectic and science. Dialectic is the procedure to deliver arguments on the basis of common opinions.

[5] The identity of οὐσία as principle and οὐσία as genus and subject of demonstrations follows from the identity between definiens and definiendum. The principle indicated by the definition and the subject indicated by the genus must be one and the same thing. Cf. note 2 above.

[6] This is the reason why the argument of the *Metaphysics* does not possess the features of a demonstrative science yet. The developmental character of the project has salient implications. Whilst Aristotle makes it clear that the genus of substances is prima facie co-extensive with the genus of bodies (i.e. sensible substances) studied by physics, its demonstrable attributes are still obscure. These cannot be the motions studied by physics; for they do not belong to sensible substances qua sensible substances, but to substances qua substances.

Much of this procedure is devoted to the examination of argumentative theses, such as definitions. Thus, it provides us with a formal characterization of the statement that accounts for the objects of metaphysics. Science is the set of guidelines for the systematic organization of demonstrative knowledge expounded in the *Posterior Analytics*. As already suggested, it is illustrative of the role of definition for knowledge; for definition is one of the principles of a science and the statement accounting for its objects. Overall, Aristotle is concerned with two fundamental issues: the primacy and the unity of definition. **The primacy of definition** is the immediate character of the statement; since definition must be the principle of demonstrative knowledge, it cannot be mediated by another statement and thus be object of demonstration itself. **The unity of definition** is the predicative oneness of definition; since there must be identity between the definiens and the definiendum, definition must be one statement of some predicate(s) signifying one object and not many. In Z's enquiry, Aristotle is bound to deal with the counterparts of these issues; for he is attempting to establish a principle that must be credited with the corresponding primacy and unity.

In this work, I shall start with defending the demonstrative character of metaphysics and the conception of substance as the cause of other entities.[7] Subsequently, I shall engage with Z's enquiry in the light of my theory of definition. I will argue for the following theses:

I. Aristotle endorses a formalist essentialism to solve Z's enquiry: substance is defined as essence and identified with the form of substances.

II. Aristotle acknowledges the failure of Z's enquiry: there is no way to define substance and to establish the principle of metaphysics.

III. Aristotle acknowledges the contribution of Z's enquiry: the definition of sensible substances enables the enquirer to envision the principle of metaphysics.

Chapter Three and Four argue for (I) by connecting the development of essentialism with the treatment of primacy. In particular, I will focus on Z.4-6 and

[7] These are the themes treated in Chapter One and Chapter Two.

Z.10-11, in which Aristotle examines the definition of substance as essence by looking at the definitions in metaphysics. My contention is that the definition as essence is a promising solution to Z insofar as it ensures the primacy of substance. This leads to identifying the principle of metaphysics with the form of substances. Chapter Five and Six argue for (II) and (III) by connecting the problems of the enquiry with the treatment of unity. In particular, I will focus on Z.13-14 and Z.17, in which Aristotle questions and restores the possibility of metaphysics by looking at the possibility of definitions in metaphysics. My contention is that the failure of Z's enquiry is tied to the failure to ensure the unity of substance. This leads to dismissing the formalist essentialism and to use the results of Z to envision the principle of metaphysics.

At the end of the day, Z's enquiry turns out to be a philosophical exercise in metaphysics. Different views about the principles grounding the existence and the nature of the totality of objects are examined, defended, and rejected. In this context, hylomorphic essentialism perhaps represents the most interesting conception to ground the science of being and still a partial, if not invalid, solution. Accordingly, Z is neither a fully-fledged science nor a purely dialectical argument. It is not a fully-fledged science in that it does not reach the principle and thus complete the foundation of metaphysics; it is not a dialectical argument in that its examinations are meant to develop a demonstrative knowledge.

Chapter One

The Logic of Definition

In *Metaphysics* Z, Aristotle sets out an enquiry to answer a definite question: *what is substance?* (τίς ἡ οὐσία). This enquiry is part of the larger project outlined in book A, in which Aristotle announces that he will pursue some knowledge of principles and causes. Later commentators and philosophers called this knowledge 'metaphysics'.[1] The purpose of Chapter One is to set up the theoretical basis for my discussion of Z's enquiry. The most promising approach to Z is, I will argue, to establish a correspondence between substance and definition. Substance is the principle of the objects studied by metaphysics just as definition is the principle of the demonstrations conducted within a science. Hence, the problems and the arguments about definition are the linguistic counterparts of the problems and the arguments about substance.[2]

In so arguing, I will firstly defend the demonstrative understanding of Aristotle's project. In accordance with the guidelines of the *Analytics*, metaphysics is a demonstrative science (ἐπιστήμη) that articulates into principles and demonstrations about its subject-matter. Therefore, Z's enquiry is neither dialectical nor aporematic; for its aim is to ground a demonstrative science by establishing its principle, i.e. what substance is. Secondly, I will take advantage of the correspondence between substance and definition to outline the framework of Z. In the light of the treatment of definition found in the *Organon*, I shall suggest that Aristotle is bound to deal with two issues: primacy and unity. Primacy is the *immediate character* of definition; since a definition must be the principle of demonstrative knowledge, it cannot be mediated by another statement and be the object of demonstration itself. Unity is the *predicative oneness* of definition; since there must be identity between the definiens and the definiendum, definition

[1] Henceforth, I shall use 'metaphysics' to mean the form of knowledge Aristotle labels 'wisdom' (A.1, 982a1-2) and 'first philosophy' (E.1, 1026a29-31).
[2] For this methodological insight, see also the Introduction.

must be one statement of some predicate(s) signifying one object and not many. If my hypothesis is correct, the ‘theory of definition’ gathered from the logical works is crucial to Z’s enquiry; for Aristotle is attempting to establish a principle that must be credited with the corresponding primacy and unity.

1.1 Metaphysics: the Demonstrative Science of Being

This section will be focused on the nature of the philosophical project to which Z’s enquiry belongs. Contrary to the majority of the interpreters, I shall argue that Aristotle conceives his metaphysics as a demonstrative science. In other words, metaphysics is designed to be a systematic knowledge articulated into demonstrations about a definite subject-matter. This does not mean that the work named *Metaphysics* presents us with a fully-fledged science. The *Metaphysics* is aimed to develop such a science by investigating some principles and causes; for these will ground the demonstrations conducted within metaphysics. Given its epistemic framework, I contend that Z’s enquiry into substance is to be understood as the enquiry to establish the principle of a demonstrative science. On this basis, it is possible to adopt the innovative approach to Z I outlined in the Introduction. Since definitions are the principles of demonstrative sciences, and since what substance is is the principle of metaphysics, the problems concerning what substance is will be the counterparts of the problems concerning definitions. There are two major contributions with this approach. Firstly, I will make a fruitful use of Aristotle’s views on definitions within metaphysics. Definitions will not only be treated as accounts of what an entity is, but also as the statements of which metaphysics consists. That is, I will shed light on their function within the relevant science. Secondly, I will offer an enlightening way to address book Z. My approach will enable us to make sense of the relationship between this work and the logical treatises of the *Organon*, which has been widely recognized by commentators, though not sufficiently examined.

1.1.1 What is Metaphysics? Some Interpretations

As outlined in the initial chapters of book A, the project undertaken in the *Metaphysics* is to illustrate the highest form of knowledge. This must be a science concerning the first principles and causes and is the knowledge to which I will refer as 'metaphysics'. The turning point of this project is considered to be at Γ.1-2. The science of first principles is identified with the science of being qua being. Basically, metaphysics studies the totality of entities without limiting its study to any definite genus. This marks the peculiarity of metaphysics. Every other science is concerned with a genus of entities. For example, mathematical sciences are concerned with quantities. Metaphysics, by contrast, is concerned with no genus of entities in particular, but with being as a whole.

Being divides into a plurality of different genera that hinders its treatment as a unified object of study. This **multiplicity of being** can be understood in terms of two categorial classifications:

	Substance	Quality	Quantity	Place	Etc.
What-it-is					
What-it-is-like					
How-much-it-is					
Where-it-is					
Etc.					

On the horizontal bar, the ontological categories classify entities by indicating the most universal genus to which they belong. On the vertical column, the predicative categories classify predications by indicating the most universal genus according to which a predicate is attributed to a subject.[3] The study of an

[3] This distinction is established in *Topics* I.9, in which Aristotle suggests that the items in the predicative categories can signify any of the items in the ontological categories. For example, the predicate 'colour' belongs to the category of what-it-is and signifies a quality, such as white. For this distinction see Ackrill (1963: 77-81), and Frede (1981). As observed by Ackrill, Aristotle tends to conflate the two classifications (cf. Mansion, 1946: 49-61). This is evident in Z.1 (1028a13-15), in which every predicative category simply signifies the corresponding ontological category (what-it-is/substance; how-much-it-is/quantity, etc.; cf. Bostock, 1994: 52-55; 65-66). My analysis will explain why in metaphysics the two classifications end up with overlapping.

object is confined to a definite genus of entities. That is, it is concerned with what can be predicated of the object within the same vertical column. For example, the study of number is confined to the genus of quantities and is concerned with what number is, what number is like (e.g. odd/even), etc. The possibility of metaphysics is then tied to a key problem: how can being be the genus studied by a science? The study of being looks impossible because it could not be confined to any genus of entities. Since an entity can be a substance, or a quality, or a quantity, etc., its study ranges over the horizontal bar. To illustrate, while the object of arithmetic is studied within the genus of quantities, the object of metaphysics is immediately pluralized into different genera. Likewise, 'to be' or 'is' can be attributed to a subject to signify either what it is, or what it is like, or how much it is, its study ranges over the vertical bar. To illustrate, while the attribute 'odd' is predicated of number to signify what it is like, 'is' is predicated of everything to signify any of the senses of 'to be'.

Commentators have widely debated about the solution given by Aristotle to override the multiplicity of being. Besides guaranteeing the possibility of metaphysics, this solution will also be illustrative of the nature of this science. That is to clarify whether metaphysics is a standard type of science consisting of demonstrations about its subject-matter or it represents a special form of knowledge.

Let me proceed with a review of the main positions held in the recent past. In the 1960s, Gwil Owen proposed a first interpretative line according to which metaphysics is not a demonstrative science, such as mathematics, biology, etc. Rather, it is a general study of being that Aristotle develops from his dialectic. Dialectic is the procedure to deliver arguments on the basis of common opinions. In order to conduct the study of such a heterogeneous object, metaphysics offers a dialectical treatment that does not aim at scientific proofs; it simply attempts to make cogent points by examining common views. In a nutshell, metaphysics turns out to be a dialectical science. At the core of this thesis is the doctrine of the focal meaning to explain how being can be treated as a genus by metaphysics. In *Metaphysics* Γ.2, Aristotle suggests that the science of being is still possible by virtue of the common dependence of its object upon substance (1003a33ff.). This is the πρὸς ἕν relation of every entity to substance. Basically, although being is not a genus, it can be treated as a genus because the nature of substance is the focus of the studies of the differentiated natures of the

remaining entities (henceforth, non-substances). To use Aristotle's example, the study of quality is related to the study of substance in the same way as the study of something healthy (e.g. a tool, an action) is related to the study of health.

It is important to highlight that there are two ways to understand this doctrine. Owen takes the πρὸς ἕν relation to apply to the senses of 'to be'. This approach presupposes an interpretation of the multiplicity of being in terms of predicative categories. Thus, 'to be a substance' means something different from 'to be a quality' and 'to be a quality' means something different from 'to be a quantity' and so on. However, the sense according to which a non-substance 'is' depends upon the sense according to which a substance 'is'. Owen takes then Aristotle to introduce the πρὸς ἕν relation to restrict the analysis of the many senses of being to the analysis of 'being a substance'. Alternatively, the πρὸς ἕν relation is taken to apply to the genera of entities that are found in reality.[4] This approach presupposes an interpretation of the multiplicity of being in terms of ontological categories. Thus, substances, qualities, quantities etc. belong to different genera and possess different natures. However, every non-substance is either a quality, or a quantity etc. of a substance and thus depends upon its nature. Accordingly, the πρὸς ἕν relation is introduced to highlight the core dependence of each non-substantial genus upon the genus of substances.

Be that as it may, the conception of metaphysics as dialectical science gathered large currency in the scholarship.[5] In his *Aristotle's First Principles*, Terrence Irwin argues that metaphysics consists of the study of the principles of being, which can only be developed through 'strong dialectic'. Unlike 'pure dialectic', the strong dialectic is a systematic discussion of common beliefs achieving scientific truths. In this way, Aristotle is able to provide an objective foundation for his knowledge of principles without appealing to any demonstrative argument and thus triggering an epistemic regress. Thanks to the πρὸς ἕν relation of every entity to substance, it is possible to achieve the principles of and the axiomatic conditions on the totality of the genera of being.

In the 1980s, some commentators proposed an alternative interpretative line. What separates metaphysics from demonstrative sciences is not its nature but its method. Basically, since metaphysics adopts dialectic for the examination of its

[4] See Irwin (1988: 154-161), Loux (1991: 17ff.), and Bostock (1994: 45-48), Galluzzo (2013a: 21-27).
[5] See especially Aubenque (1972) and Irwin (1988).

subject-matter, it turns out to be completely different from any other science. However, this does not undermine the scientific character of the project set out by Aristotle. To begin with, Michael Frede suggests that the science of being consists of a series of studies that possess only generic continuity.[6] These studies concern everything that there is and are part of a genuinely scientific project, in which the study of the divine entities (i.e. theology) represents the most important section because it concerns the kind of entities with reference to which every other kind has to be studied. Similarly, Charlotte Witt attempts to show that while metaphysics is not a dialectical science, it still uses a dialectical method.[7] This procedure is meant to work out the materials that would be later arranged scientifically. In this way, metaphysics turns out to be science that investigates the key concepts in each science. A salient development in this phase of the scholarship comes with Burnyeat's *A Map of Metaphysics Zeta*.[8] Despite being mostly focused on the seventh book, this monograph offers interesting observations about the nature and the method of metaphysics. In particular, Burnyeat defends the positive task fulfilled by the enquiry into substance. Within this treatment, Aristotle makes abundant use of dialectical remarks that enable him to discard the invalid theses about substance and to offer a pre-scientific picture of the knowledge of entities.

Finally, it is interesting to consider two more interpretative lines advocated by scholars in the recent years. Both Code and Menn propose to illustrate Aristotle's project from its original viewpoint.[9] The metaphysics has to be primarily understood as the science of principles and secondarily as science of being. As argued by Code, this general study is conducted by examining the causes of being qua being and provides a system of formal conditions that govern the most basic entities. The possibility of treating being as a genus is still the focal relation to substance. Substance is indeed the cause of the being of the other entities and Z's enquiry is aimed at specifying this cause.[10] In a similar vein, Menn takes the *Metaphysics* to offer an analysis of the principles that are dialectically tested and mostly rejected. Aristotle is then committed to challenging and refuting the views on primary causes held by previous philosophers. The argument of Z attempts to

[6] See Frede (1987: 84-85). Cf. Patzig (1960).
[7] See Witt (1989: 7-14; 25-31).
[8] See Burnyeat (2000).
[9] See Code (1997) and Menn (2001).
[10] See Code (1997: 369).

demonstrate that no substance – neither the substance defended by Pre-Socratics' nor the substance defended by Platonists' – is a valid principle.

1.1.2 Textual Evidence

As mentioned, I intend to show that Aristotle's metaphysics has to be conceived as a demonstrative science. My first concern is then to prove that the nature of metaphysics is not dialectical. To this effect, let me start with recalling some salient textual evidence. At *Metaphysics* Γ.2, 1004b22ff., Aristotle explicitly opposes dialectic to philosophy, i.e. metaphysics.

> Dialectic and sophistry turn on the same class of things as philosophy. However, philosophy differs from dialectic in the nature of the faculty required and from sophistry in respect of the purpose of life. Dialectic is indeed tentative (peirastic) where philosophy is true knowledge (*Metaph*. Γ.2, 1004b22-26).[11]

> περὶ μὲν γὰρ τὸ αὐτὸ γένος στρέφεται ἡ σοφιστικὴ καὶ ἡ διαλεκτικὴ τῇ φιλοσοφίᾳ, ἀλλὰ διαφέρει τῆς μὲν τῷ τρόπῳ τῆς δυνάμεως, τῆς δὲ τοῦ βίου τῇ προαιρέσει· ἔστι δὲ ἡ διαλεκτικὴ πειραστικὴ περὶ ὧν ἡ φιλοσοφία γνωριστική.

Both dialectic and metaphysics consists of arguments about the same object: the totality of entities. Consequently, their treatments are not confined to a single genus of being, but concern whatever can be categorially classified. The point is that whereas the arguments of metaphysics do express some form of knowledge, the arguments of dialectic do not. Dialectic is a procedure to test and examine theses by looking at reputable opinions and, as such, does not produce any knowledge about its object. To use Aristotle's terminology, dialectic is peirastic. Metaphysics, by contrast, is primarily 'true knowledge' of something. Therefore, it cannot be a test about its object of study; for a test does not represent any truth, but either corroborates or rejects a given thesis. On a first level of reading, Aristotle separates two methods to conduct a certain intellectual activity: the one involves testing theses, the other does not. On a second level of reading, dialectic and metaphysics turn out to be separated in nature. While there is no definite

[11] Unless otherwise noted, all translations are from Barnes (1984) with minor changes.

content that can be dialectically organized into a permanent body of knowledge, this does not apply to metaphysics. Arguably, the content of metaphysics can be organized into definitions and demonstrations expressing some true knowledge.

However, Aristotle does not make this explicit in the passage. Following Owen's reading, some scholars propose reconsidering the text by contrasting two forms of dialectic, rather than dialectic and science.[12] Irwin, for example, takes Aristotle to oppose the pure dialectic of the *Organon* to the strong dialectic of the *Metaphysics*. While the pure dialectic is the traditional treatment of arguments by means of attacking and defending schemes, the strong dialectic is a procedure to establish indisputable truths. The distinction lies in the fact that metaphysics studies the totality of entities insofar as it studies the first principles. Since no principle of a science can be established by the very same science (on pain of circularity), Aristotle conceives his metaphysics as a refined treatment of the totality of entities by which to ground scientific knowledge. It does not test reputable opinions, but delivers cogent arguments applying to every genus of being. There are a couple of passages that prevent us from endorsing this reading.

1) From this it is clear too that those people are silly who think they get their principles correctly if the premise is reputable and true […] For it is not what is reputable or not that is a principle, but what is primary in the genus about which we demonstrate something (*An. Post*. I.6, 74b21-25).

   δῆλον δ' ἐκ τούτων καὶ ὅτι εὐήθεις οἱ λαμβάνειν οἰόμενοι καλῶς τὰς ἀρχάς, ἐὰν ἔνδοξος ᾖ ἡ πρότασις καὶ ἀληθής […] οὐ γὰρ τὸ ἔνδοξον ἡμῖν ἀρχή ἐστιν, ἀλλὰ τὸ πρῶτον τοῦ γένους περὶ ὃ δείκνυται.

2) It is also clear that the question 'what is it?' is not dialectical either. For the question must give one the choice of stating whichever side of the contradiction one wishes. However, the questioner must specify further and ask whether human is this or not this (*De Int*. 11, 20b27-30).

   ἅμα δὲ δῆλον ὅτι οὐδὲ τὸ τί ἐστιν ἐρώτησίς ἐστι διαλεκτική· δεῖ γὰρ δεδόσθαι ἐκ τῆς ἐρωτήσεως ἐλέσθαι ὁπότερον βούλεται τῆς ἀντιφάσεως μόριον

[12] See Owen (1960), Irwin (1988). For a different reading based on the same approach see Bolton (1990). For some criticism on these positions see Smith (1997: 52-55) and Fraser (2002: 50-58).

ἀποφήνασθαι. ἀλλὰ δεῖ τὸν ἐρωτῶντα προσδιορίσαι πότερον τόδε ἐστὶν ὁ ἄνθρωπος ἢ οὐ τοῦτο.

Aristotle is making the same point in both passages. Consider text (1). Since every dialectical procedure starts from common opinions, and since no common opinion can ground any scientific knowledge, metaphysics cannot be a dialectical science. Even if metaphysics were a dialectical science, it could at best establish the principles of other sciences, while it could not establish its own principles; for these must not be common opinions. What could then be the principles of metaphysics? How metaphysics could ground its own knowledge without relying on the common opinions grounding dialectical analysis? At a closer look, Aristotle turns out to be calling into question the general attempt to establish principles through dialectic. In the *Analytics*, Aristotle tells us that the principles of a science are the definition and the assumption of the existence of the genus studied.[13] Remarkably, both of these cannot be achieved through dialectic; for there is no dialectical test to be carried out. Consider text (2). A dialectical procedure consists in examining whether something is the case or not. For example, 'whether the statesman is an expert or not'. Accordingly, a dialectical procedure can be employed to either strengthen or reject definitions by testing their content. On the contrary, it will not be employed to investigate such a definitional content.

The textual evidence against the dialectical nature of metaphysics is enriched by the textual evidence in favour of its apodeictic character. On different occasions, Aristotle insists on the importance of the education in the theory of demonstrative science for the development and the study of metaphysics. Consider texts (3) and (4) below:

3) Therefore, one must be already trained to know how to demonstrate, since it is absurd to seek at the same time knowledge and the way of attaining knowledge; and neither is easy to get. (*Metaph*. α.3, 995a12-16)

διὸ δεῖ πεπαιδεῦσθαι πῶς ἕκαστα ἀποδεκτέον, ὡς ἄτοπον ἅμα ζητεῖν ἐπιστήμην καὶ τρόπον ἐπιστήμης· ἔστι δ' οὐδὲ θάτερον ῥᾴδιον λαβεῖν.

4) And the attempts of some who discuss the terms on which truth should be accepted are originated from the ignorance in the *Analytics*. For they should

[13] To these one has to add axioms. I will go into the details of this view in Section 1.3.

> possess preliminary knowledge about these things and not to enquire into them while listening to these lectures. (*Metaph*. Γ.3, 1005b2-5)

> ὅσα δ’ ἐγχειροῦσι τῶν λεγόντων τινὲς περὶ τῆς ἀληθείας ὃν τρόπον δεῖ ἀποδέχεσθαι, δι’ ἀπαιδευσίαν τῶν ἀναλυτικῶν τοῦτο δρῶσιν· δεῖ γὰρ περὶ τούτων ἥκειν προεπισταμένους ἀλλὰ μὴ ἀκούοντας ζητεῖν.

In passage (3), Aristotle points out that some expertise in the method of demonstration is essential before investigating metaphysics; for it looks impossible to conduct a simultaneous investigation about a science and its own method. In arguing so, Aristotle separates the content of the science from its formal structure. The enquirer who intends to develop the science of being and thus to become a metaphysician has to know in advance how to present such a knowledge. What is salient to us is that the content of the science of being has to be presented by means of demonstrations. Likewise, in passage (4) Aristotle connects the treatment of truth – conducted by metaphysics – with some preliminary study of the *Analytics*. In order to avoid any failure with her studies, the student of metaphysics has to keep in mind the guidelines about demonstrations. The key point is that the truth is not only the object of metaphysics, but of any scientific knowledge. In order to successfully understand the content of metaphysics, it is then essential to be acquainted with the apodeictic method.

I shall conclude this analysis of textual sources with a passage from book Z. In a few lines at the start of Z.15, Aristotle indirectly provides some remarks that strongly support my interpretation of the demonstrative character of metaphysics.

> 5) For this reason, also, there is neither definition nor demonstration of sensible individual substances; for they have matter that is such that they are capable both of being and of not being. Thus every individual substance is corruptible. If then demonstration is only of necessary truths and if definition is scientific, and if, just as science cannot be sometimes science and sometimes ignorance (this is the nature of opinion), so too demonstration and definition cannot vary thus, but it is opinion that deals with that which can be otherwise than as it is, clearly there can neither be definition nor demonstration of sensible individuals. (Z.15, 1039b28-1040a1).

> διὰ τοῦτο δὲ καὶ τῶν οὐσιῶν τῶν αἰσθητῶν τῶν καθ' ἕκαστα οὔτε ὁρισμὸς οὔτε ἀπόδειξις ἔστιν, ὅτι ἔχουσιν ὕλην ἧς ἡ φύσις τοιαύτη ὥστ' ἐνδέχεσθαι καὶ εἶναι καὶ μή· διὸ φθαρτὰ πάντα τὰ καθ' ἕκαστα αὐτῶν. εἰ οὖν ἥ τ' ἀπόδειξις τῶν ἀναγκαίων καὶ ὁ ὁρισμὸς ἐπιστημονικόν, καὶ οὐκ ἐνδέχεται, ὥσπερ οὐδ' ἐπιστήμην ὁτὲ μὲν ἐπιστήμην ὁτὲ δ' ἄγνοιαν εἶναι, ἀλλὰ δόξα τὸ τοιοῦτόν ἐστιν, οὕτως οὐδ' ἀπόδειξιν οὐδ' ὁρισμόν, ἀλλὰ δόξα ἐστὶ τοῦ ἐνδεχομένου ἄλλως ἔχειν, δῆλον ὅτι οὐκ ἂν εἴη αὐτῶν οὔτε ὁρισμὸς οὔτε ἀπόδειξις.

The aim of the chapter is to show the impossibility to achieve knowledge of individuals. More precisely, Aristotle rejects the possibility of defining corruptible and particular substances (as will be shown, this is the genus of being with which metaphysics is concerned). The argument contrasts the liability to change that is characteristic of particular substances (e.g. Socrates, Bucephalus) with the necessary nature that is the object of metaphysical knowledge. What is remarkable is that this form of knowledge is exclusively identified with demonstrative science. Aristotle repeatedly points out that the impossibility of knowing particular substances amounts to the impossibility of defining and conducting demonstrations about them. As argued in the *Analytics*, a demonstration proves that a certain fact stated in the conclusion necessarily obtains in virtue of a certain cause stated in the premises. The content of such a demonstrative knowledge is necessary in that it is impossible to be otherwise. Given their corruptibility, there is no fact about particular substances that is necessary and thus provable by a demonstration. Accordingly, there is no demonstrative knowledge of particular substances.

In arguing so, Aristotle assumes the demonstrative nature of metaphysics as a fundamental premise of his argument. Just like other sciences, metaphysics appears to be organized into definitions and demonstrations about one genus of entities. Z.15 makes it clear that particular and sensible substances are not included in this genus. In Chapter Five, I will argue that the argument of Z.15 is part of Aristotle's own plan to show the impossibility of achieving knowledge of any substance and thus the impossibility of developing metaphysics in general. This will mark the necessity of a new start of the enquiry.[14] At present, it represents a key piece of evidence in favour of my approach. Aristotle comes to reject the demonstrative knowledge of particular substances on the basis of the

[14] See Section 5.1.

demonstrative character of metaphysics. Hence, metaphysics is conceived to be as a science that articulates into definitions and demonstrations about the genus studied.

1.1.3 The Science of Substances and of Non-Substances

The passages reviewed above call into question the dialectical nature of metaphysics. On the contrary, they provide us with some evidence in favour of my demonstrative reading. In this section, I will illustrate how metaphysics can be conceived as a demonstrative form of knowledge. Since metaphysics is the science of being, my focus will be to spell out the features that make of the genus studied the subject-matter of a demonstrative science; for the multiplicity of being hinders its treatment as genus and thus prevents its study from being a unified science. This involves two things: on the one hand, I will show the limits of the alternative interpretations advanced by scholars; on the other, I will illustrate the advantages of the demonstrative reading.

Let me give a different insight into the problem of the multiplicity of being. The reason why being cannot be treated as a genus is also expounded in the logical works.[15] According to the guidelines of the *Analytics*, the study conducted by every demonstrative science must be confined to one genus of entities that is the subject of some demonstrable attributes. For example, astronomy studies the genus of celestial bodies that is the subject of some demonstrable attributes, such as eclipse (i.e. being eclipsed).[16] The reason is quite simple: an argument is scientific insofar as its conclusions necessarily obtains in virtue of a cause stated in its premises. If a science were not limited to one genus, its arguments could not guarantee such a necessity; for they could be grounded in heterogeneous causes from which their conclusions would follow only incidentally. The causes in virtue of which the conclusion ‘moon is eclipsed’ obtains (i.e. ‘being eclipsed belongs to moon’) lies in the nature of celestial body, which is the genus studied

[15] See *An. Post.* I.7, 75b2-12 (cf. I.9, 76a4-30; I.32).

[16] More precisely, the subject is either the genus or a sub-genus. For example, a lunar eclipse is a demonstrable attribute of the subject moon and, indirectly, of the genus to which moon belongs, i.e. celestial body. Celestial body is the genus with which the demonstrations of astronomy are concerned, and these include those about the moon. On the different senses of ‘genus’ see Mignucci (2007: 176) and Mckirahan (1992: 50-63).

by astronomy. This is the condition of homogeneity: for each science, there is one genus of entities that is the subject-matter of its study.[17] Since being is a plurality of different genera, its study cannot be confined to a single genus of entities. In other words, there is no such a unitary subject-matter that makes of its study a demonstrative science. By missing the condition of homogeneity, metaphysics appears to be a general treatment of the heterogeneous nature of being.

In this regard, it is common to contrast the synonymous nature of a genuine subject-matter with the homonymous nature of being. A subject-matter possesses a synonymous nature insofar as there is one single nature to which its study refers. Every object within the subject-matter is then defined according to the univocal nature (καθ' ἕν) of the genus of entities with which the study is concerned. To illustrate, every object studied by astronomy is defined according to the nature of the genus of celestial bodies (i.e. what a celestial body is). In the light of the categorial classifications above, the nature of a genus is synonymous in that the predicative relations of which the study consists obtain within the same vertical category.[18] To use our example, the predicative relations of which astronomy consists obtain within the category of substance because they express the nature of one of its sub-genera, i.e. celestial body. The possibility of setting out a demonstrative science is bound to the possibility of studying its subject-matter with reference to a univocal nature.

This possibility is not granted while studying being. Since its study concerns a plurality of different genera, being appears to possess a homonymous nature. Namely, its subject-matter encompasses objects sharing a common name but no common nature. Thus, every object within the subject-matter cannot be defined according to a univocal nature (καθ' ἕν). In metaphysics, every object is named 'being/entity' and is defined according to one of the natures ascribed to the many genera of being (e.g. what a quality is, what a quantity is, etc.). In the light of the categorial classification above, the nature of being is homonymous in that the

[17] This condition regulates the communication among autonomous sciences, especially the transferability of principles. Namely, a science can apply some principles from another science insofar as the genus of the former is a sub-genus of the genus of the latter. For example, the principles of arithmetic are not transferable to geometry, because arithmetic studies discrete magnitude, whereas geometry studies continuous magnitudes. This is instead possible between geometry and optics because optics studies a sub-genus of continuous magnitudes. Cf. Mignucci (2007: 174-176; 178-179; 244).

[18] A study indeed consists of the statements that make up its arguments and each statement amounts to a predicative relation in which a predicate belongs to a subject.

predicative relations of which the study consists obtain within every vertical category. Therefore, it looks impossible to conceive metaphysics as a demonstrative science that is concerned with one unitary genus of objects.

Traditionally, the solution is taken to be the introduction of the πρὸς ἕν relation in place of the καθ' ἕν relation. Whilst there is no nature *according to* which the objects within the subject-matter can be defined, there is one nature *with reference to* which they can be studied: the nature of substance. The πρὸς ἕν relation to substance marks the common dependence of every object upon the nature of the first genus of being. Although the study of being concerns a plurality of objects belonging to different genera and thus definable according to the different natures, it primarily concerns a genus that is the 'focus' of the others. Quality, quantity etc. are what they are inasmuch as there is the substance of which they are quality, quantity etc. Since the objects within the subject-matter do not simply share the name but also hold the common dependence upon the genus of substances, the nature of being can be considered neither purely homonymous nor purely synonymous. What kind of study does metaphysics turn out to be then?

As already seen, this solution is a key element in the dialectical reading of Aristotle's metaphysics. With the introduction of the πρὸς ἕν relation, Aristotle seems to conceive the study of being as a peculiar form of knowledge that must be separated from regular demonstrative sciences. Whereas demonstrative sciences are concerned with objects that are καθ' ἕν λεγόμενα (i.e. defined according to the nature of their genus), metaphysics is concerned with objects that are πρὸς ἕν λεγόμενα (i.e. defined with reference to the nature of the genus of substance). From this perspective, being can be treated as a genus because of the special relation held among its objects. Despite the intrinsic multiplicity, it is then possible to conduct a unitary study of entities. The point is that such knowledge does not fulfil the condition of homogeneity. The study of substance does not seem to provide the metaphysician with the principles grounding the demonstrations about the entire subject-matter. Rather, it enables the metaphysician to conduct parallel studies about the genera into which being divides. This general treatment of heterogeneous natures is proper to a dialectical science that must be separated from regular demonstrative sciences.

In order to avoid this conclusion, some commentators have recently proposed an alternative reading of Aristotle's views. The central idea is that the argument

in Γ.1-2 does not classify metaphysics as a special science because of some feature of its subject-matter. On the contrary, it shows that metaphysics conforms to model of demonstrative knowledge presented in the *Analytics*. Basically, its objects constitute a unitary genus that must be treated as a genuinely scientific subject-matter. Kyle Fraser has offered the most convincing argument in favour of this interpretative line.[19] The possibility of metaphysics, he argues, is not guaranteed by the introduction of the πρὸς ἕν relation in place of the καθ' ἕν relation; for both of them work within every demonstrative science. In other words, the πρὸς ἕν relation is not a special form of dependence that is exclusively held in case of non-substances and substance. By καθ' ἕν and πρὸς ἕν, Aristotle indicates two relations to one same nature that is ascribed to the genus with which the relevant demonstrative science is concerned. For example, the objects studied by arithmetic hold both καθ' ἕν and πρὸς ἕν relations to the nature of number; likewise, the objects studied by metaphysics hold both καθ' ἕν and πρὸς ἕν relations to the nature of substance. In sum, the πρὸς ἕν relation marks the genuinely scientific character of the subject-matter of the metaphysics and thus the demonstrative organization of its knowledge.

I take lines 1003b10-15 to confirm the alternative reading of the argument suggested by Fraser.

> As, then, there is one science which deals with all healthy things, the same applies in other cases also. For not only the study of the objects defined according to one nature does pertain to one science, but also the study of the objects defined with reference to one nature; for even these in a sense are defined according to one nature. It is clear then that it is the work of one science also to study all entities qua entities (*Metaph*. Γ.2, 1003b10-15).

> καθάπερ οὖν καὶ τῶν ὑγιεινῶν ἁπάντων μία ἐπιστήμη ἔστιν, καθάπερ οὖν καὶ τῶν ὑγιεινῶν ἁπάντων μία ἐπιστήμη ἔστιν, ὁμοίως τοῦτο καὶ ἐπὶ τῶν ἄλλων. οὐ γὰρ μόνον τῶν καθ' ἓν λεγομένων ἐπιστήμης ἐστὶ θεωρῆσαι μιᾶς ἀλλὰ καὶ τῶν πρὸς μίαν λεγομένων φύσιν· καὶ γὰρ ταῦτα τρόπον τινὰ λέγονται καθ' ἕν. δῆλον οὖν ὅτι καὶ τὰ ὄντα μιᾶς θεωρῆσαι ᾗ ὄντα.

Aristotle does not distinguish between two types of sciences. His concern is to separate the καθ' ἕν λεγόμενα from the πρὸς ἕν λεγόμενα. Remarkably, these are presented as the objects of one single science. The distinction is not immediately

[19] See Fraser (2002) and also Bolton (1994: 420-429; 1995).

evident, says Aristotle, because the πρὸς ἕν λεγόμενα can be treated as καθ' ἕν λεγόμενα and thus assimilated to other objects studied by the science. How this assimilation is possible will be clear later. What is salient to us is that Aristotle makes here a general claim about scientific knowledge: every subject-matter includes both objects defined according to and objects defined with reference to the nature of the relevant genus. The study of being is the case of a science in which the distinction between καθ' ἕν and πρὸς ἕν λεγόμενα is less plain.

If the πρὸς ἕν relation characterizes every subject-matter, then this feature has to be treated in the guidelines about the structure of demonstrative sciences. Therefore, the key to supporting Fraser's interpretation is a detailed revision of the doctrine of the *Analytics*. Indeed, Aristotle does not seem to take into consideration the πρὸς ἕν in the logical works. In point of fact, it suffices to articulate the content of any demonstrative science to realize that the καθ' ἕν relation could never apply to the totality of the objects studied by a demonstrative science. That is, every genuinely scientific subject-matter could never be exhausted by καθ' ἕν λεγόμενα. Consider the following demonstration:

A) Loss of light belongs to B) screening of Sun by Earth

B) Screening of Sun by Earth belongs to C) Moon

A) Loss of light belongs to C) Moon.[20]

This demonstration is a piece of the knowledge that constitutes astronomy, the science of celestial bodies. In particular, this demonstration proves that the moon undergoes a certain loss of light, i.e. an eclipse. On the basis of the traditional reading, the nature of the genus studied should be expressed by the predicative relations that make up this demonstration. Basically, if every object within the subject-matter is καθ' ἕν related to the nature of the genus studied, then the conclusion AaC should follow from AaB and BaC insofar as B expresses the nature of celestial bodies. But this is not the case. The conclusion AaC follows insofar as B expresses the nature of eclipse (or at least part of it).[21] Since the demonstration concerns the moon, it still constitutes the science of celestial bodies. The point is that whereas moon is known in terms of the nature of celestial

[20] See *An. Post.* I.8, 93a15-b14. Cf. Mignucci (2007: 268-273).
[21] The definition of eclipse is indeed 'loss of light caused by screening of sun by earth'.

bodies, eclipse is not. Since the subject-matter of astronomy includes both moon and eclipse, there must be different ways in which the objects studied are related to the nature of the genus. Arguably, there must be different types of objects holding different relations to the nature of the genus: the καθ' ἕν λεγόμενα and the πρὸς ἕν λεγόμενα. Is this distinction available in the *Analytics*?

As suggested by Fraser, the answer is given at the beginning of the *Posterior Analytics*. More precisely, the distinction between the objects of a science can be established in light of the distinction between the statements of which the science consists; for the former are signified by the latter. At I.4, Aristotle tells us that demonstrative knowledge consists of statements in which a predicate belongs per se to a subject. In a first sense, a predicate belongs per se[1] to a subject if the predicate is stated in the account of the subject (i.e. its τί ἐστιν, I.4, 73a34-37). For example, animal belongs per se[1] to human because animal occurs in the account of human.[22] In a second sense, a predicate belongs per se[2] to a subject if the subject is stated in the account of the predicate (I.4, 73a37-b1). For example, odd belongs per se[2] to number because number occurs in the account of odd. Both the per se[1] belonging and the per se[2] belonging indicate a relation to the nature of the genus studied. However, while the per se[1] belonging indicates the relation between a genus and a sub-genus, the per se[2] belonging indicates the relation between a genus and an attribute. The distinction between these relations corresponds to the distinction between the objects within a scientific subject-matter. For one thing, a demonstrative science is the knowledge of the sub-genera of the genus studied. For example, arithmetic is firstly the knowledge of what number and its species (e.g. three) are. Such objects are καθ' ἕν λεγόμενα in that they are known by stating the nature of the genus in their account (i.e. by the statement of a per se[1] belonging). For another thing, a demonstrative science is the knowledge of the demonstrable attributes of those sub-genera. For example, arithmetic is also the knowledge of odd/even. What is salient to us is that the attributes are not the sub-genera of the genus studied and thus cannot be καθ' ἕν λεγόμενα. To illustrate, the genus number is not divided into odd and even; consequently, odd and even are not known according to the nature of number. Rather, odd and even are known according to the cause in virtue of

[22] As noticed by commentators, Aristotle's examples are slightly puzzling; a triangle does not seem to be point and line (cf. McKirahan, 1992: 86-19; Mignucci, 2007: 164-165). We can perhaps soften the difficulties if we think that Aristotle has in mind a constitutive relation between the statements of 'point' and of 'line' and the statement of what triangle is.

which they belong to the species of number. Put it more generally, the demonstrable attributes, like odd and even, are not καθ' ἕν related to the nature of the genus studied.

Such objects are the πρὸς ἕν λεγόμενα that parallel the καθ' ἕν λεγόμενα within a subject-matter. Although the demonstrable attributes are not defined according to (καθ' ἕν) the nature of the genus, they are in fact known with reference to it (πρὸς ἕν). The knowledge of what an attribute is is scientific only if it explains the necessary belonging of the attribute to a genus (i.e. the existence of the attribute) in virtue of a cause. Therefore, the attribute turns out to be related to the nature of the genus without being one of its sub-genera. For example, the knowledge of what eclipse is is scientific insofar as it explains the necessary belonging of loss of light to moon (i.e. the existence of the eclipse) in virtue of the screening of sun by earth. The account of eclipse does not state the nature of the genus of celestial bodies, though it refers to moon and to a further characterization of some celestial bodies (i.e. the screening of sun). Hence, every scientific subject-matter consists of the genus and the sub-genera studied and their demonstrable attributes; the former being καθ' ἕν and the latter being πρὸς ἕν related to the nature of the genus.

In sum, a demonstrative science consists of statements of both per se^{1} and per se^{2} belonging. Whereas the statement of per se^{1} signifies a sub-genus studied by the science, the statement of per se^{2} signifies an attribute characterizing the sub-genus. Accordingly, sub-genera and attributes hold distinct relationships with the nature of the genus. I will expand upon demonstrable attributes in Section 1.3. At present, we are pressed by a different question: why does Aristotle not speak of πρὸς ἕν in the *Analytics*? He speaks of per se^{2} belonging of a predicate to a subject and this corresponds to the relation between a demonstrable attribute and a genus/sub-genus. Since this is not a καθ' ἕν relation, we propose to identify it with the πρὸς ἕν relation introduced in the *Metaphysics*. In all likelihood, Aristotle did not need to separate the καθ' ἕν from the πρὸς ἕν λεγόμενα before coping with being as the subject-matter of a science. The concepts of καθ' ἕν and πρὸς ἕν do not simply separate the objects within a subject-matter, but separate these objects in relation to one genus. The project to set out the science of being starts with realizing that being is a plurality of genera. Consequently, it is impossible to study every genus/sub-genus into which being divides because these are defined according to different natures.

The problem lies in the assumption that each genus and sub-genus of being is the subject of demonstrable attributes. If it were so, metaphysics would exclusively consist of statements of predicates that per se[1] belong to the many genera of being (i.e. substance, quality, etc.). The result is that each genus is assumed to be καθ' ἕν related to one single nature. The introduction of the πρὸς ἕν enables Aristotle to clarify the treatment of being: the genus of substance is the only genus that is the subject of demonstrable attributes. The nature of substance is then the nature to which some objects, i.e. substances, are καθ' ἕν related. Firstly, the science of being turns out to consist of statements of predicates that per se[1] belong to the genus of substances. The remaining genera instead are the demonstrable attributes of the genus of substances. The nature of substance is then the nature to which some objects, i.e. non-substances, are πρὸς ἕν related. Thus, the science of being also consists of statements of predicates that per se[2] belong to the genus of substances. In a nutshell, metaphysics studies the whole being insofar as it studies substances and non-substances. The former are καθ' ἕν λεγόμενα in that they are defined according to the nature of substance; indeed, every substance is the subject of some demonstrable attributes. The latter are πρὸς ἕν λεγόμενα in that they are defined with reference to the nature of substance; indeed, every non-substance is a demonstrable attribute characterizing a substance.

In the passage 1003b10-15, Aristotle remarks that the πρὸς ἕν λεγόμενα tend to be assimilated to the καθ' ἕν λεγόμενα. For in a sense the πρὸς ἕν λεγόμενα can be defined according to (καθ' ἕν) one nature. This might prevent us from missing the unity of the science studying heterogeneous objects (e.g. the many healthy things, the many entities). The assimilation is possible because a demonstrable attribute holds different relations with different natures. On the one hand, the attribute is πρὸς ἕν related to the nature of the genus studied. On the other, the attribute is καθ' ἕν related to the nature of the genus to which it belongs. To illustrate, odd is πρὸς ἕν related to the nature of number, while it is καθ' ἕν related to the nature of numerical qualities. Basically, the definition of a demonstrable attribute does refer to the genus studied by the relevant science, although it states the nature of a dependent genus of entities.

With the introduction of the πρὸς ἕν, Aristotle is able to reconsider the apparent multiplicity of the subject-matter. Metaphysics does not study distinct genera, but one genus, substance, of which the other genera, quality, quantity

etc., are demonstrable attributes. This solution can be even more clear through a distinction between the notions of ‘genus’ and ‘subject-matter’. So far, I have employed these concepts to equally refer to the objects studied by a science. The case of being compels us to be more rigorous. The concept of genus is to be limited to the objects that are subjects of the demonstrative knowledge of a science. Such objects are not known by demonstrations; for a demonstration assumes the existence and the nature of the genus and proves the belonging of some attributes. For example, the genus of celestial bodies encompasses planets and stars, though not eclipse and twinkling, which are not instances of celestial body. The concept of subject-matter is then very useful to refer to every object with which a demonstrative knowledge is concerned: the genus/sub-genus and the relevant attributes. Namely, the subjects and their characterizations.

On the basis of this asymmetry, we are in a better position to understand the treatment of being. If being is taken to be a genus, metaphysics turns out to be impossible; for being is immediately pluralized into different natures. On the contrary, if being is taken to be a subject-matter, metaphysics turns out to be possible because being is just a name to refer to the totality of the objects studied by the science. The point is that some of these objects make up the genus that is subject of the demonstrative knowledge, while the remaining objects make up distinct genera that are attributes of the genus. Hence, metaphysics as demonstrative science consists of the knowledge of the genus, whose existence and nature ground every demonstration, plus the knowledge of the remainder of the subject-matter, which is the existence and the nature of the attributes characterizing the genus. The former being substance, the latter being non-substances.

1.1.4 Advantages and Possible Objections

I shall conclude with some remarks on the possible objections to my demonstrative reading and on the advantages for our understanding of Aristotle’s metaphysics. To start with, metaphysics is often paralleled with mathematics and physics.[23] More precisely, each of them occupies the first level in the hierarchy of

[23] See *De An*. I.1, 403b7-16; *Metaph*. E.1, 1025b1; *Eth. Nic*. VI.8, 1142a19.

the sciences that are concerned with more specific subject-matters. Basically, mathematics, physics and metaphysics study the causes and the principles of a genus, while their subordinate sciences study the respective sub-genera. To illustrate, mathematics studies the principles of the genus of quantities, while geometry studies extensive quantities. What matters to us is that in order to establish this parallel, Aristotle must be assuming the common nature of mathematics, physics and metaphysics. In other words, these studies exemplify the same kind of knowledge and their epistemic contents are organized in the same way.

In view of this, the majority of commentators argue in favour of the dialectical nature.[24] Since these sciences study the highest principles of a genus of entities, they are to be conceived as dialectical analyses. They consist in testing common views in order to yield stronger theses. After all, no demonstrative sciences can ever establish principles; for every principle is the starting point of the demonstrative arguments within a science and thus is not the subject of demonstration itself. If it were, the demonstrative science would turn out to be a regressive form of knowledge.[25] Admittedly, this seems to be the case with metaphysics and physics. Aristotle devotes much of his works to investigating the relevant principles. That is, the principles of being in the *Metaphysics* and the principles of motion in the *Physics*. In doing so, he never proceeds with genuine demonstrations in these treatises. Rather, he often employs dialectical arguments in order to either discard or strengthen views about his object of study.

There are a couple of things that can help us to resist this approach and to defend the demonstrative reading. Firstly, *every science must be separated from its preliminary enquiry*. Whereas a science is a fully-fledged body of knowledge, an enquiry is a procedure to develop a certain epistemic content in a demonstrative form. Accordingly, an enquiry represents a preliminary phase of study in which the enquirer attempts to establish the principles that will ground the relevant demonstrative knowledge. Once these principles are established, the enquirer is able to complete the development of the science by articulating its demonstrations. It could be said that the enquiry develops into science just like the enquirer turns into scientist. From this perspective, it is not difficult to explain the absence of demonstrations in the *Metaphysics* and in the *Physics*. Unlike

[24] See Irwin (1988).
[25] See Section 1.3.1 for some further remarks. Cf. *An. Post.* I.3.

mathematics, these sciences are not fully-fledged bodies of knowledge. In his works, Aristotle is indeed conducting two phases of enquiry that will lead to developing the science of being and the science of motion. The key point is that the argument of the *Metaphysics* does not correspond to the fully developed science that is labelled 'metaphysics'. Within the *Metaphysics*, Aristotle sets out a project to develop the science of being and this project consists of an enquiry to establish its principles. The enquiry, if successful, will provide the basis to articulate the relevant demonstrations and thus to present the knowledge of being in its complete form. Clearly, no demonstration can be part of this phase of enquiry. To make a comparison with mathematical sciences, if there were a work labelled *Geometry* in which the author investigates the principles of extensive quantities (i.e. point and line), we could hardly find Pythagoras' theorem; for Pythagoras' theorem is part of the fully-fledged science that develops from the enquiry conducted in the *Geometry*.

Secondly, *the nature of a science must not be confused with the method to develop it*. Whereas the nature of a science corresponds to the organization of the knowledge after its full development, the method to develop a science corresponds to the procedure to establish the principles by which the knowledge will be organized. Accordingly, the procedure to establish the principles of a science can hardly be demonstrative; for no principle is the subject of demonstration itself. As suggested at *Topics* I.2, such a procedure is likely to consist of dialectical arguments that contribute to achieving the principles of a demonstrative knowledge.[26] This distinction help us to make sense of the dialectical character of Aristotle's discussions. In the *Metaphysics*, dialectic contributes to the enquiry to establish the principles of the science of being. Nevertheless, it does not represent the nature of this very science. As will be seen in the next Chapters, most of the arguments about substance are based on the attack and defending schemes introduced in the *Topics*. The point is that these schemes will not be the epistemic content of metaphysics.

While the dialectical reading fails to make sense of the project set out in Aristotle's work, the demonstrative reading sheds light on the different ways to present the nature of the science. At different times, metaphysics is understood in terms of 'study of principles', 'study of being', and 'study of substance'. In order

[26] See *Top*. I.2.

to preserve the connection between these accounts, the dialectical reading makes of metaphysics a special science. Its goal is to investigate the principles of the genera of being by investigating the principles of substance; for the knowledge of non-substances is possible only with reference to the knowledge of substance. The demonstrative reading preserves the connection between the accounts of metaphysics without turning it into a special science. When Aristotle embarks on his project, he is after the highest form of knowledge, which must be a science concerning some principles. In this attempt, the key step is to select the genus that is grounded in these principles, i.e. the genus studied by metaphysics. Thanks to the demonstrative reading, we can explain why in a broad sense metaphysics is the science of being and in narrow sense metaphysics is the science of substance. Substance is indeed the genus of which the remaining genera of being are demonstrable attributes. In accordance with the guidelines of the *Analytics*, metaphysics turns out to consist of the knowledge of a genus and the knowledge of its attributes. Therefore, its development consists of an enquiry to establish the principles grounding the genus studied and, consequently, the demonstrations in which the attributes are proved to belong to the genus.

This reconstruction of the project does not presuppose any special relation among entities to explain how metaphysics is both the science of being and the science of substance. Rather, it employs the apodeictic model of science to illustrate how the enquiry conducted by Aristotle is expected to develop. In this regard, it is interesting to note that one peculiarity of demonstrative sciences is the possibility of being accounted for in different ways. A science can be defined in terms of either its principles, or the genus studied, or the attributes characterizing the genus. Physics, for example, is often defined as the science of nature (φύσις), which is the principle grounding its demonstrative knowledge. Moreover, physics is defined as the science of bodies, which make up the genus that is the subject of the demonstrative knowledge In particular, the genus of natural bodies is in fact the genus of the substances that undergo motions. Finally, physics is defined as the science of motion insofar as its demonstrations prove that a natural body is characterized by some motion, i.e. that some motion belongs to a natural body. Likewise, metaphysics is defined as the science of being insofar as its demonstration proves that a substance is characterized by a non-substance, e.g. that a substance is so-and-so qualified, so-and-so quantified

etc. Strictly speaking, however, metaphysics is defined as the science of substances, which make up the genus that is the subject of the demonstrative knowledge. The goal of the enquiry conducted in the *Metaphysics* is to achieve the principles of the genus of substance, because this will lead to the development of the highest form of knowledge by grounding the knowledge of the genus and the knowledge of the relevant demonstrable attributes. The enquiry to establish this principle is the enquiry into what substance is.

1.1.5 The Enquiry into the Principle

In the previous four sections, I argued that metaphysics is conceived as a demonstrative science. This is the science of being insofar as it studies substance and non-substances. Substance is the genus of entities that is the subject of demonstrative knowledge, while non-substances are the genera of entities characterizing the genus. On the basis of the appropriate principles, the metaphysician can demonstrate the belonging of a non-substance to a substance (e.g. 'that a substance is so-and-so qualified') and this is nothing but demonstrating the existence of the relevant non-substance (e.g. 'that there is a quality'). Remarkably, this is not the content of the *Metaphysics*. In his work, Aristotle sets out a project that, if successful, will evolve into a fully-fledged science. The key phase of this project is to investigate the principles grounding metaphysical knowledge.

My contention is that Z's enquiry to answer 'What is substance?' is an enquiry to establish one of the principles of metaphysics. As already mentioned, every demonstrative science is grounded in two proper principles: the assumption of the existence of the genus and the definition of the genus. Since substance is the genus studied by metaphysics, the enquiry into what substance is is aimed to establish the principle grounding the science of being. In this section, I will defend this interpretation of book Z. To this end, I will first argue that the primacy of substance over non-substances is to be addressed against the demonstrative character of metaphysics. Namely, non-substances depend upon substance in that the latter is the genus of which the former are demonstrable attributes. Secondly, I will spend some words on the type of answer to be provided in Z. Throughout the book, there is a fundamental uniformity between the analysis of

the concept of substantiality and the analysis of the entities that are substances. In enquiring into what substance is, Aristotle is not simply concerned with what being a substance means. He is attempting to establish the definition of the genus encompassing every substance (especially its most reputable cases: sensible substances, such as human, horse, etc).[27] Clearly, these ways to understand the object of Z are not mutually exclusive. The answer to 'what is the genus substance?' and the answer to 'what does substantiality mean?' are equivalent ways to signify the cause in virtue of which every instance of the genus is a substance.

Earlier on I pointed out that the multiplicity of being is apparent insofar as every non-substance depends upon substance. Accordingly, substance is the genus encompassing the subjects of metaphysical knowledge, while non-substances are the genera encompassing the attributes of substance. In order to show that Z's enquiry is aimed to establish the principle of metaphysics, I will analyse the ontological dependence at work in Z. Not only does this form of dependence correspond to the form of dependence at work in demonstrative science; it also highlights the causal role played by substance in grounding the knowledge of non-substances.

In this regard, Z.1 represents a valuable source for our understanding of Z's enquiry. In the first half of the chapter, Aristotle recalls the multiplicity of being and hints at its solution. Substance is the first genus of being because every other entity is a characterization of a substance: a quality is a qualified substance, a quantity is a quantified substance etc.[28] Since there are no clear boundaries of the genus studied, our examples can hardly be more enlightening than those mentioned. In fact, the science of being has still to be developed. However, we can borrow an example from astronomy to illustrate how an attribute is a characterization of the genus studied: eclipse is nothing but an eclipsed moon, i.e. the moon undergoing a certain loss of light.

In the second half of the chapter, Aristotle turns to specify the ontological dependence upon substance. At 1028a31-b1, he separates three forms of primacy: i) primacy in definition, ii) primacy in knowledge, iii) primacy in time. His goal is to show that non-substances depend upon substance in all of these forms.

[27] See Section 2.1.1.
[28] See Z.1, 1028a6-20.

Therefore, the study of being can be reduced to the study of substance. If my hypothesis is correct, non-substances depend upon substance in the same way as demonstrable attributes depend upon the subject of a science.

> Now there are several senses in which a thing is said to be primary; but substance is primary in every sense: in definition, in knowledge, and in time. For none of the other categorial predicates is separated, while substance is. Moreover, this is primary in definition (for in each definition the definition of substance is necessarily included). And we think we know each thing most fully when we know, for example, what human is or what fire is, rather than when we know either the quality, or the quantity, or the place. (1028a31-b1, Bostock's translation slightly modified)

> πολλαχῶς μὲν οὖν λέγεται τὸ πρῶτον· ὅμως δὲ πάντως ἡ οὐσία πρῶτον, καὶ λόγῳ καὶ γνώσει καὶ χρόνῳ. τῶν μὲν γὰρ ἄλλων κατηγορημάτων οὐθὲν χωριστόν, αὕτη δὲ μόνη· καὶ τῷ λόγῳ δὲ τοῦτο πρῶτον (ἀνάγκη γὰρ ἐν τῷ ἑκάστου λόγῳ τὸν τῆς οὐσίας ἐνυπάρχειν)· καὶ εἰδέναι δὲ τότ' οἰόμεθα ἕκαστον μάλιστα, ὅταν τί ἐστιν ὁ ἄνθρωπος γνῶμεν ἢ τὸ πῦρ, μᾶλλον ἢ τὸ ποιὸν ἢ τὸ ποσὸν ἢ τὸ πού, ἐπεὶ καὶ αὐτῶν τούτων τότε ἕκαστον ἴσμεν, ὅταν τί ἐστι τὸ ποσὸν ἢ τὸ ποιὸν γνῶμεν.

Plainly, the first two forms of primacy concur with the scientific reading of the ontological dependence. Substance is prior to non-substances in definition and in knowledge insofar as the definition and the knowledge of the former are presupposed by the definition and the knowledge of the latter. Since the definition and the knowledge of an object are the statement and the knowledge of what the object is, we can reformulate the ontological dependence as follows:

Ontological Dependence*:	every non-substance depends upon substance because what a non-substance is presupposes what a substance is.

Basically, it is impossible to define and to know a non-substantial entity unless we define and know a substance. For example, the definition and the knowledge of the quality of a human is possible only by assuming what a human is.[29] The assumption of the definition of an object is central to the development of a

[29] Admittedly, Aristotle specifies the primacy of definition in terms of 'constitution': what a substance is is constitutive of what an entity is. In Z, however, this stronger sense will only apply to the relations between substances (e.g. what animal is is constitutive of what human is). The constitutive sense will be extended to any ontological relation when substance is understood as actuality.

demonstrative science; for every science is a hierarchical system in which some statements are grounded in others. To illustrate, the definition of eclipse is grounded in the definition of moon because the nature of the former implies the nature of what is so affected (i.e. eclipsed). Likewise, the assumption of the knowledge of an object enables the scientist to achieve knowledge of other objects. To illustrate, the demonstrative knowledge of eclipse is grounded in the definitional knowledge of moon.

What is at work in these contexts is the form of dependence that obtains between a genus and its demonstrable attributes. The genus (or a sub-genus) is the subject of which the scientist proves some characterizations. In order to define and to know the demonstrable attribute, the scientist has to assume the definition and the knowledge of the genus; that is, the definition and the knowledge of the subject studied. With the primacy in definition and the primacy in knowledge, Aristotle is introducing the same form of dependence among the totality of entities. Basically, the ontological dependence of entities upon substance is the dependence of some demonstrable attributes upon the genus studied by a science. In order to define and to know an entity, the metaphysician has to assume the definition and the knowledge of a substance; for the nature of the former implies the nature of the latter.[30]

The picture looks quite different with the primacy in time. Aristotle offers an elliptical formulation in terms of separation: substance is prior to non-substances in time insofar as the former is separate from the latter (and not conversely). In all likelihood, Aristotle has in mind the primacy in existence discussed in the *Categories* and widely endorsed in his works.[31] This primacy introduces the following form of dependence:

Ontological Dependence:** every non-substance depends upon substance because the existence of a non-substance is not separate from the existence of a substance.

[30] This conception of ontological dependence is outlined by Bostock (1994: 51-52; 60-63). Given the traditional reading of the πρὸς ἕν relation to substance, some commentators suggested that this is the form of primacy favoured by Aristotle in the metaphysics (cf. Frede, 1985; Frede-Patzig, 1988: 21; Halper, 1989: 21-25; Rapp, 1996a: 31ff. Unless otherwise noted, every reference to Frede-Patzig, 1988, and to Ross, 1924, are to volume II).

[31] This is what he labels primacy in nature (cf. *Cat*. 14, 14b11-21; *Metaph*. Δ.11, 1019a1-11). This conception is outlined by Bostock (1994: 52; 57-60).

The idea is that a non-substance, unlike a substance, cannot be credited with separate existence. For example, the existence of a quality is impossible unless there is a subject that is qualified, i.e. a substance. This ontological dependence of non-substances upon substances appears to be less likely to work within a demonstrative science; for it regulates the relations between concrete objects rather than between their definitions. To illustrate, the existence of the wisdom of Socrates depends upon the existence of Socrates, while the existence of Socrates does not depend upon the existence of any specific quality.[32] On the one hand, this guarantees the realism of metaphysics; metaphysical knowledge must be concerned with the objective facts concerning the totality of entities. On the other, this hinders any scientific understanding of metaphysics; metaphysical knowledge does not seem to be concerned with the definitions of entities.

My approach to Z's enquiry offers a unitary conception of the primacy of substance. More precisely, it harmonizes the primacy in definition and in knowledge with the primacy in existence. In this way, it is possible to introduce a form of dependence that regulates a demonstrative science.[33] The core idea is that to enquire into what substance is is to enquire into the principle of metaphysics. In the attempt to account for substance, Aristotle is after both the nature of a genus and its definition. What is crucial to notice is that these are in fact one single principle. The definition grounding metaphysics is indeed the linguistic counterpart of what the genus substance is. From this perspective, we can conjecture that the primacy in definition and in knowledge is the counterpart of the primacy in existence. At 1028a25, Aristotle hints at how this can be the case.

> These things (i.e. non-substances) more clearly *are* because there is some determinate thing which underlies them. Namely, the substance and the particular, which is implied in such a predication; for one cannot account for a good thing or a sitting thing apart from this. Evidently, then, it is in virtue of this (i.e. substance), that each of those *is*. Therefore what primarily is and is without

[32] For the debate about the asymmetry of the existential separation and its modal reading in terms of separability see Burnyeat et al. (1979: 4-5), Bostock (1994: 58-60; 63-65).
[33] The overarching primacy of substance in Z.1 is remarked by Rapp (1996a) and sketched by Witt (1989: 58-62). An alternative view is defended by Peramatzis (2011), who proposes to establish a correspondence between the primacy in definition and the primacy in being (i.e. nature); for the primacy in being does not express the existential independence of its subject, but its essential independence (i.e. being the thing that it is).

> qualification (not is something) must be substance. (1028a25-31, Bostock's translation slightly modified)
>
> ταῦτα δὲ μᾶλλον φαίνεται ὄντα, διότι ἔστι τι τὸ ὑποκείμενον αὐτοῖς ὡρισμένον (τοῦτο δ' ἐστὶν ἡ οὐσία καὶ τὸ καθ' ἕκαστον), ὅπερ ἐμφαίνεται ἐν τῇ κατηγορίᾳ τῇ τοιαύτῃ· τὸ ἀγαθὸν γὰρ ἢ τὸ καθήμενον οὐκ ἄνευ τούτου λέγεται. δῆλον οὖν ὅτι διὰ ταύτην κἀκείνων ἕκαστον ἔστιν, ὥστε τὸ πρώτως ὂν καὶ οὐ τὶ ὂν ἀλλ' ὂν ἁπλῶς ἡ οὐσία ἂν εἴη.

Aristotle argues that the existence of any entity is 'caused' by the existence of the subject that is characterized by the entity (διότι ἔστι τι τὸ ὑποκείμενον αὐτοῖς ὡρισμένον). For example, the fact that there is the action of sitting amounts to the existence of a subject that sits and thus is caused by the existence of the subject, i.e. a substance. In metaphysics, everything is something 'that is' in virtue of being either a quality of substance, or a quantity of substance, etc.[34] In so arguing, he introduces the form of dependence in terms of primacy in existence; namely, ontological dependence**. What is remarkable is that Aristotle spells it out in terms of primacy in definition: an entity depends upon substance because the definition of an entity is impossible without the definition of a substance (1028a28). This is the form of dependence at work in a demonstrative science, namely, ontological dependence*.

The possibility of shifting from one form of dependence to another is granted by the causal role (διὰ ταύτην) played by substance. Whereas its existence grounds the existence of other entities, its definition grounds the statements of what other entities are. The primacy of substance can then be absolutely conceived as follows: substance is prior to non-substances insofar as **substance is the cause of why non-substances are**. Since the scientific knowledge of an object is the knowledge of its cause, the primacy of substance must introduce a form of dependence at work in demonstrative science.[35] The greatest advantage of my interpretation is that there is no need to separate the existence from the nature of the object. In every demonstrative science, the fact that 'there is such an object' (existence) and 'what the object is' (nature) are the focus of the same knowledge. In astronomy, for example, the knowledge of what an eclipse is is the demonstration that there is an eclipse.[36] This knowledge must be grounded in

[34] See Z.1, 1028a13-20. Cf. Burnyeat et al. (1979: 2); Frede-Patzig (1988: 16-19).
[35] Cf. *An. Post*. I.2, 71b9-12.
[36] I.e. Loss of light from moon because of the screening of sun by earth. On the definition produced by re-arranging demonstrations see Section 1.3.

some cause of the demonstrable fact. Again in astronomy, moon grounds the existence of eclipse and its definition grounds the statement of what eclipse is. In order to develop the knowledge of the totality of entities, the metaphysician has to study the causes of the demonstrable facts with which metaphysics is concerned. Initially, these causes are identified with substances. A substance grounds the existence of other entities and its definition grounds the statement of what other entities are; the former is the subject of the science, while the latter are its demonstrable attributes.

In Z's enquiry, Aristotle introduces the form of dependence that is at work in the demonstrative science of being:

Ontological Dependence (Z):	every non-substance depends upon substance because substance is the cause of why a non-substance is.

This form of ontological dependence holds both among real entities and among their definitions. Since substance is the genus of entities grounding the existence and the nature of the other genera of entities, the enquiry into 'what substance is' turns out to investigate the primary cause in being. This will indeed be the cause in virtue of which a substance is the subject of the demonstrable attributes studied by metaphysics. What solutions does Aristotle consider to answer this question?

Commentators tend to distinguish between the extensional treatment and the intensional treatment of the question.[37] The extensional treatment of 'What is substance?' consists in answering what substances there are. Aristotle is then engaged with giving an inventory of those entities that ground the existence of other entities. In Z.2, for example, bodies are evident cases of substance detected in sensible reality; for other entities (e.g. colours, weights, etc.) characterize and depend upon them. The intensional treatment of 'What is substance?' consists in answering what 'being a substance' amounts to. Aristotle is then interested in determining the substantial nature that is shared by all instances of the genus studied by metaphysics. In Z.3, he seems to indicate four ways to express the concept of substantiality: subject, essence, universal, and genus. If this reading is correct, Z is mainly devoted to an intensional analysis by evaluating whether each item on the agenda indicates the source of substantiality

[37] See Witt (1989: 7-14); Burnyeat (2001: 13-14); Galluzzo (2013a: 28-35). Cf. Lewis (2013: 16-20).

of substances. The strategy at work seems to swing between these two approaches to Z. Aristotle thinks that a full understanding of substance implies reflecting upon the uncontroversial cases of substance and illustrating their nature. To that end, he offers a preliminary extensional solution before embarking on the intensional analysis. On the other hand, the intensional solution contributes to reconsidering the range of substances established by the survey. In particular, the parts of living entities, simple elements, and Platonic Ideas will cease to be considered as substances.[38] In other words, the enquiry can be accomplished only through a revision of the extensional analysis in the light of the results of the intensional analysis.

It is dubious, however, that the enquiry is designed to develop these two treatments of substance.[39] The problem is that Aristotle can easily shift from one to the other and places no signpost to mark the distinction. In Section 2.2, I will expand upon the uniformity between the analysis of the concept of substantiality and the analysis of the entities that are substances. At present, we need to bear in mind that Z's enquiry is concerned with the nature of the genus studied by metaphysics. This is the principle and the first cause grounding the knowledge of substances and non-substances.

1.2 Dialectic: The Unity of Definition

The correspondence between substance and its definition gives us the framework against which to address Z's enquiry. In the logical works, Aristotle offers a detailed treatment of definition that spans from its technical features to

[38] See Z.16, 1040b5-16; H.1, 1042a21-24.
[39] On this point see Galluzzo (2013a: 32-35).

its scientific functions. In the remainder of this Chapter, I will take into consideration the two main contexts in which Aristotle expounds this 'theory of definition': dialectic and science. Dialectic provides us with a formal characterization of definition; science gives us an insight into its role for knowledge. At the centre of the manifold of views presented in the *Organon* are the unity and the primacy of definition. These ideas will represent the theoretical basis to map the argument of Z.

Dialectic, Aristotle tells us, is a procedure to deliver arguments on the basis of common opinions.[40] This μέθοδος enables the dialectician to tackle a problem and to either defend or attack one of its argumentative theses. To illustrate, the problem 'whether the statesman is an expert or not' is treated by arguing in favour of either 'the statesman is an expert' or 'the statesman is not an expert'. Namely, the dialectician attempts to infer either the endorsement or the rejection of a statement.[41] Overall, dialectic is not a structured body of knowledge, such as a science, but is a formal analysis of the features that make a thesis more or less acceptable.[42]

Although it is not clear to what extent Aristotle's dialectic is a Platonic legacy, there is little doubt about the common engagement with definitions.[43] In the late dialogues, Plato conceives his dialectic as a procedure to deliver definitions by which the dialectician accomplishes her enquiry into the nature of an object. In particular, it is the analysis of the connections between Forms through dichotomous division. The dialectician firstly subsumes the object under its most general kind, and, secondly, divides such a kind into two sub-kinds; the division

[40] See *Top*. I.1, 100a18-21.

[41] A statement is a linguistic formula in which some predicate(s) belongs to or is separated from a subject; thus, it is a bearer of a truth-value (*De Int.* 5-6, esp. 17a2-0-24). A problem is a composition of two alternative statements; it posits the question about which the dialectician formulates her deduction (*Top.* I.4 and 11, esp. 101b15-18). Cf. Smith (1997: xxviii-xxx); Brunschwig (2003: xxxvi-xxxvii; 118-119).

[42] Some scholars have defended the scientific character of Aristotle's dialectic, either generally (cf. Bolton, 1990; Deslauriers, 2007: 182-187) or limited to ontology (cf. Irwin, 1988). Bolton, in particular, distinguishes between *gymnastic dialectic* for training debates and *peirastic dialectic* with genuine scientific purport. As highlighted by Devereux (1990), peirastic is not a sub-kind of dialectic but a function to unmask false claims of knowledge (cf. Brunschwig, 1990). An opposite approach according to which dialectic, though not merely eristic (as argued by Moraux, 1968), is alien to scientific enquiry is held by Solmsen (1968) and Owen (1968a).

[43] The debate mainly revolves around the ontological commitment of Aristotle's dialectic and represents a more specific way to address its scientific character (see note 37 above). Whereas Plato's dialectic is a fully-fledged science of the true nature of entities, it is unclear whether Aristotle's dialectic is engaged with reality, and goes beyond formal linguistic accounts.

is reiterated for each kind to which the object belongs until the object is separated from anything else. The network analysed through division represents the real connections among Forms and, thus, what the object is.[44] In his *Topics*, Aristotle lists definition among **the types of predicative relations** that are treated by dialectic (i.e. accident, genus, and property). Each of these relations holds between a subject and a predicate and is expressed by the statement examined by the dialectician. Aristotle explicitly remarks that every argumentative scheme is ultimately linked to the treatment of definitions (I.6, 102b27-35); for the dialectician has to consider any predicative relation about an object that is implied by and, thus, relevant to the statement of what the object is.[45] That is, the schemes to evaluate accident, genus, and property apply to definition, but not conversely.[46] In sum, whereas Plato's dialectician is engaged in the discovery of definitions, Aristotle's is engaged with their examination.

1.2.1 A Technical Analysis

In *Topics* I.5, Aristotle argues that 'a definition is the statement signifying the essence' (101b38). More precisely, a definition is meant to replace either a term or a statement in order to spell out the essence of the object that is signified by such a term or statement. For example, the definition 'rational animal' is the statement that indicates the essence of the object signified by the term 'human'. The predicative relation established between the definiens and the definiendum is classified in the category of the τί ἐστιν. Put it simply, a definition answers the Socratic question 'What is it?'. There is a salient feature on which Aristotle insists: in accounting for an object, a definition articulates meaningful parts. If these parts

[44] See *Phaed.* 265c-266a and *Phil.* 16c-17a. According to Crivelli (2013: 15-20), the model is designed to produce sub-kinds that are i) immediate, ii) disjoint, and iii) exhaustive (cf. Gill, 2016). For example, in the enquiry into angling the kind expertise–to which angling belongs–is firstly divided into two sub-kinds, acquisitive expertise and productive expertise; then, acquisitive expertise–to which angling belongs–is divided into acquisitive expertise by exchange and acquisitive expertise by subduing and so on and so forth (*Soph*. 218e-219b).

[45] So far I have been employing the term 'object' both in the sense of 'object of statement/knowledge' and in the sense of 'entity/body'. Henceforth, my use will be confined to the first sense (cf. *Top*. I.5, 101a18-20; 8, 103b8; VI.7, 146a3-7; *An. Post*. I.2, 71b11; 22, 72a25; 6, 74b33-36). This is closer to Aristotle's use of πρᾶγμα, which indicates a variety of items not necessarily corresponding to a real entity, such as i) subject (*An. Post*. I.1, 71b9-12; 2, 73b28; 6, 74b7; 22, 84a12; II.8, 93a22), ii) a characterization of the subject (*De Int.* 1, 16a6-8; *An. Post.* II.6, 91b14; 16, 98b29-31), iii) the counterpart of a predication (*De Int.* 7, 17a38ff; *An. Pr.* I.27, 43b1-14; 30, 46a24ff.). Cf. Mignucci (1975: 17-18).

[46] See *Top*. VII.5, 155a2-22.

are appropriately selected and combined, the definition successfully states what its object is, i.e. the what-it-is.

What is the content of such a statement? The answer is given in the treatment of definition undertaken in book VI. Besides applying the schemes on accident, genus, and property, the dialectician has to evaluate i) whether a definition is correct, and ii) whether a definition states the essence of the object (VI.1, 139a6-7). In this context, Aristotle makes it clear that *the definition is the statement of the genus and the differentiae of its object*. The genus is the predicate that separates the object from other kinds to which the object does not belong; e.g. animal separates human from courage, which is a virtue. The differentia is the predicate that separates the object from other objects within the same kind; e.g. biped separates human from horse, which is quadruped. To use Aristotle's words, the genus and the differentia constitute the definition of an object insofar as they are 'prior and more intelligible elements' among those predicated of the object in the category of τί ἐστιν (ἐν τῷ τί ἐστι κατηγορούμενον, I.5, 102a32-34; 8, 103b14-19).[47]

From this perspective, the Platonic inheritance of Aristotle's dialectic becomes more perspicuous. For the review of the schemes appears to rely on **a structured system of kinds** that is reminiscent of the network of Forms scanned in Plato's late dialogues. Basically, the dialectician has to test a statement with reference to the relations holding between the terms stated.[48] These terms are predicative kinds identified through the procedure of division. To illustrate, the genus animal is divided into sub-kinds, like terrestrial animal and aquatic animal, until its indivisible kinds, like the species human, are reached. However, while Plato's dialectic is based on the division of a genus into its inferior genera, Aristotle's is based on *the division of a genus into its inferior genera by means of differentiae*. The innovative step taken by Aristotle lies in the introduction of the *means* of division, which must be separated from the results of the same procedure. In this

[47] The core idea is that the statement of genus and differentia is absolutely more explanatory of what the object is than the term signifying the object (*Top*. VI.4, 141b22f.).

[48] A typical example of this strategy is to ensure the subordinate inclusion of two genera of the same object; e.g. science and virtue cannot be both the genus of justice, because none of them is the genus of the other (*Top*. IV.2, 121b24-30; VI.4, 143b11-19). Likewise, for contrary objects the dialectician has to ensure their inclusion in a common genus or in contrary genera (*Top*. IV.3, 123b1ff.). Predictably, the endorsement of the network becomes perspicuous with the schemes on opposites (cf. *Top*. II.8, 113b15-26; VII.3, 153a28-b24).

way, the dialectician is able to specify the essence of a kind by effectively narrowing the genus.[49]

There is another salient feature of definitions that can help us to make sense of these technical aspects. Aristotle remarks that much of the treatment of definitions revolves around securing the identity between the predicates and the subject of the statement (I.5, 102a6-13). At *Topics* I.7, he lists three senses of identity that are relevant to the discussion: 1. numerical identity; 2. specific identity; 3. generic identity (103a6-25). The identity that obtains between the predicates and the subject of a definition can hardly be specific or generic identity. Specific identity applies to individuals (e.g. Socrates and Callias are the same in species), thus they are not objects of definition; generic identity applies to sub-genera (e.g. human and horse are the same in genus), thus they must be different objects within the same genus. On the contrary, numerical identity could be the appropriate sense in which a subject is the same as its definitional predicates.

Numerical identity applies to one single object and takes place in three different forms:

1a. numerical identity in definition (a25-27);

1b. numerical identity in property (a27-29);

1c. numerical identity in accident (a29-39).

Since numerical identity holds between two expressions signifying one and the same object, the three forms are distinguished on the basis of the predicative relations that introduce them. What is relevant to us is that the genus does not introduce any form of numerical identity. Indeed generic identity does not entail that there is one single object, but two distinct objects sharing the genus. It is then reasonable to infer that the introduction of the differentia is thought to secure the numerical identity in definition.[50] For example, biped and terrestrial are meant to restrict the genus animal to the species human. In a nutshell, *the identity in definition obtains when a definiendum is one and the same as its definiens*;

[49] Mariani (1997) has interestingly pointed out that the verb διαιρέω can be constructed with either a) κατὰ plus accusative or b) the simple dative. Whereas in Plato's dialectic (a) and (b) are totally equivalent (cf. *Soph*. 220b9-13; *Pol*. 258e4ff.; *Phil*. 10c1ff.), in Aristotle's (a) indicates the *results* of the division, i.e. the species *into which* the genus is divided, and (b) indicates the *criterion* for dividing, i.e. the differentia *according to which* the genus is divided. It is worth noting indeed, that Aristotle divides a genus into its differentiae only in the *Postpredicamenta* (*Cat*. 13, 14b32-15a7), which is believed to be among his earliest Platonizing writings.

[50] Cf. *Top*. I.18, 108b1-6.

namely, when the definiens is the combination of the appropriate genus and differentia of the definiendum.

At this point, we can shed light on a central idea in Aristotle's treatment: the unity of definition. As a matter of fact, the notion of identity is just a way to cast the notion of unity; for there is a correspondence between the different senses in which identity and unity are said.[51] The common insight is that, despite articulating some elements that make up the essence of its object, a definition concerns one single thing. To rephrase:

Unity of Definition:		a definition is one statement signifying one object and not many.

For one thing, there must be unity among the predicates stated in the definition. The genus and the differentia must signify one single thing, namely the essence of the definiendum. For another thing, there must be unity between the subject and the predicates. The definiendum and the definiens must signify one single thing. To put it in a different way, an object is one and the same as its essence.

1.2.2 A Categorial Distinction

There is a thorny issue that arises with the treatment of definitions. In several passages, Aristotle insists on separating the genus from the differentia: the genus is the predicate that signifies the τί ἐστιν; the differentia, instead, is the predicate that signifies the ποιόν τι (*Top*. IV.2, 122b16-17; IV.6, 128a26-29; VI.6, 144a19-21).[52] Both predicates are stated in the definition and belong to the object. To rephrase the distinction: the genus indicates what the object is, while the differentia indicates what the object is like. For example, number signifies what three is, whereas odd and prime signify its qualitative attributes. On what basis does Aristotle establish this separation? The notions of τί ἐστιν and ποιόν τι invite us to think of a **categorial distinction**.[53] Namely, the two predicates are to be distinct insofar as each of them is differently classified. In particular, since they

[51] In *Metaphysics* Δ.9 (1017b27-1018a9), Aristotle argues that the senses of accidental and per se identity correspond to the senses of accidental and per se unity reviewed in Δ.6.
[52] At *Top*. IV.6, 128a26-29, the differentia is presented as a quality of the genus in that it indicates one of its instances with a certain quality. Cf. *Metaph*. Δ.14, 1020a33-b2; b13-17.
[53] The terminology is from Granger (1984).

are distinct in the light of what they signify, Aristotle is taken to refer to different ontological categories.[54] Basically, the genus must be separated from the differentia because, despite both stating what the object is, they signify distinct kinds of entities. The genus is a fully-determined substance, while the differentia is a certain attribute.[55]

At this point, the treatment of definition gets slightly complicated. On the one hand, definition is the statement of genus and differentiae and signifies the essence of the object; on the other hand, the statement of a genus and the statement of a differentia signify categorially distinct entities. Consequently, definitions turn out to state an ontologically mixed content in which the substantial nature of the object is coupled with some qualitative attribute. It is perhaps after having realized this inconsistency that Alexander (contrary to Aristotle) firmly argues that every predicate in the definition must signify what the object is.[56] The traditional strategy for tackling this tension is based on a chronological reconstruction of Aristotle's views. In a first Platonizing phase of thought, the concept of what-it-is (τί ἐστιν) might have narrower scope than the concept of essence (τὸ τί ἦν εἶναι);[57] thus, the former could not be exhaustive of the content of definitions. In a later phase, Aristotle extends the former concept so as to encompass both the genus and the differentia and, thus, identifies what an object is with its essence.[58] Alternatively, Marko Malink proposes a highly technical solution. Definitions state an ontologically uniform content because genus and differentia always signify the essence of the object that is entitled to a definition. That is, if the object possesses an essence, the content stated in the definition will always consist of its genus and its differentiae, independently of any categorial distinction.[59]

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[54] On the ontological and the predicative categories see Section 1.1.1 above.

[55] This reading of the categorial distinction presupposes that Aristotle uses τί ἐστιν to refer to the ontological class of οὐσία.

[56] See Alexander (*In Top.* 504.4-12) and Simplicius (*In Cat.* 99.19ff.), who credits Alexander with having raised the problem of the differentia.

[57] On the expression τί ἦν εἶναι see Frede-Patzig (1988: Einleitung, 18-19). I take 'essence' to be the modern term that best preserve the meaning of the Greek term (compared to 'what-was-being' or 'what-being-signifies').

[58] Indeed the qualitative character of the differentia is mostly defended in the central books of the *Topics*, which are often taken to represent his early views on dialectic. See Evans (1977: 112-114), Morrison (1993), and Mariani (1997: 12-13) who point out the priority that Aristotle ascribes to the genus over the differentia (cf. *Top*. IV.6, 128a24-26; VI.1, 139a29-31; 5, 142b28-29; 11, 149a14-27).

[59] Malink (2007) credits Aristotle with a rigorous distinction between τὸ τί ἐστι σημαίνειν and τὸ τί ἐστι λέγειν; the former indicating the membership in a category, the latter indicating the predicable at work. As predicable, the differentia states the essence of its object, yet, as a categorial item, it

I am inclined to think that neither of these approaches successfully removes the tension. The point is that the categorial distinction is embedded in Aristotle's theory of predication. Hence, it is meant to apply in predicative contexts. Both genus and differentia are two predicates that belong to the species to which the definition pertains. More precisely, each of them is involved in a *synonymous predication*. Thus, their subject receives the name and the definition of the terms predicated; to illustrate, 'human is animal' and 'human is biped' are synonymous predications because a human is named 'animal' and 'biped' and is accounted for as animal and biped. The remaining predicates, instead, are involved in a *paronymous predication*. Thus, their subject receives neither the name nor the definition of the term predicated, but is named through an inflexion; to illustrate, 'human is courageous' is a paronymous predication because human is named after an inflexion of 'courage'.[60] What is salient to see is that synonymous predicates belong to their subject within the same category, whereas paronymous predicates belong to their subject across different categories. To illustrate, in stating what human is like, 'courageous' is predicated from the category of quality, to which courage belongs, to the category of substance, to which its subject, human, belongs. Unlike synonymous predicates, paronymous predicates seem to be accidentally related to their subject. This means a couple of things. Since Aristotle subscribes both to the qualitative nature and to the synonymous character of the differentia, his conception does not undergo any relevant development. Whilst stating differentiae, a definition never implies paronymous predication.[61] Hence, the differentia is assumed to be a quality and to constitute the essence of the object. Nevertheless, it would be reasonable for the differentia to be paronymously predicated of the object of which the genus is synonymously predicated; for the differentia seems to belong to its subject across different categories.

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is a quality. However, this solution does not apply absolutely: i) at *Top*. IV.6, 128a23ff. the genus showing (δηλοῖ) the τί ἐστιν is contrasted with the differentia stating (λέγει) a ποιόν; ii) likewise, since δηλοῖ is likely to be equivalent to λέγει, the differentia seems to fail to τί ἐστι λέγειν; iii) at VI.6, 139a29-31 Aristotle argues that the genus is more fitted to signify the substance (οὐσίαν σημαίνειν).

[60] See *Cat*. 1, 1a6-15.

[61] It is relevant to notice that in the *Categories* Aristotle warns us against the multiplicity of 'quality' (8, 8b25-26). In order to oppose primary and secondary substances, he points out that genera and species also signify a quality, despite being predicated synonymously (5, 3a33-b15). In so arguing, Aristotle does not specify what a differentia signifies but only that it is a synonymous predicate. At that point, indeed, he lacks terms to preserve the categorial distinction.

Given this tension in the treatment of definition, we can conjecture that the categorial distinction is firstly conceived to fit the predicative framework of Aristotle's dialectic. As suggested by Porphyry, the difficulty lies in the fact that a differentia can be assimilated neither to a genus nor to an accident. It cannot be assimilated to a genus because its predication contributes to establishing identity between the subject and its definition; it cannot be assimilated to an accident because its predication always applies to the subject. With this in mind, it is worth noting that Aristotle himself struggles with illustrating the relation between genus and differentia. In book IV of the *Topics*, he points out that the genus always implies the differentia, while the converse is not the case (IV.6, 128a38-b9). With a similar approach, Aristotle says that the differentia is 'ascribed to', 'added to', or 'true of' the genus (προσάπτειν, VI.1, 139a29-30; ἀληθεύειν, προστιθέναι, VI.6, 143b2-7), and, correspondingly, that the genus is 'imported' by the differentia (ἐπιφέρειν, VI.6, 144b16-30). This imprecise terminology is totally unsurprising. If differentia is neither a genus nor an accident, its relation to the genus cannot be clearly specified in terms of predication; for it can be neither synonymously nor paronymously related to the genus. The reason for this attitude is the reason to separate the two predicates stated in definition.[62]

My suggestion is that *the categorial distinction follows from the unity of definition*. Should genus and differentia be predicated of one another, some dialectical difficulties would undermine the statement of the essence of the object. Aristotle considers these dialectical difficulties in his review of the schemes on the essentiality of definition. One difficulty is triggered (I) if the differentia is predicated of the genus; the other difficulty is triggered (II) if the genus (or the species) is predicated of the differentia. Let us start with (I).

> Moreover, see if one divides the genus by a negation, as those do who define a line as 'length without breadth'; for this means simply that the line has not any breadth. Ia) The genus will then be found to participate in its own species; for, since of everything either the affirmation or the negation is true, length must always be either 'without breadth' or 'with breadth', so that 'length' as well, i.e. the genus of line, will be either 'without breadth' or 'with breadth'. But 'length without breadth' is the definition of a species, as also is 'length with breadth'; for

[62] I agree with Granger (1981) that the differentia is likely to be a per se accident of the genus. This can explain in what sense the differentia indicates a quality, though not why it is meant to do so.

> ‘with breadth’ and ‘without breadth’ are differentiae, and the genus and differentia constitute the definition of the species. Hence the genus will receive the definition of its species. Likewise, also, Ib) the genus will receive the definition of the differentia, seeing that one or the other of the aforesaid differentiae is of necessity predicated of the genus (κατηγορεῖται τοῦ γένους). […] For one assertion or the other will have to be true of length universally, if it is to be true of the genus. And this is contrary to the fact; for there exist both lengths without breadth and lengths with breadth. Hence the only people against whom the rule can be employed are those who assert that every genus is numerically one. (*Top*. VI.6, 143b11-30, Pickard-Cambridge’s translation slightly modified)

> Ἔτι ἐὰν ἀποφάσει διαιρῇ τὸ γένος, καθάπερ οἱ τὴν γραμμὴν ὁριζόμενοι μῆκος ἀπλατὲς εἶναι· οὐδὲν γὰρ ἄλλο σημαίνει ἢ ὅτι οὐκ ἔχει πλάτος. συμβήσεται οὖν τὸ γένος μετέχειν τοῦ εἴδους· πᾶν γὰρ μῆκος ἢ ἀπλατὲς ἢ πλάτος ἔχον ἐστίν, ἐπεὶ κατὰ παντὸς ἢ ἡ κατάφασις ἢ ἡ ἀπό ἔχον ἐστίν, ἐπεὶ κατὰ παντὸς ἢ ἡ κατάφασις ἢ ἡ ἀπόφασις ἀληθεύεται, ὥστε καὶ τὸ γένος τῆς γραμμῆς, μῆκος ὄν, ἢ ἀπλατὲς ἢ πλάτος ἔχον ἔσται. μῆκος δ’ ἀπλατὲς εἴδους ἐστὶ λόγος· ὁμοίως δὲ καὶ μῆκος πλάτος ἔχον. τὸ γὰρ ἀπλατὲς καὶ τὸ πλάτος ἔχον διαφοραί εἰσιν· ἐκ δὲ τῆς διαφορᾶς καὶ τοῦ γένους ὁ τοῦ εἴδους ἐστὶ λόγος, ὥστε τὸ γένος ἐπιδέχοιτ’ ἂν τὸν τοῦ εἴδους λόγον. ὁμοίως δὲ καὶ τὸν τῆς διαφορᾶς, ἐπειδὴ ἡ ἑτέρα τῶν εἰρημένων διαφορῶν ἐξ ἀνάγκης κατηγορεῖται τοῦ γένους. […] δεῖ γὰρ κατὰ παντὸς μήκους τὸ ἕτερον αὐτῶν ἀληθεύεσθαι, εἴπερ κατὰ τοῦ γένους ἀληθεύεσθαι μέλλει. τοῦτο δ’ οὐ συμβαίνει· ἔστι γὰρ καὶ ἀπλατῆ καὶ πλάτος ἔχοντα μήκη. ὥστε πρὸς ἐκείνους μόνους χρήσιμος ὁ τόπος οἳ πᾶν γένος ἓν ἀριθμῷ φασιν εἶναι.

The scheme is focused on the definition of objects that consists of one genus and one of two contradictory differentiae. Namely, the genus is divided into its species by means of two exhaustive and mutually exclusive differentiae. Nevertheless, Aristotle’s main concern is the participation of the genus Ia) in its species, and Ib) in its differentiae. In its technical use, the notion of ‘participation’ (μέθεξις) amounts to the reverse of a synonymous predication: *A* participates in *B iff B* is synonymously predicated of *A* (i.e. *A* receives the definition of *B*).[63] What Aristotle has then in mind is the relation between a definiendum and the constituents of its definiens.

Ia) and Ib) stem from the fact that there is one single differentia that truly applies to the genus. To illustrate, if length is divided into two species via ‘with

[63] See *Top*. IV.1, 121a10-12; V, 133a1-2. Aristotle makes use of a technical term from Plato’s metaphysics to indicate the relation between an object (i.e. definiendum) and its essential elements (i.e. definiens). Cf. Brunschwig (2007: 159-161).

breadth' and 'without breadth', then either with breadth or without breadth will truly apply to length; that is, length must be either with breadth or without breadth. Since 'length without breadth' is the definition of one species of length, it will be the case that the genus length receives the definition of one of its species. Consequently, Ia) the genus participates in its own species. Likewise, since 'length without breadth' is constituted from a genus and a differentia, it will be the case that the genus length receives the definition of one of its differentiae. Consequently, Ib) the genus participates in its own differentiae. At a general level, Ia) and Ib) clash with the network of kinds on which the dialectician relies; species and differentiae are necessarily less extended than the genus and, consequently, are never predicated of it.[64] The dialectical difficulty lies in **the pluralization of the definition**. More precisely, the participation of the genus in its species and differentiae entails that any definition includes opposite characterizations of the same object; for the reception of the definition of the genus means the reception of its opposite definitions through opposite differentiae. In a nutshell, the definition does not state the essence of the object because it fails to signify one object rather than many. That is, there is no unity of the definition.

Let us move to (II).

> Again, see if the genus is predicated (κατηγορεῖται) of the differentia; for it seems that the genus is predicated, not of the differentia, but of the objects of which the differentia is predicated. For example 'animal' is predicated of human and cow and other terrestrial animals, not of the differentia itself, which we predicate of the species. For if 'animal' is to be predicated of each of its differentiae, then many animals will be predicated of the species; for the differentiae are predicated of the species. (*Top*. VI.6, 144a31-b3, Pickard-Cambridge's translation slightly modified)[65]

> πάλιν εἰ κατηγορεῖται τὸ γένος τῆς διαφορᾶς· οὐ γὰρ κατὰ τῆς διαφορᾶς, ἀλλὰ καθ' ὧν ἡ διαφορά, τὸ γένος δοκεῖ κατηγορεῖσθαι, οἷον τὸ ζῷον κατὰ τοῦ ἀνθρώπου καὶ τοῦ βοὸς καὶ τῶν ἄλλων πεζῶν ζῴων, οὐ κατ' αὐτῆς τῆς διαφορᾶς τῆς κατὰ τοῦ εἴδους λε γομένης. εἰ γὰρ καθ' ἑκάστης τῶν διαφορῶν τὸ ζῷον κατηγορηθήσεται, πολλὰ ζῷα τοῦ εἴδους ἂν κατηγοροῖτο· αἱ γὰρ διαφοραὶ τοῦ εἴδους κατηγοροῦνται. ἔτι αἱ διαφοραὶ πᾶσαι ἢ εἴδη ἢ ἄτομα ἔσονται, εἴπερ ζῷα· ἕκαστον γὰρ τῶν ζῴων

[64] See *Top.* IV.2, 122a2-10; 122b25-36; 123a6-10; VI.6, 144a18-30.
[65] See *Top*. VI.6, 144b4-11 for a subcase of this scheme.

Aristotle is here concerned with the cases in which the genus is predicated of the differentia. Namely, the definition fails to state the essence of an object if the differentia participates in the genus. The basic idea is that for one genus there is a plurality of differentiae. Thus, if the genus were predicated of each differentia, the genus would then be multiplied by the number of its differentiae. Indeed, each differentia would receive the definition of the genus separately. To illustrate, since 'human' is defined as 'terrestrial biped animal', if 'animal' were predicated of 'terrestrial' and 'biped', then there would be two distinct accounts of 'animal': 'terrestrial animal' and 'biped animal'.[66]

What is puzzling is that the species receives distinct definitions of the genus, one for each of the differentiae in which the species participates. Again, the dialectical difficulty lies in **the pluralization of the definition**. The participation of the differentia in its genus entails that any definition includes repeatable characterizations of the same object; for the reception of the definition of the differentiae implies the reception of distinct definitions of the genus. In other words, since such a repetition of the genus amounts to accounting for an object through a plurality of distinct predicates, the definition fails to signify one object rather than many.[67] That is, there is no unity of definition. Therefore, the definition does not state the essence of the object.

These schemes on definition are indicative of the reasons behind the categorial distinction. In view of the unity of definition, Aristotle prevents genus and differentia from being predicated of one another. That is, the predicates must not pluralize the definition by either stating opposite attributes or multiplying their object. To this effect, he requires that the predicates be separate on the basis of the category to which they belong. The genus is the predicate that indicates the general nature of the subject, while the differentia is the predicate that specifies this nature in a qualitative way. It could be said that Aristotle introduces the differentia in definitions because there must be one single object signified by

[66] Cf. Brunschwig (2007: 228).
[67] As argued at *Top*. VI.3, 140b27-14, the difficulty turns out to be pressing if the predication entails not simply saying twice the same term, but attributing the same characterization to the same object twice. On the forms of repetition see *Top*. V.2, 130a29-130b10.

definiendum and definiens; likewise, he categorially separates the differentia because there must be one single object signified by definiendum and definiens.

1.3 Science: The Primacy of Definition

An Aristotelian science, I said, is a body of demonstrative knowledge.[68] Each demonstration proves that a certain fact stated in the conclusion necessarily obtains on the basis of a certain cause stated in the premises. The fact is the belonging of a demonstrable attribute to a subject (i.e. explanandum), while the cause is the term that mediates such belonging (i.e. explanans). To illustrate,

C) Non-twinkling belongs to B) celestial bodies near to the earth
D) Nearness to the earth belongs to C) planets
B) Non-twinkling belongs to C) planets.

The astronomer explains why AaC obtains on the basis of two premises, AaB and BaC, in which a further term, nearness to the earth, causes the belonging of non-twinkling to planets.[69] In other words, non-twinkling is a per se attribute of planets and, more generally, of celestial bodies (which is the genus of the objects studied by astronomy).

Earlier, I remarked that a science is a hierarchical system articulated into principles and demonstrations.[70] Some demonstrations are directly grounded in the principles of the science. Their results are the starting point of other demonstrations, which are indirectly grounded in the principles. In one word, the system is regulated by a form of dependence: the knowledge of some objects depends upon the knowledge of other objects because the former is grounded in

[68] The term ἐπιστήμη indicates both the cognitive state of the knower (*Eth. Nic.* VI.3, 1139b31-34) and the formal system to present it (1139b25-31). I will use 'demonstrative knowledge' to stress the first sense and 'science' to stress the second sense. In point of fact, there is no distinction. ἐπιστήμη is the type of γνῶσις that is possessed by the expert scientist and presented in a formal way. See Mckirahan (1992: 23) and Bronstein (2016: 16-21); for a slightly different treatment see Burnyeat (1981).

[69] See *An. Post.* I.13, 78a39-b4. The syllogism BaA, AaC ⊦ BaC, instead, is not a demonstration insofar as it does not reveal the reason why the conclusion obtains. See Lennox (1987).

[70] Barnes (1994: xii; 1981: 25-27) and Scholz (1975) speak of a formal axiomatized system.

the latter.[71] For example, the knowledge that non-twinkling belongs to planets is grounded in the knowledge that nearness to the earth belongs to planets because the nearness to the earth is presupposed by our knowledge of planets, in particular, and of celestial bodies, in general. As already seen, this dependence can be cast in epistemic, definitional, or existential terms. The key point is that *in a science what is more basic in the system grounds what is higher*. Aristotle places definition among the principles at the basis of this hierarchical body of demonstrations. My concern is to spell out what a definition is in such a context.

1.3.1 At the Foundations of Demonstrative Science

Within a demonstrative science, there are two kinds of principles: axioms and theses.[72] Axioms are common principles that apply in any subject-matter. Indeed, they ground any demonstration about any genus of objects. These take the form of general laws to which every scientist is committed, such as the law of non-contradiction.[73] Theses, by contrast, are principles that are proper to the subject-matter treated by the relevant science. Namely, they ground the demonstrations about a specific genus of objects. Aristotle divides the theses into hypotheses and definitions. A hypothesis states the existence of the elements of a science; for example, the geometer grounds her demonstrations upon the statement that point and line exist. A definition states the essence of the elements of a science; for example, the geometer grounds her demonstrations upon the statements of what point and line are.

In *Posterior Analytics* I.2, Aristotle gives us a general insight into the nature of scientific principles and at 72a7-8 seems to summarise his views.

> A principle of a demonstration is an immediate premise (πρότασις), and a premise is immediate if there is no other premise prior to it. (Barnes' translation slightly modified)
>
> ἀρχὴ δ' ἐστὶν ἀποδείξεως πρότασις ἄμεσος, ἄμεσος δὲ ἧς μὴ ἔστιν ἄλλη προτέρα.

[71] That is the ontological dependence regulating metaphysics. See Section 1.1.2 above.
[72] See *An. Post*. I.2, 72a14-24. Cf. I.10, 76a37-b11.
[73] Since the application of axioms in a science is always relevant to the genus studied by the science, their common character does not clash with the autonomy of sciences.

The passage sounds slightly circular. Aristotle argues that a certain premise is a scientific principle because of its immediacy and explains its immediacy in terms of priority, which is an intrinsic feature of principles. Perhaps we can make a virtue of necessity by casting light on the connections between these philosophical concepts. In general, it is worth noting that a principle is not simply the premise of a demonstration. A premise can be assumed on the basis of other demonstrations within the same science and its priority is understood in relation to the conclusion inferred by the scientist; roughly, a premise is more knowable than and the cause of the conclusion. *A principle holds absolute priority*, instead. It is the priority of the principles, I contend, that must be understood in terms of immediacy.[74]

An important suggestion is given by commentators. The notion of πρότασις is not to be rigidly identified with the premise of a syllogistic demonstration. Aristotle's usage is often fluid and concerns statements in which one term is predicated of another; in particular, it is the statement that is the true branch of a contradiction.[75] Therefore, principles, like definitions, are statements that are assumed to ground demonstrative knowledge. This makes sense within the loose conception of science in which a definition fulfils its function of principle. In the *Analytics*, demonstrative knowledge is not exclusively presented in a syllogistic form with a conclusion obtaining in virtue of two premises. Aristotle devotes much attention to the presentation of the same epistemic content through deductive chains of statements.[76] To illustrate, a conclusion (C) necessarily follows from a sequence of statements (S_1; S_2; […] S_n) in which every statement is chained to another through the predicative relations holding between the terms stated. Syllogistic demonstrations are just a pattern to display the demonstrative knowledge that a per se attribute belongs to an object. The same demonstrative knowledge is displayed by a chain of statements of per se^1 and per se^2 predications.[77]

[74] The basic condition for every element of science is, of course, its truth.
[75] On the senses of πρότασις, see Barnes (1994: 98-99); Mignucci (1975: 32-33; 2007: 155). Cf. Ross (1949: 288-289) and Brunschwig (2003: 118).
[76] 'A science is no more than a coherent sequence of propositions, beginning with a set of ἀρχαί or axioms, and proceeding thence from theorem to theorem' Barnes (1981: 27). Cf. Barnes (1969).
[77] See *An*. *Post*. I.15-22, in which Aristotle attempts to reject infinite chains of predications in order to prove the impossibility of infinite demonstrative knowledge.

What is relevant to us is that the function of definition is to provide the starting point of such deductive chains in science. Since a definition accounts for an object by stating its essence, its immediacy amounts to the impossibility of demonstrating such an essential characterization. In other words, *the definition of an object is immediate insofar as its statement cannot be mediated by any other statement about the object*. For example, the definition of the moon is immediate insofar as its statement cannot be mediated by any other statement about moon; by contrast, every other statement about moon (e.g. eclipse belongs to moon) is subject to be mediated (e.g. screening of sun by earth). Since a definition is an immediate statement, it grounds the deductive chain displaying scientific knowledge.

We are now able to illustrate the absolute priority that makes definitions the principles of demonstrative science.

Primacy of Definition: a definition is an immediate statement of what an object is.

The primacy of definitions is equivalent to their indemonstrable status as principles. If definitions were demonstrable, they would not ground any demonstrative science; for it would be possible to mediate their statement. Namely, the definiens and, thus, an essential characterization would be proved to belong to the definiendum and to the object, respectively. Whereas there is no cause for a definition, there are always causes why other statements obtain. Hence, the scientific knowledge of an object is expressed either by an immediate statement or by other statements. The former hold primacy, while the latter do not.[78]

1.3.2 Demonstrating a Definition

It is a common tendency to think that book I of the *Posterior Analytics* describes the organization of a fully-fledged science, whereas book II is mainly concerned

[78] Once again, Aristotle appears to depart from the Platonic treatment of definition. For a definition is primary in virtue of being not a result of a scientific argument, but its indemonstrable starting point. This earns Plato's science the methodological charge of *petitio principii* (cf. *An. Pr.* I.31, 46a31ff.; II.16, 64b28-65a5; II.5, 91b12-27; b36-92a5). See Cavini (1995) and Castagnoli (2013).

with the enquiry to develop such knowledge. Arguably, an enquirer becomes a scientist after having completed some research on her subject-matter and, thus, achieved full understanding of its principles and demonstrations.[79] It is then reasonable to say that, if book I gives us an insight into the function ascribed to definition within a demonstrative science, book II might give us an insight into how definition comes to perform this function. This, however, means making sense of the aporematic and widely debated discussion of book II. For our purposes, I will focus on the difficulty that is most significant for the issue of primacy: *the possibility of demonstrating a definition*. Although the difficulties presented in II.3-7 broadly range over the relation between demonstration and definition, Aristotle turns out to be chiefly interested in whether a definition can somehow be proved. His arguments will expand on the idea of primacy of definition I just outlined.

At the start of II.3, Aristotle concentrates his aporematic discussion on how to prove the τί ἐστιν (90a35-38). This notion, I remarked, indicates both the predication accounting for an object and the content of definitions. It is then straightforward that the possibility of proving the τί ἐστιν is nothing but the possibility of proving a definition. This sounds puzzling to the reader of book I. Indeed, a definition is the principle of a demonstrative science and is not subject to being demonstrated itself.[80] Why does Aristotle take this possibility into consideration?

The answer lies in II.1-2 in which Aristotle sets out the framework of the enquiry that will develop into a fully-fledged science. Roughly, there are two central points. First of all, to know something is to account for either what an object is (τί ἐστιν) or why there is an object (διότι/διὰ τί); that is, the knowledge of some objects is displayed by definition and the knowledge of some others by demonstration. Secondly, to enquire is to look for the cause in virtue of which the

[79] For the interpretation of science as the pure presentation of data in a pedagogical context (mostly based on book I) see Barnes (1969; 1993: xi-xxii). For the connection between the practice of scientific enquiry and the theory of book II see Bolton (1987), Lennox (1987), Charles (2000: 23-77), Deslauriers (2007: Ch. 2-3). Interestingly, Bronstein (2016: 69-80) argues that II.1-13 is a discussion of the non-demonstrative knowledge that will serve in the practices of demonstrative knowledge presented in book I (e.g. didactic learning).

[80] Aristotle is clearly playing on the senses of δεικνύναι, conveying both the idea of 'showing', 'revealing' and the idea of 'demonstrating', which is properly expressed by adding the suffix ἀπό (cf. Chantraine, 1968: 257-258)

definiendum and the explanandum exist (εἰ ἔστι and ὅτι, respectively).[81] To illustrate, the enquirer into centaur and eclipse has to account for what centaur is and for why there is an eclipse; this means indicating the cause in virtue of which there are a centaur and an eclipse, respectively. The knowledge of an object, either by definition or by demonstration, requires the enquirer to establish a middle-term. In other words, the enquirer has to mediate a certain fact about the object (either εἰ ἔστι or ὅτι) through some cause that will provide her with knowledge (either of τί ἐστιν or of διότι).

The aporematic step is that Aristotle considers definition and demonstration to be equivalent forms of knowledge (90a31-33).[82] In either case, the enquirer achieves knowledge of an object insofar as she discovers the cause to be stated in the account of either the τί ἐστιν or the διότι. Despite being clearly able to separate the objects of definition from the objects of demonstration, *Aristotle is then relying on an absolute notion of knowledge as the statement of a causal middle-term*. Now, since the enquiry achieves knowledge only if it indicates a causal middle-term, the enquiry will always lead to demonstrative knowledge; for the identification of a cause mediating a certain fact amounts to the demonstration that the fact occurs. To illustrate, the identification of nearness to the earth to mediate the belonging of non-twinkling to planets amounts to demonstrating that planets do not twinkle. Given this framework, the demonstration of a definition is not simply a possibility, but the unique procedure to state what an object is.[83]

Let me spell out the aporetic consequences of this reasoning. In order to achieve knowledge, it is necessary to demonstrate a definition. However, Aristotle reminds us that a demonstration presupposes the statement of what an object is. Since every demonstration is grounded in a definition, the demonstration of a definition must itself be grounded in a definition; therefore, the

[81] Again, I take εἶναι to indicate (i) the existence of an object that is the subject of a science (i.e. the genus or a sub-genus, like moon), and (ii) the existence of a per se characterization of the object (i.e. the fact that a per se attribute belongs to a genus, like eclipse). In either case, what Aristotle has in mind is the statement 'there is such a thing' (see Section 1.1 above). It could be said that existence is not fully disentangled from the sortal sense according to which the subject is object of knowledge. On this point see Owen (1965).

[82] Cf. Goldin (1996: 3ff.) and Deslauriers (2007: 48-55). For a different view see Charles (2000: 248-249).

[83] This may sound less unreasonable if we think that in book I Aristotle postpones his analysis of whether the knowledge of principles, such as definitions, is other than demonstrative knowledge (I.2, 71b16-19); rather, he often introduces definitions as resulting from some sort of assumption. See *An. Post*. I.1, 71a11-16 (προγινώσκειν); 2, 72a21-24 (τίθημι); 3, 72b13-15 (ἐξ ὑποθέσεως, cf. 84a4-6); 10, 76a31-b5 (λαμβάνειν cf. 78a10-12).

enquirer will achieve a regressive form of knowledge. Basically, if there were demonstrative knowledge of definitions, there would be a regressive assumption of a further definition to ground such knowledge (II.3, 90b25-33). From chapter 4 to 6, Aristotle examines different methods to prove a definition and illustrates their regressive character. The point is that every attempt to demonstrate a definition is to mediate the belonging of the definiens to the definiendum through some cause; but nothing prevents such a cause from being mediated itself. In Aristotle's words, 'it is always possible to ask why', for example, human is such-and-such an animal (II.7, 92b19-25).[84]

These consequences undermine Aristotle's conception of science. The enquirer is supposed to achieve demonstrative knowledge of her object on the basis of a definition. This is hindered by the absence of any definitional knowledge. Since a definition cannot be demonstrated, there is no knowledge of definienda. From the absence of definitional knowledge, Aristotle infers the absence of demonstrative knowledge too; for there is no knowledge to ground the demonstrations of the explananda. In the end, there is no knowledge achievable. One possibility could be to appeal to the notion of nominal definition to introduce some form of definitional knowledge. Nominal definitions do not establish the existence of their object, thus the enquirer has still the possibility of achieving demonstrative knowledge on the basis of some definition. The problem, Aristotle reminds us, is that a nominal definition does not state what an object is, but what a name signifies (λόγος τοῦ τί σημαίνει τὸ ὄνομα); thus, it will ground scientific explanations as much as arbitrary explanations. Its definienda range from real necessary objects to unreal and accidental objects. For example, the definition of a goatstag and the definition of a wise human could be employed to ground demonstrations about a non-existent and an accidental object, respectively. In brief, the knowledge grounded in nominal definitions would fail to be genuinely scientific (II.7, 92b25-34).

Aristotle proposes a complex argument in order to solve these puzzles. Since the source of the difficulty lies in an absolute notion of knowledge, his ultimate

[84] At a more technical level, Aristotle also points out that definition cannot be demonstrated because a demonstration proves that something belongs to something else, while no belonging is stated in a definition (II.3, 90b33-37); for predication among its terms would undermine the unity of the statement (see Section 1.2.2 above). Plainly, Aristotle is here identifying a definition with the definiens. Indeed, no definiens is fully stated in deductive arguments, but only the element that is sufficient to establish the conclusion. Cf. *An. Pr.* I.43.

goal is to disentangle knowledge by definition and knowledge by demonstration and clarify how these two are interconnected in scientific enquiry. Each argumentative step, I contend, pivots on the immediate character of definition. Hence, the demonstration of a definition will be possible only if it does not undermine the primacy of scientific principles.

The first argumentative step is to re-establish **the distinction between objects of knowledge**. This move enables Aristotle to separate two senses of τί ἐστιν, for which the cause applies differently: in some cases, the τί ἐστιν of an object is indicated by a cause within a definition and is indemonstrable; in other cases, the τί ἐστιν of an object is indicated by a cause within a demonstration and is somehow demonstrable. The distinction is hinted at the beginning of II.8 and fully expounded in II.9.

> For some objects the cause is something different, while for others it is not. Consequently, it is evident that (A) in some cases what an object is is immediate and principle […]; whereas (B) in those cases which have a middle-term and of which there is a cause other than their substance, it is possible, as we said, to reveal what an object is through demonstration, but not to demonstrate it. (II.9, 93b21-28, Barnes' translation slightly modified)[85]

> Ἔστι δὲ τῶν μὲν ἕτερόν τι αἴτιον, τῶν δ' οὐκ ἔστιν. ὥστε δῆλον ὅτι καὶ τῶν τί ἐστι τὰ μὲν ἄμεσα καὶ ἀρχαί εἰσιν, ἃ καὶ εἶναι καὶ τί ἐστιν ὑποθέσθαι δεῖ ἢ ἄλλον τρόπον φανερὰ ποιῆσαι (…)· τῶν δ' ἐχόντων μέσον, καὶ ὧν ἔστι τι ἕτερον αἴτιον τῆς οὐσίας, ἔστι δι'ἀποδείξεως, ὥσπερ εἴπομεν, δηλῶσαι, μὴ τὸ τί ἐστιν ἀποδεικνύντας.

Basically, there are two objects of knowledge: (A) objects identical with their cause; (B) objects other than their cause. Aristotle argues that the what-it-is of A-objects is immediate because its statement does not refer to any other cause but itself; the what-it-is of B-objects is not immediate because it is shown through a demonstration stating the cause of the object. According to some commentators, Aristotle has in mind an ontological distinction to separate substances from non-substances, such as events. Whereas substances are caused by themselves, events are caused by something else; for example, whereas a human is caused

[85] Cf. *An. Post.* II.8, 90a3-8; *An. Pr.* II.16, 64b34-36.

by her specific essence, a thunder is caused by some external factor.[86] According to others, the distinction is conceived to separate primitive terms and derived terms in science. Whereas primitive terms are not analysable, derived terms are analysable with reference to more primitive terms. Unity, Aristotle seems to suggest, is a primitive term in arithmetic because every other term is analysable with reference to unity.[87]

What things is Aristotle separating? The key point is that the immediacy of what an A-object is marks the primacy of its statement. *The what-it-is of A-objects is stated by immediate definitions* that ground demonstrative science. Therefore, an A-object is either the genus or a sub-genus studied by a science. *The what-it-is of B-objects is instead stated by derivative definitions* and does not ground demonstrative science; for it requires some other cause for its statement. Therefore, a B-object is a demonstrable attribute of the genus studied by a science.[88] If this is correct, Aristotle attempts to solve the aporetic discussion by introducing the following distinctions:

A-Objects	B-objects
Identical with their cause	Other than their cause
Immediate definitions	Derivative definitions
Knowledge by Definition	Knowledge by Demonstration

Admittedly, his argument to disentangle knowledge by definition and knowledge by demonstration is just to assume the primacy of the definitions of A-objects. Definitions hold primacy because they are immediate statements of a what-it-is (τί ἐστιν); therefore, they ground the demonstrations about the object of science. To illustrate, the definition of moon is the immediate statement of what moon is (say, moon is such-and-such a celestial body) and grounds the demonstration of eclipse (i.e. that eclipse belongs to moon). These definitions imply the existence of their objects; for there is identity between an A-object and the cause of the fact that there is such-and-such an object. There are, however, other definitions that are derivative statements of a what-it-is; that is, they are derived from some mediating cause. Accordingly, they do not hold primacy. To illustrate, the

[86] Cf. Ross (1949: 629); Goldin (1996: 101-136).
[87] Cf. Scholz (1975: 60f.); Barnes (1994: 221-222); Charles (2000: 24-56; 197-204).
[88] For a similar view, see Deslauriers (2007: 55-65) and Bronstein (2016: 131-138).

definition of eclipse is a derivative statement of what eclipse is (i.e. loss of light from moon because of the screening of sun by earth). In fact, these definitions correspond to demonstrations in which the terms are non-syllogistically arranged; for example, the definition of eclipse corresponds to the demonstration of eclipse (i.e. that eclipse [loss of light] belongs to moon). I shall call them demonstrative definitions.[89]

In sum, every demonstrative science consists of the knowledge of some objects by definitions and the knowledge of some objects by demonstration. The A-objects that are known by immediate definition are the subjects of scientific knowledge, whereas the B-objects that are known by derivative definitions are the demonstrable attributes of the subjects. On this score, the distinction introduced in the *Analytics* turns out to separate the primary objects from the secondary objects of a science.

A-Objects	B-objects
Primary objects	Secondary objects

The primary objects are the subjects of which the scientist assumes definition and existence. The secondary objects are the demonstrable attributes of which the scientist delivers a demonstration (or a demonstrative definition). This is the form of dependence that regulates demonstrative sciences, including metaphysics.[90] Therefore, every definition represents a principle to ground a demonstration within the relevant science. Since definitions account for the genera that are the subjects of some demonstrable attributes, their statement is immediate and does not refer to other causes.[91]

Given this overarching distinction, Aristotle is able to reconceive **the relation between definition and demonstration**. His main task is to show how a demonstration of a definition is possible and, thus, how an enquirer achieves demonstrative knowledge of an object. The point is that Aristotle will not focus on the account of A-objects (i.e. immediate definitions), but only on the account of

[89] See *An. Post.* II.10, 94a11-14. My use of definition will always be confined to the immediate definitions of A-objects, unless otherwise noted.
[90] In metaphysics, substances are A-objects that are the subject of the study, while non-substances are the B-objects that are the demonstrable attributes of the subject. I will expand this insight in Chapter Three.
[91] Nonetheless, the ultimate principle of a science is what holds primacy within the genus itself, i.e. the definition of the genus. See *An*. *Post*. I.6, 74b24-25.

B-objects (i.e. derivative definitions). The procedure is expounded in II.8 and works within the framework of II.1-2: the knowledge of an object must be grounded in the knowledge of the existence of the object. To that end, Aristotle tells us that the enquirer has firstly to know 'something of the object' (93a22); for example, the enquirer into eclipse has to know that eclipse is a loss of light.[92] Such partial knowledge of the object enables the enquirer to achieve either i) knowledge that the object exists, or ii) knowledge why the object exists. On route (ii), the enquirer directly establishes a middle-term that is the cause of the existence of the object. Thus, she achieves demonstrative knowledge of her object (e.g. there is an eclipse because of screening of sun by earth). On route (i), the enquirer establishes a middle-term that is not the cause of the existence of the object. Thus, she is merely able to deduce the existence of her object (e.g. there is an eclipse because of the moon's impossibility of shadowing).

Since the τί ἐστιν of the object is partially stated in the conclusion and completed with the statement of the cause, the enquirer turns out to perform the demonstration of a definition. For her enquiry reveals the definition by stating the cause of why the definiendum exists. In Aristotle's words, the demonstration of an object can be rearranged in a syllogistic way to produce a statement of what the object is. In the demonstration of eclipse, for example, what an eclipse is is revealed by stating its existence, 'that loss of light belongs to moon', and its cause, 'screening of sun by earth'. In a nutshell, such demonstrative definitions are derivative and must be grounded in immediate definitions, just as demonstrable attributes are posterior and must be grounded in their subject.[93]

1.4 A Theory of Definition

Aristotle's metaphysics is the demonstrative science of being and Z is the enquiry to establish its principle: what substance is. My approach to Z is to establish a

[92] The partial knowledge of the object is regarded as either i) a grasp of some definitional attributes (Ackrill, 1981: 368-376; Barnes, 1994: 218-219; Goldin, 1996: 108-118) or ii) a nominal definition to launch the search for the existence of the object (DeMoss-Devereux, 1988: 134-135; Charles, 2000: 23-56). For a different view see Bolton (1976: 523-525).
[93] See *An. Post.* II.10, 93b38-a2.

correspondence between the enquiry into substance and the enquiry into definition. Indeed, what substance is is the principle of other entities just as definition is the principle of the demonstrations in a science. In order to discuss the problems and the arguments about substance in Z, we need to examine their linguistic counterparts, namely the problems and the arguments about definition. Such a 'theory of definition' is expounded in the logical works. I focused my analysis on two chief contexts: dialectic and science. Aristotle's dialectic provides us with a technical treatment of definition: *a definition is a statement of the genus and the differentia of an object signifying its essence*. The innovative aspects of this treatment (such as the introduction of the differentia and the categorial distinction) are to be understood with reference to **the unity of definition**: a definition is one statement signifying one object and not many. The unity of definition is indeed required to avoid some dialectical difficulties undermining the statements about the object. Aristotle's science gives us an insight into the epistemic function of definition: *a definition is the principle grounding the demonstrations about an object*. This role can be understood with reference to **the primacy of definition**: a definition is an immediate statement of what an object is. The primacy of definition is assumed to articulate the scientific knowledge of an object, which consists of the definitional knowledge of the subject studied and the demonstrative knowledge of its per se attributes. The remainder of this work is a discussion of Z's enquiry in the light of this theory of definition. For Aristotle is attempting to establish a principle that must be credited with the corresponding unity and primacy.

Chapter Two

Argumentative Strategies for the Enquiry

This work argues for three theses. First, the most promising solution to Z's enquiry appears to be the formalist essentialism of Z.4-11; namely, substance is the essence and, thus, the form of substances. Second, Z's enquiry turns out to fail; namely, there is no way to establish the principle of metaphysics. Third, Z's enquiry contributes to the foundation of metaphysics; namely, its results enable the enquirer to envision–though not to establish–the principle of metaphysics. The presence of both positive and negative aspects is a salient trait of Aristotle's discussion in the central books. My concern in Chapter Two is to illustrate the argumentative strategy at work in Z. In particular, I aim to offer a unitary understanding of the argument in order to make sense of its role for a demonstrative science. Commentators have proposed a variety of philosophical strategies that revolve around a basic idea: in Z Aristotle plays with different notions of substance. Each strategy tends to emphasize either the dialectical or the pre-scientific character of the book in the light of the senses of substance detected. The strategy I am going to propose lines up with my approach to Z's enquiry. There is an absolute notion of substance that drives the enquiry to ground the demonstrative science of being: *substance is the cause of why other entities are*. Aristotle is attempting to define the genus of entities that grounds the existence and the nature of the entities in other genera.[1] What substance is is the principle of metaphysics, whose definition grounds the demonstrations about other entities. Aristotle considers four ways to define this entity: subject, essence, universal, and genus. The enquiry is designed to see whether they define substance in sensible reality and, thus, whether they lead us to identify substance with one of the principles of physics, form, matter, or the composite of both.

At the start of Z.4, there is a fundamental turn in the method to effect this strategy: Aristotle drives his examination from the objects of metaphysics to their

[1] See Section 1.1.2.

linguistic counterparts; that is, from entities (ὄντα) to their statements (λόγοι). This logical turn marks neither a linguistic nor a dialectical discussion; rather, it consists in inspecting the predicative relations among the terms stated in order to establish conclusions about the actual objects of metaphysics. Predictably, Aristotle ends up with focusing on the content of definitions; for every conclusion about definitions is corresponded to by a conclusion about substances. In the end, most of Z's enquiry turns out to be logically oriented.[2]

2.1 A General Overview: Some Answers

Before considering the potential strategies of Z, let me start with a general overview of the book. In the first three chapters, Aristotle offers some methodological remarks that are recalled at later stages of the enquiry. Undoubtedly, the most relevant observations concern how to answer the question of Z; that is, the solution to establish the principle of metaphysics. Aristotle seems to consider at least three different ways to spell out what substance is.

2.1.1 The Domain of the Enquiry

A first group of answers is given in Z.2, in which Aristotle reviews the most reputable solutions that have been endorsed in philosophy. In other words, he offers a survey of the entities that are traditionally regarded as 'substance'. The survey reports three main views:

i. Bodies

Complex Bodies (e.g. animals, plants, and their parts)

[2] It is important to emphasize the difference between my approach to Z's enquiry and Aristotle's logical procedure. My strategy is to rely on the correspondence between what substance is and the concept of definition, while Aristotle's own strategy–at least in large portions of the book–is to rely on the correspondence between substance and its own definition. In particular, since Aristotle takes sensible substances (i.e. the primary objects of physics) to be included in the genus of substance and, thus, the starting point of his examinations in Z, his strategy is to rely on the correspondence between these substances and their own definitions in order to identify the principle of metaphysics: the primary substance and its own definition. See the Introduction.

Simple Bodies

ii. Mathematicals (e.g. point, line)

iii. Platonic Forms

According to the first view, the most evident case of 'substance' is represented by bodies. Although this solution could be peculiar to some Pre-Socratic thinkers,[3] Aristotle clearly acknowledges its promising character. He himself subscribes to this conception in *On the Heavens* III.1.[4] What is crucial to notice is that in *On the Heavens* bodies are regarded as substances because they are the object of physics and of its subordinate sciences. For example, animals and plants are the object of the science of living entities and celestial bodies are the object of astronomy. Consequently, the definitions of such bodies ground the demonstrations about the relevant subject-matters; the definition of moon, we noticed, grounds the demonstration of eclipse. Put it simply, bodies are substances insofar as they are the subject of some per se attributes (e.g. memory, leaf-shedding, being eclipsed). Thus, they are primary objects in each physical science and belong to the genus whose definition is principle.

While the first view is based on the assumption that metaphysics is confined to sensible reality (which is the domain of physics, indeed), the second and the third views follow an alternative approach. Substances are not found among bodies, but among some other entities such as mathematicals and Platonic Forms.[5] As partly made explicit, Aristotle has in mind Pythagoreans and Academics.[6] Again, this could look reasonable with mathematicals. Since mathematicals are the object of mathematics and of its subordinate sciences, their definitions ground the relevant demonstrations. For example, the definition of triangle grounds the demonstration of the property of 2R (i.e. having internal angles equal two right angles). As with bodies, mathematicals are subject of some per se attributes (e.g. odd, 2R). The point is that mathematicals are unlikely to be substances because they are characterizations of bodies and are obtained by abstraction.[7] Therefore, within metaphysics mathematicals turn out to be per

[3] Such as the Milesians. Cf. Ross (1924: 162); Bostock (1994: 70).
[4] See *De Cael.* III.1, 298a24-b5. Cf. I.1, 268a1-6.
[5] Aristotle considers different possibilities as to where substances are to be found. A review of these options is offered by Frede-Patzig (1988: 28).
[6] See also A.4 and Z.2, 1028b21-27.
[7] For example, the sphere is a shape and, thus, a quality of celestial bodies. Cf. *Phys.* II.2, 193b22-194a12.

se attributes of the substances from which they are abstracted. In brief, mathematicals are entities that are ontologically dependent upon substances.

At the end of the survey, Aristotle considers some pressing puzzles.

> We must consider which of these views is right and which wrong; and what substances there are; and whether there are or are not any substances beside those that are sensible, and in what way these latter are; and whether there is or is not any separate substance, apart from the sensible ones, and if so why and in what way. (1028b27-31, Bostock's translation slightly modified)

> περὶ δὴ τούτων τί λέγεται καλῶς ἢ μὴ καλῶς, καὶ τίνες εἰσὶν οὐσίαι, καὶ πότερον εἰσί τινες παρὰ τὰς αἰσθητὰς ἢ οὐκ εἰσί, καὶ αὗται πῶς εἰσί, καὶ πότερον ἔστι τις χωριστὴ οὐσία, καὶ διὰ τί καὶ πῶς, ἢ οὐδεμία, παρὰ τὰς αἰσθητάς, σκεπτέον, ὑποτυπωσαμένοις τὴν οὐσίαν πρῶτον τί ἐστιν.

Z's enquiry will put us in a position to answer two questions about the principle of metaphysics. One question corresponds to the fifth aporia of book B: *whether there are only sensible substances or others beside these*.[8] This puzzle summarizes the reasoning of the chapter. Whereas the existence of sensible substances, such as bodies, is widely accepted, the existence of non-sensible substances, such as Platonic Forms, is more controversial. Therefore, to establish the principle of metaphysics entails shedding light on the possibility of substances beyond the sensible ones; and this includes examining whether Platonic Forms are valid solutions to Z's enquiry. The other question seems to expand on the previous one:[9] *whether there is a non-sensible substance that is separate*. Commentators take Aristotle to be referring to the divine substance. Although this is certainly the case (for the principle of metaphysics will be ultimately achieved by answering what God is, namely pure actuality), the question must be treated in the course of Z. The problem is that such entities never feature in the entire enquiry.[10] Conceivably, what Aristotle intends to do is to elaborate on the answer to B#5 and this means considering whether non-sensible substances are separate or not. More precisely, his goal is to ensure

[8] See B#5, 996b13-18; 997a34-998a19.
[9] Cf. Frede-Patzig (1988: 32). For a different reading see Ross (1924: 163).
[10] The unique exception is the cursory reference at Z.17, 1041a7-9.

that such non-sensible substances are ontologically independent of the remaining entities in reality.[11]

Behind these observations, there is a fundamental insight into the domain of Z: *the principle of metaphysics must be primarily enquired by looking at sensible substances*. Indeed, the enquirer has to start with the examination of the substances whose existence is uncontroversial.[12] This does not mean ruling out the existence of non-sensible substances. What Aristotle has in mind is that the enquiry conducted among sensible substances is likely to lead to some further substance besides the sensible ones. This is indeed the result achieved by Platonists and Pythagoreans. However, this further substance could hold primacy only if it is separate. For its separate status would mark the absolute primacy over the other entities in reality.[13]

2.1.2 Defining Substance

A second group of answers is offered straight after Z.2's survey in the well-known agenda of Z.3. Substance, says Aristotle, can be defined in four different ways: essence, universal, genus, and subject (1028a33-36). Each of them is initially presented as a promising and not exclusive solution to the enquiry; namely, they are alternative ways to specify what substance is. Two other signposts in Z.13 and H.1 confirm that Aristotle organizes the enquiry around these four solutions:[14] the subject is examined in Z.3; the essence is examined in Z.4-6 and its treatment is completed with the analysis of definition in Z.10-11; the universal is discussed in the course of Z.13-16, which, presumably, include the examination of the genus.[15] It is then standard to believe that Z's enquiry breaks down into at least three distinct sections. His main results are summarized in H.1: whereas essence

[11] This is indeed the notion of separation at work in Z.1. See Section 1.1.2.
[12] On different occasions, Aristotle spells out the methodological basis of this strategy. Since any knowledge is achieved by going from more familiar things to less familiar things, the science of being will develop from the understanding of familiar substances (which are sensible) to the understanding of less familiar substances (which are, predictably, non-sensible). See Z.3, 1029a33-b12; Z.11, 1037a10-17; Z.16, 1040b5-6; H.1, 1042a24.
[13] A similar view is defended by Menn (2001: 87ff.).
[14] See Z.13, 1038b1-3; H.1, 1042a11-24.
[15] Z.17 marks a new start of the enquiry. Instead, Z.7-9 and Z.12 are traditionally regarded as later interpolations (either by Aristotle or by some later editor). I will say more about their roles. For a different reconstruction see Menn (2001: 85-95).

and subject are valid solutions, universal and genus are entirely discarded.[16] Roughly, the problem with universal and genus is that they can be assimilated to Platonic Forms; consequently, they suffer from the same difficulties as Plato's solution.

What is the relationship between Z.2's and Z.3's answers? Commentators often connect them with two ways to address the enquiry into what substance is.[17] The first way is to address an **extensional treatment of substance** by answering what substances there are. Accordingly, Aristotle is partly engaged in giving an inventory of those entities that ground the existence of other entities. Thus, Z.2 surveys the solutions in extensional terms. Bodies are evident cases of substance detected in sensible reality; for other entities (e.g. colours, weights, etc.) characterize and depend upon them. Mathematicals, instead, are not cases of substance; for, despite being primary objects in mathematics, they are per se attributes of bodies and thus entities depending upon some substances. The second way is to address an **intensional treatment of substance** by answering what 'being a substance' amounts to. Accordingly, Aristotle is also interested in determining the substantial nature that is shared by all instances of the genus studied by metaphysics. The agenda of Z.3 lists the solutions in intensional terms. Subject, essence, universal, and genus are taken to illustrate what 'being a substance' means for bodies (on which the enquiry is mainly concerned). If this reading is correct, Z is mainly devoted to an intensional analysis by evaluating whether each item on the agenda indicates the source of substantiality of sensible substances. The strategy at work seems to swing between these two approaches to Z. Aristotle thinks that a full understanding of substance implies reflecting upon the uncontroversial cases of substance and illustrating their nature. To that end, he offers a preliminary extensional solution before embarking on the intensional analysis. On the other hand, the intensional solution contributes to reconsidering

[16] Devereux (2003) argues that H was written before the final revision of Z. His main argument is that Z.3 represents a refined version of H.1-2, while Z.17 represents a refined version of H.3. Admittedly, Aristotle was able to modify his works and I agree that Z.17 is likely to be posterior to H. However, this does not prove Devereux's thesis that Z represents Aristotle's final word on the enquiry into substance. Firstly, in H.1 Aristotle does claim that substance is subject, but this conclusion is not supported by the argument of Z.3; presumably, it requires the account of substance in terms of potentiality that is expounded in H.4-5. Likewise, the conclusion that substance is essence requires the account of substance in terms of actuality, which is expounded in H.2-3 and at which Z.17 seems to drive. I find totally reasonable to suppose that the argument of H will accomplish Z's enquiry as Aristotle himself suggests in H.1.

[17] See Witt (1989: 7-14); Burnyeat (2001: 13-14); Galluzzo (2013a: 28-35). Cf. Lewis (2013: 16-20).

the range of substances established by the survey; in particular, the parts of living entities, simple elements, and Platonic Ideas will cease to be considered as substances.[18] In other words, the enquiry can be accomplished only through a revision of the extensional analysis in the light of the results of the intensional analysis.

It is dubious, however, that the enquiry is designed to develop these two treatments of substance.[19] The problem is that Aristotle can easily shift from one to the other and places no signpost to mark the distinction. Later on, I will argue that Z offers a unitary treatment of substance that requires no distinction between the population of substances and their nature. At present, I want to insist on the role played by Z.3's agenda. Aristotle suggests that the four answers are inferred from the survey of the reputable cases of substance. To illustrate, the first view in Z.2 could rest on the ideas that substance is subject and essence. A body is a substance because it is the subject upon which other entities depend and its essence is presupposed by what other entities are.[20] The third view in Z.2, instead, could rest on the idea that substance is not only essence, but also universal. Platonic Forms are indeed taken to be the reference of definitions and to be participated in by a plurality of individuals.[21] Since Z's enquiry must be conducted among reputable substances, in Z.3 Aristotle is considering different ways to spell out what this genus of entities is. In a nutshell, Z.3 presents four **definitions of substance**. To define substance as either subject, essence, universal, or genus is to indicate the fundamental nature that will ground the demonstrative science of being. Basically, the enquirer has to examine substances (e.g. human, animal, etc.) and the different ways in which they can be defined; for one of these definitions indicates the principle of metaphysics. This does not reduce the items on the agenda to some criteria that a substance has to satisfy; for their role is to define the object of Z, i.e. what substance is.[22] Of course, each definition imports some requirements that must be applied to every substance. The point is that in Z Aristotle attempts to establish his principle

[18] See Z.16, 1040b5-16; H.1, 1042a21-24.
[19] On this point see Galluzzo (2013a: 32-35).
[20] Namely, subject and essence articulate the two forms of dependence of entities upon substance: ontological dependence* and ontological dependence**, respectively. See Section 1.1.2.
[21] See A.6, 987a32ff.
[22] For the idea that Z.3 lists four criteria on substance see Irwin (1988: 200-203). In this regard, my view is closer to Lewis' (2013: 16-23), who speaks of 'role-properties'.

by examining the definition of substance as subject, as essence, and as universal. This means spelling out the distinctive character of every substance in metaphysics (thus of bodies in the first place) and stating what the genus studied by metaphysics is.

2.1.3 Metaphysics and Physics: Hylomorphism

A third group of answers is represented by the doctrine of hylomorphism. According to hylomorphism, sensible substances, such as bodies, are composites resulting from some matter organized by a certain form. For example, a bronze statue is a composite substance resulting from a lump of bronze in the shape of a statue. Since Z's enquiry has to start with examining sensible substances, and since in physics sensible substances are defined in hylomorphic terms, Aristotle attempts to specify what substance is in terms of either the form, or the matter, or the composite of both.

The application of hylomorphism in Z is not uniform. In Z.3, Aristotle makes abundant use of these notions, while they are almost entirely absent in Z.4-6. From Z.7 to Z.11, hylomorphism is central in the discussion before almost disappearing in the remaining chapters.[23] Interestingly, the application of hylomorphism appears to be designed to complete the examination of the definitions of substance. In Z.3, the definition as subject leads to identifying the principle of metaphysics with a certain notion of matter.[24] In Z.10-11, Aristotle takes up an examination of the parts of a definition and thus of an essence that leads to identifying substance with form. On the contrary, the definitions as universal and as genus lead to Plato's Ideas and are rejected. Traditionally, the enquiry is taken to give a formalist solution: the principle of metaphysics is form, which is the 'primary substance' upon which the totality of entities depends.[25] To

[23] In Z.4-6 there are very few occurrences of εἶδος and Aristotle seems to have in mind a general notion of species (cf. Burnyeat, 2001: 19-29; Driscoll, 1981. For a different view see Wedin, 2000: Ch. 6). Z.15-16 are respectively focused on the impossibility of defining particulars and on the dismissal of simple bodies and summa genera. The use of hylomorphic notions is indeed marginal. In Z.17, hylomorphism seems to play a key role in the fresh account of substance; however, there is no explicit use of the notion of form, except for a disputed occurrence at 1041b8.
[24] This is unlikely to be an Aristotelian notion of matter (cf. Gill, 1989: 13-82), but could be reminiscent of the receptacle described in the *Timaeus*.
[25] Cf. Frede-Patzig (1988: Einleitung, 33-47); Irwin (1988: 199-247); Witt (1989: 143-179); Loux (1991: 147-196); Scaltsas (1994b); Bolton (1995); Code (1997); Wedin (2000); Burnyeat (2001); Charles (2010a); Peramatzis (2011); Galluzzo (2013a); Lewis (2013).

put it as some commentators do, form is the best candidate to fulfil the conditions on substance imported by each definition. The overall idea is that matter and composite depend upon the form; for a form is the cause in virtue of which a matter and a composite are a certain kind of substance. To illustrate, the existence of the lump of bronze of a statue depends on the shape that makes such a lump of bronze a statue; likewise, the composite statue resulting from bronze and shape depends upon the shape that makes this composition a statue.

What is the role of the hylomorphic answer within Z's enquiry? According to the majority of commentators, Z's hylomorphism is meant to advance the understanding of substance achieved in the *Categories*. In the fifth chapter of the treatise, Aristotle offers an analysis of the category of οὐσία and concludes that individual objects (e.g. Socrates, Buchephalus) are primary substances, while general objects (e.g. human, horse) are secondary substances. Whereas in the *Categories* the hylomorphic analysis is either neglected or not fully developed, in the *Metaphysics* Aristotle is keen to identify substance with one among form, matter, and composite.[26] From this perspective, hylomorphism enables Aristotle to move from an analysis of the entities that are substances in reality to an analysis of their inner structure. Since a human is a composite resulting from flesh&bone and a human soul, the enquiry has to establish what constituent is the causal principle of human. On this traditional view, Z's enquiry is meant to explore the nature of the entities in the category of substance. Since these entities are sensible substances, the enquiry has to examine their hylomorphic constitution.

What is unconvincing about this interpretation is that hylomorphism in Z is not applied in terms of constitution. When Aristotle recalls it in the preliminaries of his examination of the subject, the notions are introduced as senses of subject and not of substance. In the *Physics*, form and matter are introduced as principles of physics according to the same approach. The matter (ὕλη) is the subject that undergoes change, while form (μορφή, εἶδος) may indicate the subject either before or after the change. The composite (τὸ ἐκ τούτων, σύνολον) is to be

[26] In the debate about the relationship between *Categories* 5 and *Metaphysics* Z commentators split into two broad camps. Some hold that in Z Aristotle concludes that the primary substance in reality is the form of sensible substances and not the individual object (cf. Averroes, *In Metaph.*; Frede, 1985; Frede-Patzig, 1988); some others hold that in Z Aristotle is in fact addressing a different question about the nature of individual substances and, thus, do not see any contrast between the two doctrines (cf. Aquinas, *Expositio*; Wedin, 2000; Burnyeat, 2001). For a general presentation of the debate, see Galluzzo-Mariani (2006: 83-88).

understood as the subject resulting from the generation of a sensible substance; that is, when the form determines anew what the underlying matter is.[27] The direct link between hylomorphism and substance is established in Z.10, in which form and matter are said to be 'parts' of substance. However, Aristotle does not present form and matter as two constituents of the same composite; rather, he contrasts the constitution from formal parts with the constitution from material parts; the former pertains to forms, while the latter pertains to composites (1035a1-22).[28] For example, a human soul divides into formal elements (presumably, its genus, animal, and its differentia, biped), while a human divides into material elements (such as flesh&bone).

I am inclined to think that the role of hylomorphism in Z can be better understood in the light of its role in physical sciences. Physics is the science of sensible entities and, in particular, of bodies. This means that physics and its subordinate sciences are concerned with the demonstrable attributes of bodies: motions. As already said, bodies are substances because they constitute a genus of entities (i.e. a sub-genus of substances) about which the physicist conducts relevant demonstrations. The principle that grounds such demonstrations is nature (φύσις). In order to establish this principle, Aristotle sets out a discussion that clearly parallels Z's enquiry. *While in metaphysics Aristotle attempts to answer 'What is substance?', in his physics he is concerned with 'What is nature?'*. The solution given in *Physics* II.1 consists in his hylomorphism. For one thing, nature is matter because it is the primary underlying element of a body (193a9-31); for another thing, nature is form because it is the kind of thing a body is (193a28-b5). The crucial point is that form and matter are two principles that ground the science of bodies and their demonstrable attributes (i.e. motions). Therefore, hylomorphism is introduced not to spell out the constitution of sensible substances, but to develop our demonstrative knowledge about them. For example, the demonstration that human is capable of learning requires the assumption of the definition of human soul; since the soul is the form of living bodies, the demonstration is grounded in the notion of form. Likewise, the demonstration that the sea is salty requires the assumption of the definition of

[27] The application of these notions in Z.7-9 is also tied to a theory of generation and corruption and not immediately linked to the identification of substance.
[28] I will focus on this hylomorphic analysis of substance in Chapter Four.

water; since water is the matter of the sea, the demonstration is grounded in the notion of matter.

In Z, Aristotle is attempting to establish the principle of metaphysics. Since his enquiry starts with examining sensible substances, it is then totally reasonable to resort to hylomorphism. For one of the principles of physics is likely to be the principle of metaphysics too.[29] In examining the definitions of substance, Aristotle expects the answer to 'What is substance?' to match the answer to 'What is nature?'.[30] Consequently, his application of hylomorphism is meant *not to advance our understanding* of the category of substance, but *to identify one of the items* that are listed in the category of substance. In *Metaphysics* Z, Aristotle is accounting for what the genus substance is because the answer will ground the demonstrative knowledge of any other entity, both in sensible reality and, possibly, in suprasensible reality. Given the focus on sensible reality, this principle is likely to be one of the principles that ground the demonstrative knowledge of the same entities, when characterized by motions.

2.2 Senses of Substance

On the basis of the observations gathered from the first chapters of Z, it is possible to set out a variety of philosophical strategies for the enquiry into substance. There is a fundamental insight behind the strategies suggested by commentators: *in Z Aristotle plays with different senses of substance*. In some versions, the multiple conception of substance puts emphasis on the dialectical character of the enquiry; the solution lies in a stronger notion of substance that emerges from the contrast among the plurality of senses. In other versions, the multiple conception casts light on the pre-scientific intent of the book; the enquirer moves from preliminary senses of substance to the definition of substance as

[29] A similar approach is found in Rapp (2016). Basically, although to enquire into the principles of change (i.e. motion) is different from enquiring into the principles of existence (i.e. being), since the subjects of both are sensible substances, these principles must somehow be the same.
[30] This does not make Z part of his physics. Although the enquiry is mainly focused on sensible entities and, thus, its domain is co-extensive with physics, Aristotle is concerned with entities qua entities and not with entities qua moving entities (which are the object of physical sciences). For this reason, Z is open to admit substances beyond sensible reality (cf. Section 2.1.1 above).

principle. In accordance with Chapter I, I contend that the argument of Z is driven by an absolute notion of substance: *substance is the cause of why other entities are*. On this score, I will propose a unitary understanding of Aristotle's strategy that makes sense of its role for the development of metaphysics.

2.2.1 Dialectical *vs* Pre-scientific Strategies

A classic way to exploit the plurality of senses of substance is suggested by Gwyl Owen.[31] The enquiry, he argues, is structured around two notions introduced in Z.1: τόδε τι and τί ἐστιν. τόδε τι is often taken to refer to the individual items in the first ontological category.[32] In the *Categories*, τόδε τι is a label for any object that is an indivisible subject of characterizations; for example, Socrates is a τόδε τι inasmuch as it is the subject of 'human', 'wise', etc. τί ἐστιν is employed to refer to the first predicative category. In particular, it labels the predicates (or the predication) stated to define an object; for example, animal is a τί ἐστιν inasmuch as it is what a human is. Each notion represents a requirement on substance and Z is designed to press the contrast between them. To use Owen's words, Aristotle follows a pincer-movement strategy 'to pull the argument in opposite directions and to show that either direction, if single-mindedly pursued, leads to intolerable results'. In this way, the enquiry will achieve a stronger conception of substance holding the two senses in one focus.[33]

What is interesting is that Owen takes the notions of τόδε τι and of τί ἐστιν to reveal **two metaphysical inclinations**. On the one hand, an object is understood as the subject of predicates and thus of attributes. This is reminiscent of a Kripkean approach to metaphysics according to which an object must be a particular item independently of its characterizations.[34] On the other, an object is understood as the member of a general class. This is reminiscent of a Fregean approach according to which an object must always be referred to as the instance

[31] Owen (1978-79: esp. 1-13). Cf. Owen (1961).
[32] The expression τόδε τι results from the combination of two pronouns, which can be credited with different functions. A first option is to take τόδε to indicate the object and τι to qualify it; the result could be expressed by 'a this-something'. An alternative option is to take τι to indicate any object whatsoever and τόδε to qualify it; the result could be expressed by 'a certain-something'. Cf. Frede-Patzig (1988: 15); Burnyeat (2001: 49 n. 99).
[33] Owen (1978-79: 12).
[34] However, Kripke (1980: esp. 114 n. 57) acknowledges some essential characterizations that can be employed to refer to the object.

of a certain kind. Within this framework, it is possible to map the argument of Z in the following way. Firstly, Aristotle insists on the requirement of τόδε τι through the examination of the subject in Z.3. The idea is to consider as substance every object that is a fixed subject as opposed to its attributes. The result is a controversial notion of indeterminate matter. Consider a bronze sphere, which is a sensible substance. Although the lump of bronze is the subject of 'being spherical', some other entity must be the subject of 'being bronze'; consequently, the entire process turns out to be regressive.[35] Aristotle insists on the requirement of τί ἐστιν through the examinations of the essence in Z.4-6 and of the universal in Z.13-16. The idea is to consider as substance the intrinsic nature of an object. This attempt faces the difficulties that prevent universal objects from being substances.[36] To illustrate, the common nature animality must always belong to a plurality of individual humans that are all fixed subjects in their own right.

The model outlined by Owen is reformulated in other versions of Z's strategy. *The enquiry is designed to hold that substance must be both a fully determined subject and an essential characterization*. The requirement of τόδε τι is expressed by the definition of substance as subject; for individual substances perfectly exemplify a τόδε τι and are the ultimate subject of their attributes. The requirement of τί ἐστιν is expressed by the definition of substance as essence; for a common nature indicates what an individual substance is and thus is the content stated by a definition. Within Z's enquiry, the contrast between subjecthood and essentiality marks the separation of Z.3 from Z.4-16. The interpretations defended by Gill and Halper are developed along these lines. In their views, Z's enquiry is firstly concerned with the unity of substance and this can be ensured either by its subjecthood or by its essential nature. The task of the enquirer is to harmonize these senses of unity in favour of a single notion.[37]

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[35] For the so-called stripping-away argument against the solution of Z.3 see Loux (1991: 54-64), Lewis (2013: 53-61), Galluzzo (2013a: 47-54).

[36] A similar strategy is presented by Code (1984), who identifies Z with the treatment of the last aporia of B: *whether principles are universal or particular* (B#12, 996a9-10; 1003a5-17). According to Code, Aristotle is in fact contrasting the individual status (τόδε τι) with the definable status (τί ἐστιν) of a substance.

[37] According to Gill (1989), Aristotle attempts to harmonize the horizontal and the vertical unity of an object. The horizontal unity is the status ascribed to sensible substances in the *Physics* and rests on the idea of persistence (ontological primacy); the vertical unity is the status ascribed to substances in the *Metaphysics* and rests on the idea of basic predication (definitional primacy). It is only with the new understanding of form and matter of organic composites that from Z.17 Aristotle is able to ensure the absolute unity of substance achieved in H.6. Contrary to Gill, Halper (1989: esp. 227-229) considers Z's enquiry to be a positive argument driving toward a definite

It is not difficult to see that these versions emphasize the dialectical character of the enquiry. The senses of substance appear to be reminiscent of the metaphysical doctrines advocated by other philosophers, in particular Pre-Socratics and Academics.[38] In order to establish what substance is, Aristotle starts with collecting the reputable views on the matter treated. This function is performed by the survey of Z.2 and the agenda of Z.3. Subsequently, he moves to explore the puzzles raised by each view and to show their limits. In doing so, the examinations conducted in the book lead to a stronger solution that does justice to the truth contained in the initial views. In Z.17, the conception of substance as cause is often understood to signpost the end of the dialectical treatment.[39]

In order to play down the aporematic and dialectical character of the enquiry, some commentators consider a different strategy for Z's enquiry. The central idea is to insist on the application of hylomorphism. Since form and matter are the principles of sensible substances, Z is designed to answer what substance is in terms of these notions. Thus, the enquiry seems to carry out a pre-scientific project; for it is supposed to match the principle of metaphysics with one of the principles of physics. There is a complication with this picture. I have already noted that hylomorphism is traditionally understood in terms of constitution: a sensible substance is the composite resulting from a portion of matter and a specific form.[40] Since Z seems to offer a formalist solution, it is unclear how both a composite substance and its form can be the primary entity enquired. Throughout the book, Aristotle tends to regard both of them as substances.

Consequently, the pre-scientific character of the enquiry can be defended only if there is a way to ensure the substantiality of both composites and their forms.

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solution: substance is form. In his reconstruction, unity represents the criterion to investigate the different ways of being (per se being; being in actuality and in potentiality; being true and false).

[38] Rorty (1974) proposes a reconstruction of the argument of Z that foreshadows Owen's in many respects. Z is designed to disentangle two senses of substance: the determinable and the self-reliant object. The notion of determinability is at work in the Pre-Socratic reductionism to matter, while the notion of self-reliance is at work in the Platonic-Pythagorean reductionism to form. The final target of Z is then to show the limits of these forms of metaphysics.

[39] Irwin (1988: esp. 200-203), for example, argues that the four accounts serve as four criteria for the strong dialectic performed in metaphysics. The positive solution will be the individual form of sensible substances, which combines the status of τόδε τι and the status of τί ἐστιν.

[40] See Section 2.1.3.

To this end, commentators often propose a distinction between two senses of substance.

i. *Substance*: the primary entity in reality (οὐσία);
ii. *Substance-of*: the cause of being a substance (οὐσία ἑκάστου).

The monadic sense of substance indicates the items that are classified in the ontological category of substance. A substance is any entity on which any non-substance depends for its existence.[41] For example, Socrates is a substance insofar as there are non-substances, such as his paleness, that cannot be separated from Socrates. Thus, the *Categories* and Z.2's survey are taken to work with a monadic sense of substance; for Aristotle is concerned with ontologically independent objects as opposed to their attributes. The dyadic sense of substance indicates the causal principle in virtue of which a monadic substance is a substance. To illustrate, the substance of Socrates is the cause that makes Socrates a substance, i.e. his human nature. The examinations of Z.3's definitions are taken to work with the dyadic sense of substance; their task is to explain why sensible substances are instances of the genus substance.[42] On this score, commentators take the substance of a sensible substance to be the form that constitutes a composite. In other words, the primary entity studied in Z is the composite if substance is understood in a monadic sense, while it is the form if substance is understood in a dyadic sense. The crucial point is that Z is the enquiry into the substance of sensible substances. In examining composite substances, Aristotle attempts to establish the principle of metaphysics, which is either form, matter, or the composite itself. Accordingly, Z turns out to play a pre-scientific function for the development of the science of being. At the end of the day, **form turns out to be the substance of sensible substances**; for form is the cause in virtue of which a composite substance is a substance.[43]

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[41] This is the form of ontological dependence** that is traditionally based on the primacy in existence. See Section 1.1.2.

[42] For this distinction of senses see Burnyeat et al. (1977: 7), Loux (1991: 49-53); Bostock (1994: 43-44), Code (1997: 357-362); Burnyeat (2000: 13); Lewis (2013: 10-20).

[43] Loux (1991: 2-12 and Ch. 4) employs the monadic and dyadic senses of substance to separate two distinct metaphysical levels. One is the metaphysical level of the *Categories*: a substance is the indivisible instance of a kind (e.g. Socrates is a human). The other level concerns the hylomorphic constitution of sensible substances introduced in the *Metaphysics*: a substance is a specific form belonging to a portion of matter (e.g. a human soul belongs to these flesh&bone). The distinction between monadic and dyadic sense is also employed by Bolton (1995), who firmly argues in favour of the scientific procedure of Z. His view is that form is the substance of sensible substances because it gives the cause of the facts to be explained; for example, form explains

In his *A Map of Metaphysics Z*, Myles Burnyeat provides an interesting version of these strategies. The enquiry, says Burnyeat, is characterized by two features: non-linearity and two-level analysis. The non-linearity of Z lies in the fact that after Z.1-2 Aristotle sets out independent sections about each definition of substance.[44] Accordingly, every time Aristotle takes up the examination of a new definition, the enquiry makes a fresh start and does not develop the results achieved in the previous section. For example, whilst Z.3 concludes that form and composite are better solutions to the enquiry compared to matter, Z.4 does not pursue this analysis but begins a new discussion about substance as essence. Nevertheless, each section argues in favour of the same conclusion: substance is form. The two-level analysis lies in the idea that Z's examinations are twofold. At a first level, Aristotle advances formal observations which help the enquirer to familiarize with a given definition; these phases, however, are not genuinely scientific and tend to raise dialectical difficulties. At a second level, Aristotle develops his formal views in the light of the principles that are proper to metaphysics, i.e. form and matter.[45]

Whilst the non-linearity has been often criticized, many commentators organize Z's strategy in light of the two-level procedure.[46] With the hylomorphic treatment of substance, Aristotle is conducting a partisan and genuinely pre-scientific enquiry that is expected to establish positive results.[47] What is salient to see is that *this reconstruction makes Z an enquiry into the substance of sensible substances*. For this project, Aristotle considers four definitions–subject,

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that a certain object is a substance, or that a certain object is a τόδε τι. A weaker interpretation is suggested by Charles (2000: esp. 282-283; 2010), who considers Z a successful project to uniform the account of substance to the demonstrative model of the *Analytics*, which is achieved in Z.17. Whilst I agree with Charles about the turning point reached in Z.17, I will argue that the application of the demonstrative account marks the failure of Z's enquiry.

[44] See Section 2.1.2 above.

[45] Burnyeat (2001: 4-8) labels the first level 'logical' and the second level 'metaphysical'. I will go into the details of his interpretation in Section 2.3.1 below.

[46] I agree with Wedin (2000) and Lewis (2013: 32-37) that Z is more likely to follow a linear argument. If we assume the non-linearity, we accept the possibility of embarking on the enquiry at each new start, namely, at Z.4, Z.13, and Z.17 (according to Burnyeat's map). But it would be absurd to start with the examination of the universal without having examined essence; Aristotle himself criticizes this account insofar as a universal can be substance neither as essence nor as part of an essence (Z.13, 1038b16-23).

[47] Similar strategies can be found in Code (1997) (who foreshadows Burnyeat's two-level analysis), and in Lewis (2013: 28-32). However, Lewis takes each account to represent a philosophical view received from other philosophers (Pre-Socratics and Academics) or from other Aristotelian works. This view is tested through Aristotle's partisan conception of substance in hylomorphic terms. In his view, then, Z's enquiry is largely a dialectical treatment of other conceptions that concludes in favour of form through an abductive reasoning in Z.17.

essence, universal, and genus–that must lead to the solution to the enquiry: form. The form is indeed the ultimate principle that is responsible for the existence and the nature of sensible substances and of the other dependent entities.

2.2.2 A Univocal Conception of Substance

In Chapter One, I pointed out that Aristotle is committed to two categorial classifications: the predicative categories and the ontological categories.[48] The predicative categories classify the predications (what-it-is; how-much-it-is, etc.) that are referred to a subject; the ontological categories classify entities (substances, quantities, etc.). Arguably, the multiple conception of substance in Z can be reduced to this distinction. For the concept of substance (οὐσία) is understood both as an instance of the first genus of being (substance) and as the signification of the first genus of predication (substance-of).[49] Let me expand on this point. The notion of subjecthood and the monadic sense refer to the first ontological category; for they indicate the entities that are individual substances as opposed to other dependent entities. Thus, they concern the population of the genus substance (e.g. humans, horses, plants, etc.). The notion of essentiality and the dyadic sense, instead, refer to first predicative category; for they indicate the counterparts of the statements of what a substance is. Namely, they concern the what-it-is of substances. In the case of sensible substances, this is identified with their constitutive form (e.g. human soul for humans, equestrian soul for horses).

If this insight is correct, there are major consequences for every version of Z's strategy. Unless the enquiry works with the categorial classifications separately, it is not designed to exploit the multiple conception of substance. But in Z.1, we learned, Aristotle does not apply any distinction between ontological and predicative categories.[50] He takes up the enquiry into what substance is because of the dependence upon substance: every entity depends upon substance because substance is the cause of why an entity is. For one thing, this form of dependence holds among the items classified by the ontological categories; for

[48] See Section 1.1.1.
[49] As a matter of fact, the Greek term οὐσία amounts to the nominalization of the expression τί ἐστιν. Cf. Menn (2001: 89).
[50] See Section 1.1.2.

the existence of an entity presupposes the existence of a substance. To illustrate, that there is an eclipse (i.e. an eclipsed moon) is grounded in the existence of moon. For another thing, this form of dependence holds among the items classified by the predicative categories; for how a substance is affected presupposes what a substance is. To illustrate, that moon is eclipsed is grounded in what moon is. Not only does this explain how Aristotle can shift from the ontological to the predicative categories, it also proves the uniformity between the two classifications. The metaphysician has to prove the existence of some entities (i.e. that there is a non-substance) by inferring the demonstrable characterizations of substances (i.e. a predication about a substance). Therefore, since both ontological and predicative categories underpin the same classification, no multiple conception of substance can be at the basis of the enquiry.

There are other elements that concur with this conclusion.[51] First of all, commentators tend to infer the plurality of senses of substance from *Metaphysics* Δ.8. Aristotle offers the following distinction:

A) Substance as subject;
B) Substance as cause of being;
    Bi) Substance as essence;
    Bii) Substance as defining parts.

(A) substance as subject and (B) substance as cause of being represent the two chief notions. In addition, substance as cause of being encompasses (Bi) substance as essence and (Bii) substance as defining parts. In all likelihood, (A) and (Bi) are the two definitions treated between Z.3 and Z.11.[52] Interestingly, Aristotle remarks that substance as subject is the sense in which bodies are substances (1017b10-14). On the contrary, in Z.3 subject and essence are alternative ways to spell out what substance is; that is, they are accounts of bodies, which are indeed instances of substance. If Z were meant to contrast the senses in Δ.8, Aristotle would not specify that substance, such as a body, grounds the existence of other entities and that it can be defined both as subject

[51] For other forms of criticism see Frede-Patzig (1988: Einleitung 36-42) and Menn (2001: 87ff.).
[52] Arguably, (Bii) corresponds to the accounts as universal and as genus treated in Z.13-16; for the defining parts of an object are likely to be universal and generic characterizations, such as humanity and animality. On this suggestion see Menn (2001: 96-102).

and as essence. Regardless of the definitions, the enquiry is initially designed to pursue one single notion. This does not mean that Aristotle separates a monadic notion of substance ascribed to bodies from a dyadic notion of substance to be enquired. Rather, he tends to refer to the four definitions both in the monadic and in the dyadic sense. In other words, his examinations do not simply test whether a definition signifies the *substance of sensible substances*, but whether it signifies a *substance* at all. For example, in Z.13 Aristotle contrasts the universal with both the monadic and the dyadic notion of substance and comes to an absolute conclusion: no universal is substance.[53] Likewise, the summary of H.1 makes it explicit that the subject and the essence are substances, while the universal and the genus are not; again, there is no trace of a distinction between substance and substance-of. The very same approach characterizes his application of hylomorphism in Z. Form, matter, and composite are not simply regarded as the substance of sensible substances, but also as substance *tout court*.[54]

In sum, Z's enquiry does not seem to rest on any multiple conception of substance. I contend, by contrast, that the argument is driven by the univocal notion we gathered from Z.1: substance is **the cause of why other entities are**. Indeed, this is nothing but the core sense in which an entity is the principle of a demonstrative science. Since Aristotle is attempting to ground the demonstrative science of being, Z's enquiry must rest on the univocal conception of the genus studied. This becomes clear as soon as we notice that all other senses of substance are unified into such a notion.

To start with, *if substance is the cause of why other entities are, then it will be substance in a monadic sense*. Namely, substance turns out to be any object, such as bodies, that is the subject of other attributes. In *Posterior Analytics* II.9, Aristotle reminds us about a distinction between two objects. The A-objects are the genera and the sub-genera studied by a science (e.g. numbers in arithmetic; bodies in physics) and are identical with their cause; the B-objects are the demonstrable attributes of the relevant genus and are different from their cause. The former are accounted for as by an immediate definition, the latter are accounted for as by a derivative definition. Importantly, the definition of a

[53] For the attack to the monadic sense see Z.13, 1038b9-16; for the dyadic sense see Z.13, 1038b16-23.
[54] See Z.10, 1035a1-4. Also in Z.3 Aristotle concludes that the subject is not a valid solution to the enquiry because it identifies οὐσία with an indeterminate matter (Z.3, 1029a26-30)

demonstrable attribute is derivative insofar as it presupposes the statement of the subject to which the attribute belongs. In metaphysics, substances are A-objects, while non-substances are their demonstrable attributes. Therefore, the monadic sense of substance is conveyed by the causal function performed by the subject of the demonstrations in metaphysics; for substance is the cause in virtue of which there is a demonstrable characterization. To use our example from astronomy, moon is the cause in virtue of which there is eclipse.[55] Among the totality of entities, some entities are substances in a monadic sense insofar as they are the cause in virtue of which other entities exist.

Secondly, *if substance is the cause of why other entities are, then it will be substance in a dyadic sense*. Namely, substance turns out to be the source of substantiality. To see this point, we need to return to the causal function performed by the principles of a science. When a substance is the cause of other entities, the statement of the former grounds the account of the latter; that is, substance contributes to accounting for what another entity is. Accordingly, if a substance is the cause of other substances, its definition must somehow ground their definitions. This causal relationship can be explained in terms of constitution. For example, in astronomy the statement of what a celestial body is is constitutive of the definition of the moon; thus, celestial body turns out to be the cause of moon. In metaphysics, a substance is not only the cause of some non-substances, but can also be the cause of other substances. In such a case, a substance is part of what another entity is and the source of its substantiality. Among the totality of entities, some entities will be substances in a dyadic sense insofar as they are the cause of what other non-substances and substances are.

All senses of substance are then conveyed by the notion of cause of other entities. Given this univocal conception, we are finally able to outline the argumentative strategy of the enquiry. Metaphysics is the science of being

[55] Some may object that the monadic sense of substance imports the individual status of τόδε τι. Consequently, the only substances that could be the cause of why other entities are would be particulars, such as Socrates and Bucephalus, and not their species and genera. However, the notion of τόδε τι does not necessarily indicate an individual entity. Aristotle employs τόδε τι to refer to what is signified by 'something indivisible and numerically one' (*Cat*. 5, 3b10-13) and this could be a specific characterization (*An. Post*. I.4, 73b7-8) or a genus (*Top*. III.1, 116a23; VI.6, 144a20-23; *Metaph*. Z.13, 1038b3-6). Since in scientific contexts individuals are not objects of study, τόδε τι turns out to indicate any subject of demonstrable attributes (such as human or horse) that is credited with the unity of a scientific principle; for this will be the cause of why there is a demonstrable characterization of the subject studied (e.g. capability of learning, or whinnying). What matters is that Aristotle embarks on Z's enquiry without equating being a τόδε τι with being an individual.

because it studies the genus of substances and its demonstrable attributes, the entities in other genera. *Z is the enquiry to define substance and thus to establish the principle of metaphysics*; for substance is the cause of other entities. It could be said that to answer what substance is in metaphysics corresponds to answering what nature is in physics and what unity is in mathematics; for these are the principles grounding the totality of objects studied by the relevant science (both primary and secondary objects).[56] The principle of metaphysics is not a second-order substance beyond the other substances; rather, it is the genus of substances listed in Z.2. To use Aristotle's words, this is **the primary substance** in the hierarchical system of metaphysics. Since the enquiry is focused on sensible substances, the principle is initially expected to match the cause of sensible substances (i.e. nature in physics); nevertheless, if this domain extends to non-sensible reality, the principle will be the cause of suprasensible substances too.[57]

In order to identify this primary substance, Aristotle considers four definitions: subject, essence, universal, and genus. Unless there are non-sensible substances, each definition is expected to indicate either form, matter, or the composite of both. In Z.3, the examination of substance as subject fails to establish the principle of metaphysics. If substance is defined as subject, substance is opposed to any scientific characterization; basically, not only is substance opposed to its demonstrable attributes (what-substance-is-like, how-much-substance-is, etc.), but also to the signification of its definition (what substance is). *The primary substance is initially identified with an indeterminate matter, which can hardly be the cause of other entities*. The examination of substance as essence in Z.4-6 appears to be more promising. Every substance is indeed a primary object of metaphysics and possesses an essence and a definition; more precisely, every substance is one and the same as its essence. Aristotle carries out this examination by focusing on the constitution of a definition

[56] To illustrate, nature is the principle of physics grounding its primary objects, bodies, and its secondary objects, motions. Correspondingly, substance is the principle of metaphysics grounding its primary objects, other substances, and its secondary objects, non-substances.

[57] A univocal conception of substance is also proposed by Frede-Patzig (1988) and Menn (2001). Frede-Patzig take substance to be the individual form that constitutes every sensible object, e.g. Socrates' soul. Menn argues that substance is absolutely understood as a further principle beyond the sensible objects. Contra Menn, I agree with Frede-Patzig that substance is a certain item in the category of substance and form is the solution suggested in Z.10-11. Contra Frede-Patzig, I agree with Menn that substance will ultimately be a substance beyond the sensible objects, which cannot be identified in Z, i.e. God.

in Z.10-11; for this can be illustrative of the essential elements constituting a substance. Since a definition is the statement of an essence, and since a definition seems to signify only the form of a substance, *the primary substance is then identified with the form*. Form is the cause of other entities insofar as it is presupposed by the definitions of non-substances and constitutes the definition of substances. Hence, form is the principle of metaphysics.

There is a problem with this solution, however. When Aristotle takes up the examination of substance as universal in Z.13-16, his criticism undermines the entire enquiry; for *it is impossible to define any substance in terms of the constitution expressed by its definition*. Indeed, every substance turns out to be either composite or non-composite. If it is composite, it will depend upon its constituents; thus, it will fail to hold primacy and unity. If it is non-composite, it will not be knowable; thus, it will fail to ground a demonstrative science. The point is that the study of the genus of substances leads to identifying the primary substance with their ultimate essential element. For example, human will be constituted by animal, animal will be constituted by body, body will be constituted by continuum and so on until the genus itself. This procedure marks the failure of the enquiry insofar as on this account no entity can be the cause of other entities. Indirectly, Aristotle is then able to infer that *the principle of metaphysics cannot be established by looking at sensible substances*. Rather, it is necessary to admit the existence of a suprasensible substance that, if correctly defined, will ground the totality of entities. *By looking at sensible substances it is merely possible to envision this principle through a derivative definition*. This account is provided in Z.17. The chapter sets out a demonstrative definition according to which a sensible substance is such-and-such a matter in virtue of such-and-such a cause. On the one hand, Z's enquiry fails to establish the principle of metaphysics; on the other, it answers what substance is within sensible reality.

2.3 A Logical Analysis

The last issue I want to address in this Chapter concerns how Aristotle effects his strategy in the course of the enquiry. In other words, we need to clarify the method

to establish the primary substance within sensible reality. The key signpost, I maintain, is found in the preamble of Z.4. Having discarded the definition as subject, Aristotle announces he will undertake the examination of the definition as essence 'in a logical way' (λογικῶς). Much of Z's argument is shaped by this logical turn; for the enquiry is driven from the direct analysis of entities toward the analysis of the statements accounting for them. Aristotle will thus inspect the relations among the terms stated in order to establish conclusions about the actual objects of metaphysics (i.e. substances and the dependent entities).

Let us start with an analysis of the signpost.

> At the beginning we distinguished the several ways in which substance is accounted, and one of these appeared to be the essence. Accordingly, we must now investigate this. And first let us discuss about it in a logical way. (1029b1-13, Bostock's translation slightly modified)

> Ἐπεὶ δ' ἐν ἀρχῇ διειλόμεθα πόσοις ὁρίζομεν τὴν οὐσίαν, καὶ τούτων ἕν τι ἐδόκει εἶναι τὸ τί ἦν εἶναι, θεωρητέον περὶ αὐτοῦ. καὶ πρῶτον εἴπωμεν ἔνια περὶ αὐτοῦ λογικῶς.

Commentators tend to raise two main questions about the notion of λογικῶς: i) What does λογικῶς mean? ii) What is the extension of the 'logical analysis'?[58] As for (ii), we can make some preliminary observations. First of all, the logical analysis appears to be suitable for the forthcoming discussion. Since Aristotle claims to take up this procedure in conjunction with the examination of the essence, we could suppose that the adverb λογικῶς is meant to separate the new phase of enquiry from the examination of the subject. The same idea is suggested by Z.17, in which Aristotle argues that substance as cause amounts to substance defined as essence in a logical way (1041a27-28). Again, the logical analysis seems to separate the examination of the essence from the discussion conducted in Z.17.

2.3.1 Some interpretations

[58] Cf. Burnyeat (2000: 19); Galluzzo (2013a: 57-59).

The debate about the notion of λογικῶς reproduces the general debate about Z's strategy. Some commentators insist on its dialectical character, some others defend its preliminary role for the science of being. According to the traditional interpretation, λογικῶς designates *a dialectical analysis that is excessively based on universal and abstract considerations about its object*. Within a science, a logical analysis yields an empty reasoning in that it lacks the accuracy ensured by the application of the relevant principles. A classic example is given in *On the Generation of Animals* I.8: a logical explanation about the sterility of mules is rejected in favour of explanations based on the coldness at the conception (747b28ff.). Thus, λογικῶς amounts to a pejorative synonym of διαλεκτικῶς.[59] In this light, Ross reduces the logical analysis of Z.4 to some linguistic observations about the concept of essence; this analysis would terminate at 1030a27, in which the observations about 'how we speak of things' are superseded by the observations about 'how things are'.[60] Since the concept of essence is initially spelled out in terms of common ideas (such as 'what is said per se') and abstracted from empirical facts, this turns out to be a dialectical investigation that is merely plausible and not scientifically true.[61] What is unconvincing about the dialectical interpretation is that λογικῶς can hardly be limited to general linguistic observations as opposed to proper scientific arguments. In *On the Generation of Animals* I.8, for example, the logical explanation is not deemed to be empty because it falls outside the scope of the science; rather, it is empty because of its generality, which prevents it from indicating the appropriate cause. Admittedly, such a general character is shared with dialectic, though it does not make it a procedure for testing theses.[62] Moreover, at 1030a27 Aristotle argues that essence belongs to substances either exclusively or primarily, regardless of the focus of our examination. Since his conclusion has already been established in

[59] For other negative uses of λογικῶς see *Metaph*. Γ.3, 1005b22; N.1, 1087b20; *Eth*. *Eud*. I.8, 1217b16-21.
[60] See Ross (1924: 168-171). Owen (1960: n.32) points out that the linguistic analysis marked as logical is meant to show through linguistic devices (i.e. addition and subtraction) the primacy of substance that is later proved through the focal analysis of being. This makes it an auxiliary argument. Cf. Frede-Patzig (1988: 59).
[61] Irwin (1988: 210-213), considers the logical analysis of Z.4 to be an instance of the pure dialectic that must be contrasted with the scientific method of metaphysics, the strong dialectic. Similarly, Bolton (2002: 163; n. 5) argues that λογικῶς introduces a *Topics* style discussion that must be contrasted with the method of the *Analytics*. See also Lewis (2013: 76-83), who identifies the logical analysis with the data of the received views on the subject, i.e. how philosophers have been treating essence.
[62] For a review of the passages that witness the neutral use of λογικῶς see Lemarie (2016)

the text, there is no need to contrast the logical analysis with the subsequent remarks.[63]

A sample of the alternative interpretation is given in Burnyeat's *A Map of Metaphysics Z*. His starting point is the review of the senses of λογικῶς offered by Simplicius in his commentary on the *Physics*.[64] The term, says Simplicius, conveys the following ideas:

a) Based on reputable premises;
b) Not based on empirical facts;
c) Based on general rather than proper principles in a science.

In the dialectical interpretation of λογικῶς, (c) is subordinate to (a) and (b). On the contrary, Burnyeat takes (c) to be at the core of Aristotle's usage. The notion of λογικῶς designates *an analysis that abstracts from the principles that are proper to the subject-matter of a science*. For example, a logical analysis conducted in physics does not rely on the principles of sensible entities, i.e. form and matter. Since Z's enquiry is primarily concerned with sensible entities too, the logical analysis of Z.4 is a discussion that abstracts from the same hylomorphic principles. Indeed, these principles appear to contribute to the treatment of essence only in Z.10-11. In a logical context, the arguments are not conceived to state the cause of a fact and, thus, to articulate a demonstration within the relevant science. This is the sign of their general character.[65]

According to Burnyeat, there is another salient sense conveyed in Aristotle's usage. The notion of λογικῶς designates *an analysis that draws on the materials of the so-called logical works*. In other words, a logical analysis consists in applying doctrines and conceptual tools that are found in the *Organon*. For example, in Z.3 Aristotle starts from the doctrine of the ultimate subject of predication defended in the *Categories*; in Z.4, the concept of essence is firstly defined with reference to the notion of per se elaborated in *Posterior Analytics* I.4; in Z.13, Aristotle addresses his criticism against the idea of universal outlined in *De Interpretatione* 7 (17a38-b1). The fundamental insight is that the logical

[63] For this criticism see Woods (1974-75: 170-171), Burnyeat (2000: 19-25), and Galluzzo (2013a: 60-61). Woods, in particular, considers the logical analysis to cover the initial section in which Aristotle defines essence as 'what is said per se' (Z.4, 1029b13-22). On this passage see Section 3.3.2.
[64] See Simplicius (*In Phys.*, 440.19-441.2).
[65] In Burnyeat's terminology, this is Simplicius' sense of λογικῶς.

analysis plays a pedagogic function in the study of metaphysics; for it recalls argumentative patterns that must be familiar to the metaphysician.[66] At the same time, the logical analysis can hardly exhaust a metaphysical discussion because it is alien to the hylomorphic principles; rather, Burnyeat suggests that a logical analysis raises conceptual difficulties that are to be solved through the application of form and matter. These combined senses of λογικῶς help Burnyeat to defend his two-level procedure of Z.[67] In the enquiry, every examination of the candidates starts with a logical analysis and is completed by a discussion in hylomorphic terms.

Undoubtedly, Burnyeat is able to vindicate the preliminary role of the logical analysis without missing the provisional and general character that makes it closer to a dialectical discussion. The problem with this reading is that Aristotle does not seem to follow such a rigid plan in alternating logical and hylomorphic phases of enquiry. The examinations of the subject and of the universal can be divided up into two sections less easily than the examination of the essence.[68] Rather, it is evident that form and matter are pivotal in some logical arguments. For example, in Z.10-11, Aristotle identifies the primary substance with form on the basis of an analysis of definitions, which turn out to be exclusively constituted of formal parts; similarly, in Z.17 the *Analytics* model of demonstration is employed through the notions of matter and form. Besides, we can make little sense of two facts highlighted above: for one thing, the notion of λογικῶς introduces a phase of the enquiry that breaks from the previous examination of

[66] In Burnyeat's terminology, this is Andronicus' sense of λογικῶς. Clearly, this reading presupposes that Aristotle conceives the *Organon* as a unified set of treatises with common objects and scopes. For this view see Burnyeat (2001: Ch. 5).

[67] See 2.2.1 above. Similar views are suggested by Averroes and Aquinas in their commentaries. However, unlike Burnyeat, they consider Z to be logical in its entirety. Averroes (*In Metaph.* VII, 2.153 K-L) offers a reading that is close to Andronicus' sense: Z is logical because its starting points are dialectical theses (definition, predication). Since metaphysics and dialectic are both concerned with the same subject-matter, these doctrines represent the appropriate basis of the science of being. Aquinas (*Expositio*, L.3: 1306), instead, takes Z to be logical because form and matter represent the results of its enquiry and not its starting points (like in H). The starting points of Z are common arguments that are functional to a conceptual treatment of substance as opposed to a fully realist treatment. On this topic see Galluzzo (2013a: 146-150; 237-241).

[68] With the subject, Aristotle would confine the logical analysis to three lines only (Z.3, 1028a36-1029a1), while with the essence it would cover the whole Z.4-6. With the universal, the hylomorphic analysis is supposed to take place in Z.15, but the core thesis of the chapter is the impossibility of defining and to know particular entities.

the subject; for another thing, the logical analysis seems to be suitable to treating the essence.

2.3.2 Logical Problems, Logical Discussions, and Logical Arguments

To isolate the different senses of λογικῶς does not seem to achieve any definite result, neither by insisting on its dialectical character nor by insisting on its preliminary role. This prevents us from understanding the meaning and the extension of the logical analysis and from showing how Z's strategy is put into effect. Presumably, we can gather more elements from answering not 'What does λογικῶς mean?', but 'What does λογικῶς refer to?'. By looking at the items that are qualified as 'logical' we will be able to give a preliminary insight into the notion and, thus, to establish the extension of such an analysis in Z.

In Aristotle's works, it is possible to detect three kinds of items to which λογικῶς is referred.

i) Problems;
ii) Discussions;
iii) Arguments.

The adjective form λογικός is generally applied to problems and arguments,[69] while the adverbial form λογικῶς qualifies the way in which a discussion can be conducted.[70] The logical characterization of arguments does not look very explanatory. The term is employed to separate a type of reasoning from other types, such as genuine demonstrations and enthymemes. Arguably, in the first case the deduction is not scientific because it does not state the cause of the fact inferred; in the second case, the deduction is not rhetorical because it does not state a possibility through persuasion. What is interesting is that the logical argument can be both contrasted with and placed alongside the other types of

[69] As for arguments see *An. Post.* II.8, 93a15 (συλλογισμός); *Top*. VIII.12, 162b27 (λόγος); *De Gen. An.* I.8, 747b28 (ἀπόδειξις); *Rhet*. I.1, 1355a13 (συλλογισμούς). As for problems, see *Top*. I.14, 105b20ff.; V.1, 129a30-31 (πρόβλημα, προτάσεις); *Phys*. 3.3, 202a22 (ἀπορίαν); *Metaph*. Γ.3, 1005b22 (δυσχερείας); N.1, 1087b20 (δυσχερείας).

[70] See *An. Post*. I.21, 82b35 (θεωροῦσιν); I.22, 84a7, b2 (πιστεύσειε, δέδεικται); I.24, 86a22 (εἰρημένων); I.32, 88a19 (θεωροῦσιν); *Phys*. 3.5, 204b4-10 (σκοπουμένοις); *De Cael.* I.7, 275b12 (ἐπιχειρεῖν); *De Gen. et Cor*. I.2, 316a11 (σκοποῦντες); *Metaph*. Z.4, 1029b13 (εἴπωμεν); 1030a25 (φασί); Z.17, 1041a28 (εἰπεῖν); Λ.1, 1069a28 (ζητεῖν); *Eth*. *Eud*. I.8, 1217b16-21 (διασκοπεῖν, λέγεται).

arguments. This, however, does not enable us to separate the negative from the neutral sense. In a science, a logical argument can be totally inappropriate, as with the explanation of mules' sterility, and yet parallel to genuine demonstrations, as suggested in the *Analytics*.[71]

The logical characterizations of problems and discussions are definitely more illustrative. First of all, Aristotle seems to suggest that in a science a non-logical problem can be treated either logically or non-logically. Both cases are exemplified in *On Generation and Corruption* I.2, which examines indivisible magnitudes as principles of absolute motion (i.e. change). These principles are identified with surfaces by Platonists and with atoms by Democritus. Aristotle tells us that the Platonist solution, unlike Democritus', follows from a logical treatment (λογικῶς σκοποῦντες) that blatantly fails to explain generation and corruption of non-solid things. Thus, the negative value of such a logical analysis stems from its inappropriate application to physical matters, for which atoms represent a better, albeit still invalid, solution.[72] Things look different with the treatment of genuinely logical problems. In *Physics* III.3, Aristotle raises a logical difficulty (ἀπορίαν λογικήν): how can there be one single actuality for two distinct objects, the mover and the moved? There is no suggestion of a fully physical treatment to tackle the problem; rather, Aristotle concludes that the actualities of mover and moved must be distinct in formula (τῷ λόγῳ), although they indicate one single object, the motion itself.

In a science, logical problems and discussions can feature in an appropriate way. The point is that since what is logical is not relevant to an explanatory procedure, it must be relevant to other contexts. What is the context that is common to these applications of the term? The answer I submit is quite obvious: *logical problems and logical discussions are concerned with statements* (λόγοι). Basically, what is qualified as logical is not focused on scientific facts, but on **the statements accounting for the objects of the science**. Consider *Physics* III.5, in which Aristotle logically denies the existence of an infinite body (204b1-10). This conclusion is established by examining the statement accounting for what body is. Since a body is 'whatever is limited by a surface', the statement accounting for an infinite body would consist of contradictory elements: 'limited'

[71] Cf. *An. Post.*, I.21, 82b35; I.22, 84a7; b2.
[72] Just as in the case of *De Gen. An.* I.8. Cf. *De Cael.* III.1, 298b15-25.

and ‘unlimited’ (i.e. infinite).[73] This discussion is indeed closer to the treatment of the logical difficulty of III.3, which deals with the distinction between the statements accounting for the mover and the moved. The central idea is that in a science a scientist can be concerned not only with the relevant explananda, but also with issues about statements. A set of passages in the *Posterior Analytics* concur with this reading. At I.21-22, Aristotle claims to show the impossibility of infinite chains of predications both logically and analytically.[74] Whereas the analytical discussion is focused on the explanatory tie between predications, the logical discussion is focused on the relations between the statements of such predications.[75] In particular, Aristotle argues that every predication comes to an end with the statement of a definitional predication; namely, a chain of predicates (e.g. endowed with memory, capable of learning etc.) ends with the predicates that are stated to account for the subject (e.g. what human is).

Let us go back to Z’s enquiry. Clearly, the enquirer is not concerned with explanations, but with the principle to ground explanations about the totality of entities, i.e. substance. In Z.4, Aristotle intends to show that essence effectively defines substance. What is remarkable is that this conclusion is established by looking at the statements that account for entities. More precisely, Aristotle infers that substances possess and are identical with their essence from the fact that every substance possesses a definition (1030a6-17; a28ff.). Since a definition is the statement of an essence, and since there is identity between the definiens and the definiendum, every substance turns out to be its own essence (Z.6).[76] On the contrary, non-substances do not possess definitions; for they are accounted for as by derivative statements. For example, ‘pale’ is accounted for as by adding ‘pale’ to ‘human’ so that ‘pale human’ is the definiens of ‘pale’. Basically, a non-substance is always accounted in relation to the essence of a substance. Therefore, a non-substance is not an essence.[77] Now, there are reasons to think that *the analysis of the statements accounting for substances and non-substances is at the core of the remainder of Z*. The examination of Z.4-6

[73] The same conclusion can be established in a physical way (III.5, 204b10ff.).
[74] Cf. *An. Post.* I.21, 82b34-35; I.22, 84a6-7; 84b1-2.
[75] The idea is that if there were infinite predications, there would be infinite explanatory deductions; for it would be possible to infinitely mediate the premises through an additional predication. Consequently, knowledge would be either circular or infinite.
[76] For the reconstruction of the argument of Z.4-6 see Chapter Three.
[77] This discussion is expanded in Z.5, in which Aristotle is concerned with the derivative statements in which two terms are coupled to account for an entity, e.g. snub is a concave nose.

represents the basis for the discussion of the parts of definition in Z.10-11. Having concluded that the principle of metaphysics is an essence, Aristotle attempts to identify the primary substance through his hylomorphism. Again, the enquiry is driven toward statements, in particular definitions. In order to establish what entity is the principle of metaphysics, we need to establish what parts of a substance are stated in its definition; for the primary substance will be the ultimate element that is constitutive of the definitions of substances.[78]

From this perspective, Z.12 looks to be wisely incorporated into the book. At 1037b9-14, Aristotle tells us that the explanation of the unity of the parts of definition, genus and differentia, will contribute to the enquiry into substance. The reason is that the unity of those parts will prove to be the unity of the corresponding entity. It is widely agreed that the issue receives a final answer in H.6.[79] Remarkably, there is a salient change of approach between these chapters: while Z.12 is conceived to explain the unity of substance by arguing for the unity of definition, H.6 is conceived to explain the unity of definition by arguing for the unity of substance.[80] The same focus can be recognized in the criticism of the universal in Z.13-14. In order to show that the universal is not the principle of metaphysics, Aristotle addresses the universal not simply as an entity, but also as an element that is constitutive of the definition of a substance (1038b17-23; 1039a26-30). Namely, the universal is a notion that is constitutive of a plurality of other statements accounting for entities. For example, the notion of animal (i.e. the statement of what an animal is) is constitutive of the statements accounting for human and horse. The criticism ends with a dilemma that is indeed centred on the impossibility of definitions of substances and, thus, of the primary substance; namely, the impossibility of grounding metaphysics.[81]

At this point, we are in a good position to demarcate the extension of the logical analysis. Undoubtedly, the term employed in Z.4 is meant to qualify the treatment of the essence, which is signification of a definition and is identified with substance. This discussion includes Z.4-5 and, probably, Z.6. Nevertheless, the

[78] Since the parts of a definition are only the formal parts, Aristotle concludes that the principle of the totality of entities is the form itself.
[79] It is matter of dispute whether H.6 develops or breaks with the solution in Z.12. See Gill (2010) and Code (2010a) for two different readings. See also Chapter Six.
[80] Compare Z.12, 1037b8-14 with H.6, 1045a7-20.
[81] See Z.13, 1039a14-22 (cf. Z.16, 1041a3-4). Contrary to many commentators, I will argue that the aporia at the end of Z.13 is a serious obstacle to any positive solution to Z's enquiry. See Chapter Five.

discussion of Z.10-16 is oriented in the same direction; for Aristotle is mainly interested in the content of the statements that account for substances: the definitions of the primary objects of metaphysics.[82] As a matter of fact, from Z.4 to Z.16 the enquiry shares the focus of the logical analyses conducted within a science. Aristotle is primarily concerned with the statements that account for the objects of metaphysics, i.e. entities.[83] It could be said that Z's enquiry offers a unitary argument that, after the dismissal of the subject in Z.3, leads first to a formalist solution through essentialism and second to the difficulties flowing from that solution.

2.3.3 The Platonist Roots of λογικῶς

In light of its peculiar 'subject-matter', we were able to understand how far Z's enquiry is logically oriented. Now, we need to give an answer about the meaning of λογικῶς; that is, to understand how such a shift from entities to statements affects the enquiry. To this end, I want to call the attention to a sense of the term that has never been considered to be relevant to Z.4: the notion of λογικῶς often qualifies a Platonic treatment of a question. This use of the term has already emerged in the previous sections. In *On Generation and Corruption*, the Platonic argument for indivisible surfaces is qualified as logical and compared to the Atomists' solution, which is more appropriate to a physical problem. What is

[82] This reconstruction concurs with Menn's interpretation of Z. In Z.10-16, Aristotle seems to tackle B#6, *whether the principles are the genera (i.e. formal) or material elements*, and the other aporiai (B#7-9) that follow from the assumption of genera as principles. The advantage of my reading is that Z.10-11 completes the examination of essence in Z.4-6, as can be inferred from their argument.

[83] I am inclined to think that Z.7-9 is an interpolation, possibly due to a later editor. In general, Z.7-9 clashes with other chapters about salient issues. Firstly, the incorruptible character of the form is advocated in Z.10-11 in order to show that the form does not dissolve into materials; in Z.8, instead, this is advocated to bring the process of change to an end (Z.8, 1033a28-b11). Secondly, Z.7 argues that the bronze of a bronze sphere is part of its definition (Z.7, 1032b31-a5), while Z.10-11 seems to discard this option (Z.10, 1035a9-22). Thirdly, at Z.8, 1033b29-33 Aristotle exploits the numerical unity of substances to rule out Plato's Forms, but this move does not yield the impossibility of establishing definitions as indicated in Z.13. Fourthly, at Z.7, 1032a20-21 Aristotle relies on a notion of matter as potentiality that is alien to the rest of Z (in Z.3 the notion of matter is indeed opposed to its potentialities).

interesting is that this is the prevalent use of the notion in the *Metaphysics*. The beginning of book Λ represents a clear example.

> The thinkers of the present day tend to posit universals as substances; for the genera are the universals, and these they tend to describe as principles and substances on the basis of purely logical investigations (διὰ τὸ λογικῶς ζητεῖν). The old thinkers, instead, used to posit particulars as substances, such as fire and earth, and not what is common, i.e. the body. (Λ.1, 1069a25-30, The Revised Oxford Translation slightly modified)

> οἱ μὲν οὖν νῦν τὰ καθόλου οὐσίας μᾶλλον τιθέασιν (τὰ γὰρ γένη καθόλου, ἅ φασιν ἀρχὰς καὶ οὐσίας εἶναι μᾶλλον διὰ τὸ λογικῶς ζητεῖν)· οἱ δὲ πάλαι τὰ καθ’ ἕκαστα, οἷον πῦρ καὶ γῆν, ἀλλ’ οὐ τὸ κοινόν, σῶμα.

Aristotle informs us about two traditions of studies in metaphysics. Whereas the Pre-Socratics used to identify the first principles with simple material bodies (e.g. fire, earth, etc.), Platonists tend to identify the first principles with the universals (i.e. the genera). The solution endorsed by Platonists is a modern advancement in metaphysics; for principles are now credited with a common existence as opposed to the individual existence of entities. The point is that the Platonist solution is the result of their ‘logical investigating’. If the above observations are correct, the enquiry into substance conducted by Platonists is logical in that it diverts the attention from entities to the statements that account for them.

The review of past philosophical positions given in book A confirms this insight. In A.5-6, Aristotle reports a similar turn in methods and contents. Pythagoreans are the first to take up the procedures of defining and accounting for objects (987a19ff.). It is only with Plato, however, that the focus on definitions is effectively employed in metaphysical discussions. The first principles can be detected through a study of the definitions, which are referred to some entities separated from sensible reality, the Forms. Thus, the introduction of the Forms, says Aristotle, is the result of an examination conducted among statements (διὰ τὴν ἐν τοῖς λόγοις ἐγένετο σκέψιν, 987b31-32). The statements turn out to be the most valuable means understanding the separated status of the principles; for the metaphysician can accomplish this task through pure reasoning and without the contribution of sense perception.[84] In this respect, the Platonist metaphysics

[84] Cf. *Resp.* VII, 532a; IX, 582a-583a.

resembles the logical analysis set out in Z.4. There are a couple of things to bear in mind. The notion of λογικῶς does not necessarily mark a discussion as 'Platonist'. With this use of the term, Aristotle is highlighting some aspects that characterize Platonist arguments, namely the subject-matter and the method of investigation. Although the logical analysis of Z.4 also leads to a formalist solution, it does not have to be assimilated to a Platonist treatment of substance. More plausible is that their common approach might be responsible for the same ontological limitations, which emerge in the criticism of universal. Nevertheless, this sense of λογικῶς is crucial to identifying the methodological features that the logical analysis of Z shares with the Platonist arguments. For these will illustrate in what sense Aristotle reconceives his enquiry into substance.

There is a specific trait that must characterize every discussion that is focused on statements: **the inspection of the predicative relations** held by the terms stated. In a science, a conclusion about a demonstrable fact is obtained from the analysis of the relations among the elements that constitute the fact. For example, the conclusion that there is an eclipse (i.e. loss of light from moon) is obtained from the relations between moon, eclipse, and the screening of sun by earth. Indeed, the scientist proves that the subject under study is characterized by a per se attribute. What matters to us is that demonstrable facts correspond to statements. The characterization of a subject by some attribute corresponds to the statement that some predicate belongs to the subject. If the enquiry is focused on statements, the scientist has then to analyse the relations among the predicates that constitute such statements. For example, the conclusion that 'there is an eclipse' (i.e. 'loss of light belongs to moon') is obtained from the analysis of the relations between the predicates 'moon', 'eclipse/loss of light', and 'earth screening'. Accordingly, the metaphysician has to analyse the relations among the predicates that constitute such statements; these are the statements that correspond to the objects of metaphysics, entities. For example, the conclusion that 'there is a quality Q' (i.e. 'Q belongs to substance S') is obtained from the analysis of the relations between the predicates 'Q' and 'S'; that is, the existence and the nature of a quality are in relation to the substance that is qualified. In Z.4, Aristotle exploits these relations to argue that essence belongs to substances either exclusively or primarily. Basically, it is possible to separate substances from non-substances through an examination of the statements

accounting for these objects.[85] For such a logical discussion, *the enquirer must rely on a structured system of kind terms that are stated to account for demonstrable facts*.

In Chapter One, I pointed out that Aristotle relies on such a system of kinds for his exposition of the schemes of dialectic. More importantly, I noticed that this system is reminiscent of the network of Forms at the basis of Plato's late metaphysics; the knowledge of principles is achieved by scanning the connections among the predicates that indicate each Form.[86] In the *Topics*, Aristotle formulates the schemes to attack and to defend a thesis with reference to the system of kinds inherited from Plato. In the *Metaphysics*, he attempts to establish the principle of a demonstrative science with reference to the same system. There is a fundamental difference in these pictures. With the logical analysis of Z.4, Aristotle relies on the system of kind terms *not to test* the predicative relations stated in plausible theses, *but to study* the predicative relations to be stated in a science; for these predicative relations correspond with the real connections among entities. Accordingly, the notion of λογικῶς does not mark the dialectical character of the discussion. It indicates a procedure to establish the principle of metaphysics by inspecting the same relations that are tested in dialectic.

Though indirectly, the Platonist sense of λογικῶς makes a salient contribution to our understanding of the analysis of Z.4. Since Aristotle tends to qualify as logical every discussion that is focused on statements, his use to refer to Platonist discussions sounds very appropriate; for Platonist metaphysics is focused on the statements that account for the connections among Forms. In order to examine the statements that account for the objects of metaphysics, Aristotle bears in mind the system of kind terms that also grounds Platonist metaphysics. From a cursory overview of Z, we can recognize at least three major predicative relations. A first relation is the identity between two terms insofar as if they signify one and the same object. Aristotle insists on this predicative relation at the start of Z.4 and throughout Z.6. To illustrate, a substance is identical with its essence because there is one single object that is signified by a definition. A second relation is the immediacy that characterizes a definition in that cannot be deduced from other

[85] See Section 3.3.
[86] See Section 1.2.1.

statements. Aristotle insists on this predicative relation in the main body of Z.4 and in Z.5. An essence belongs to a substance primarily because there is no further statement to mediate a definition. A third relation is the essential parthood that characterizes the elements of a definition, i.e. genus and differentia. Aristotle insists on this predicative relation in Z.10-16. The parts of a definition are the constitutive cause of what the definiendum is.

To sum up, the logical turn of Z's strategy consists of a type of analysis that is reminiscent of Platonist metaphysics. Rather than focusing on entities, Aristotle examines their corresponding statements and, thus, the predicative relations involved. This move looks very suitable for the examination of the essence, which is the content signified by a definition. The formalist solution to Z's enquiry (i.e. form is the principle of metaphysics, the primary substance) is indeed inferred from a logical analysis. In this light, we can confirm the pre-scientific value of the enquiry beyond the application of hylomorphism; for Z is not a dialectical treatment of statements but an analysis of their content insofar as it signifies an ontological fact (e.g. the existence of a quality and, thus, that 'a quality belongs to a substance').

2.4 Interim Conclusions

In order to establish the principle of metaphysics, Z's enquiry examines different definitions of substance. In other words, Z's enquiry is concerned with the first genus of entities and its definition. This makes it neither a dialectical nor an aporematic discussion. Z is part of the project to develop the demonstrative science of being, consisting of the definitional knowledge of substances (i.e. the primary objects of metaphysics encompassed by the genus substance) and the demonstrative knowledge of non-substances (i.e. the secondary objects of

metaphysics encompassed by other genera). Four definitions of substance are examined in the book–subject (Z.3), essence (Z.4-6, Z.10-11), universal and genus (Z.13-16). Since the enquiry is focused on the domain of sensible reality, each definition is expected to identify substance with either form, matter, or the composite of both; for the principle of metaphysics has to match one of the principles of physics.

In conducting his examinations, Aristotle shifts from the analysis of entities to the analysis of their statements, namely the statements accounting for them. This logical turn is found in Z.4 and orientates most of the enquiry. In order to establish the principle of metaphysics, Aristotle examines the predicative relations that are involved in accounting for entities; above all, this means examining definitions, which are the statements accounting for substances. It is not surprising then that essentialism turns out to be the most promising solution to Z's enquiry: the definition of a substance is the statement of an essence that grounds the existence and the nature of other entities just as the definition grounds the demonstrations conducted in metaphysics. However, this leads the enquiry to identify substance with the constitution of a definition and, thus, to raise some difficulties for essentialism itself. At the end of the day, there is no way to define substance but by a derivative definition. This marks the failure of Z's enquiry.

What is interesting in this picture is that Aristotle's strategy lines up with my approach to Z. The enquiry into substance corresponds to an enquiry into a definition. For one thing, Aristotle is after the entity grounding the existence and the nature of other entities; for another thing, Aristotle is after the definition that grounds the demonstrations conducted in metaphysics. In the next four chapters, I will discuss the major problems about substance in the light of the 'theory of definition' outlined earlier on. Since the treatment of definition revolves around the primacy and the unity of the statement, Aristotle's enquiry into substance will revolve around the primacy and the unity of substance. For this will make the entity and its definition the principle grounding the demonstrative science of being.

Chapter Three

Definition and Primacy (I)

In the previous Chapters, I argued that Z's enquiry aims to establish the principle of metaphysics by answering what substance is. The most promising approach to this enquiry is to take advantage of the correspondence between substance and definition: substance is the entity grounding the existence of other entities just as definition is the statement grounding demonstrations in a science. As a matter of fact, Z's strategy overlaps with my approach: Aristotle drives his enquiry from examining entities to examining the statements accounting for them. Consequently, much of Z is focused on definitions, which are the statements accounting for substances. There are two issues about definition that, we can expect, will emerge in Z: primacy and unity. In metaphysics, Aristotle is bound to deal with the corresponding primacy and unity of substance. The next two Chapters are concerned with primacy. Chapter Three explores the doctrine of essentialism developed in Z.4-6; Chapter Four explores the application of hylomorphism in Z.10-11. My contention is that Aristotle endorses a formalist essentialism in order to ensure the primacy of substance. More precisely, his solution to Z's enquiry is that the principle of metaphysics can be appropriately spelled out as essence and identified with the form of substances.

In what follows, I discuss two central ideas behind Aristotle's essentialism: the **identity thesis** and the **essential dependence**. Both these ideas, I shall argue, contribute to securing that substance holds absolute primacy over the other entities. The identity thesis establishes that a substance is one and the same as its essence. Aristotle attempts to infer it in Z.6: the identity between an object and its essence is the identity in definition; this is possible only in the case of the primary objects of a science, such as substances in metaphysics. Therefore, the endorsement of the identity thesis reveals the primacy of substance. However, the argument of Z.6 is not cogent because it is not supported by a distinction between primary objects and secondary objects in metaphysics. This task is

accomplished in Z.4, in which Aristotle assumes the identity thesis. By separating primary and secondary objects of metaphysics, Aristotle comes to the following conclusion: essence belongs to substances either exclusively or primarily. In either way, I contend, Aristotle aims to ensure the primacy of substance in terms of essential dependence: an entity depends upon substance because the essence of the latter is the cause of the essence of the former. This form of ontological dependence establishes a distinction between primary and secondary objects in metaphysics; for it separates the immediate definition accounting for substances from the derivative definition accounting for non-substances. If this is correct, the essentialism developed in Z.4-6 is conceived to ensure the primacy of substance. Indeed, the identity thesis and the essential dependence enable Aristotle to ground the demonstrative science of the totality of entities, in which the principle is essence.

3.1 What is Aristotelian Essentialism?

In modern philosophy, essentialism is a metaphysical doctrine according to which every object possesses the intrinsic source of its being what it is. This source is the essence of the object and is traditionally understood in two ways. An essence can be a set of attributes characterizing the object; for example, the essence of Socrates is the collection of features, such as rational, biped etc., that make up his human nature.[1] From a different perspective, an essence can be a constitutive element of the object; for example, the essence of Socrates is the constituent that is causally responsible for his human nature.[2] The common insight is that an essence reveals the core identity of an object and is the principle of any fact related to its identity. Accordingly, the commitment to essentialism involves *the commitment to metaphysical realism*; for the essence of an object is not simply an abstract idea associated to the object by a linguistic community, but is the real

[1] This is the form of essentialism described by Quine (1953) and defended by Kripke (1980) and Putnam (1973; 1983).

[2] Both these views are construed and developed in a variety of ways. For example, the idea of constituent is found in ‘hylomorphic’ essentialism, in which essence is identified with the union of matter and form (see Loux, 2006, and Oderberg, 2007), and in ‘scientific’ essentialism, in which essence is identified with the ultimate physical structure of the object (see Ellis, 2001).

entity that is signified by our account of the object.[3] More controversial but still widespread is *the commitment to the knowability of essence*; since an essence is an objective fact in reality, our metaphysics is an effective account of reality only if essences are knowable. In sum, essentialism is a system that provides a metaphysical analysis of real entities and of their mutual relations on the basis of the essences they possess.

The ancestor of this metaphysical doctrine is identified with the form of essentialism expounded by Aristotle in the central books of the *Metaphysics* and, in particular, in Z.4-6. In order to explore the arguments there advanced, I deem it crucial to remark on some peculiarities of Aristotle's view compared to its modern counterparts. To start with, *Aristotelian essentialism represents a solution to establish the principle of a science*. More precisely, it is the doctrine emerging from the examination of substance as essence. Since its goal is to ground a demonstrative science, Aristotelian essentialism does not immediately concern individuals; for the essence of an object is not conceived as the intrinsic principle of an individual entity, but as the characterization of an object of science.[4] To spell out this point, let me recall the distinction between the ownership and the content of an essence. To specify an essence in terms of owner is to indicate the concrete objects possessing the essence, e.g. *the essence of* Socrates; to specify an essence in terms of content is to indicate the characterization that is shared by a plurality of objects, e.g. *the essence as of* human (i.e. being human).[5] Whilst being present in modern essentialism, this distinction is not explicit in Aristotle's metaphysics. In Z.4-6, an essence is always specified as the essence of an entity (eclipse, human, etc.), and every entity is firstly regarded as the object of a science. Whereas Aristotle resorts to essence to discuss the objects of a science that are real entities, modern essentialists resort to essence to discuss real entities that are somehow objects of knowledge.

The main conclusions established in Z.4-6 confirm this approach. Aristotle tells us that every substance possesses an essence and is identical with it. In the light

[3] To use Locke's terminology, essentialism is not merely concerned with *nominal essences* but with *real essences* (cf. *Essay*: III.iii, 18; vi, 6)

[4] I use the term 'characterization' to indicate what is signified by the belonging of some predicate(s) to a subject. This is meant to avoid identifying essence with some attributes, despite being something belonging to an object. In general, every attribute is a characterization of an object, though not conversely; for some characterizations will be one and the same as their objects: essences indeed.

[5] For this distinction, see Lewis (2013: 74-76).

of this, it is totally ineffective to separate the ownership from the content of an essence; if a substance is one and the same as its essence, the possessor and its characterization can be reduced to one single thing.[6] Moreover, we need to bear in mind that in Z.4-6 Aristotle has not yet examined substance as universal. Thus, his development of essentialism does not tackle the problems about the concrete existence of universal entities, such as species and genera.[7] Aristotle is in fact able to elaborate his concept of essence without any concern for the ontological status of the items to which essence pertains because these are, firstly, objects of science and, secondly, objects of concrete reality.

A second peculiar aspect is that *Aristotelian essentialism is conceived in connection with the concept of definition*. Aristotle remarks that the essence of an object is the content stated by its definition; for example, the essence of human is being rational animal, which answers the question 'What is human?'. Admittedly, this idea is central in modern metaphysics; the foundational character of essence in reality can be understood only in connection with the role of definition in our language. Just as a definition reveals the meaning of a term in virtue of which the term can be explicated, an essence reveals the identity of an object in virtue of which the object can be characterized (e.g. a human is rational animal and, consequently, capable of learning).[8] The point is that modern metaphysicians make an analogical use of definition; whilst definitions serve to illustrate the primacy of certain facts in our ontology, they are not employed to signify them. Aristotle, by contrast, takes definitions to indicate the items investigated by the metaphysicians, i.e. entities. For example, the definition of human as rational animal must signify some entity/-ies that constitute(s) the essence of human. This concurs with the possibility of developing essentialism without any concern about the ontological status of the items to which essence pertains; indeed, in Z.4-6 Aristotle is not interested in analysing the real content signified by definitions, such as genera and differentiae. These are the concerns of modern essentialists, who tend to confine definitions to the domain of language

[6] One may argue that ownership is concerned with the monadic sense of substance and content is concerned with its dyadic sense. For my unitary understanding of the concept of substance in Z see Section 2.2.

[7] Consequently, one cannot argue that ownership and content introduce a conception of individual essences and substances. As a matter of fact, Z.4-6 do not consider the difficulties connected with the possibility of knowledge of individuals.

[8] Fine (1994; 1995a) contrasts the 'definitional' conception of essence with the modal conception. This move can help the metaphysician to set out an account of objects that does not involve irrelevant ontological claims (e.g. being member of a singleton is essential to Socrates).

and classification. For Aristotle, instead, the treatment of definitions can be an insightful approach in metaphysics; for a definition represents an alternative form to cast the scientific facts studied by the metaphysician. Nevertheless, this is just to postpone the treatment of the ontological problems about the concrete existence of genera and differentiae.

Having clarified these aspects, we can turn to the conclusions of which Aristotelian essentialism consists: I) essence belongs to substances either exclusively or primarily (Z.4-5); II) a substance is one and the same as its essence (Z.6). By moving from (I) to (II), Aristotle appears to answer what substance is. In the traditional reading, Z.4 is firstly devoted to elucidating the concept of essence. This intensional phase is followed by the analysis of the entities possessing an essence, which occupies Aristotle for the rest of the chapter. The possession of essence is initially confined to substances and, subsequently, extended to non-substances. It is only in Z.6 that Aristotle accomplishes his task by proving the identity between substance and essence.[9] I will offer a different reconstruction. Aristotle is not examining whether essence simply accounts for substance (which is in fact suggested in Z.3), but whether essence is a valid account of substance; that is, whether essence is a promising solution to establish the principle of metaphysics. The examination is successful because the account as essence, I contend, ensures the primacy of substance. Since primacy is one of the central issues concerning the principles of demonstrative sciences, the account as essence will lead Aristotle to establish the principle of metaphysics. In a nutshell, Aristotelian essentialism is conceived to ensure the primacy of substance and, thus, to ground the demonstrative science of the totality of entities.

To see this point, it is important to recognize that Z.6 does not represent an appendix to finally infer that substance amounts to essence. For Aristotle promotes the identity thesis to introduce in metaphysics a condition applying to every science: a primary object is one and the same as the cause stated to account for it. Accordingly, a substance is one and the same as its essence insofar as it is a primary object studied by metaphysics. Therefore, the identity thesis reveals the primacy of substance independently of Z.4-5. However, the argument of Z.6 is too weak to ensure the primacy of substance; for it does not

[9] See, for example, Frede-Patzig (1988: 58), Loux (1991: Ch. 3), Bostock (1994: 118). This circuitous treatment induces Ross (1924: 172) to doubt about Aristotle's accomplishment of his task.

separate between the primary and the secondary objects in metaphysics. I will argue that the same form of identity is assumed in Z.4. In this context, Aristotle supplies his argument with an appropriate distinction between substances and non-substances in terms of essential dependence: the essence of a non-substance depends upon the essence of a substance. The result is a doctrine, Aristotelian essentialism, which ensures the primacy of substance and, thus, the possibility of grounding metaphysics.

3.2 The Identity Thesis

The argument of Z.6 is originally designed to see whether an object is the same as or different from its essence. This essential identity is firstly examined in the case of 'things that are said by accident' (κατὰ συμβεβηκὸς λεγόμενα, 1031a19-28), and subsequently in the case of 'things that are said in themselves' (καθ' αὐτὰ λεγόμενα, 1031a28-1032a11). This is totally in line with the logical strategy of Z's enquiry. In the first case, Aristotle is examining the objects that correspond to the statements in which some predicate(s) accidentally belongs to a subject, e.g. pale human. In the second case, he is examining the objects that correspond to the statements in which some predicate(s) belongs per se to a subject. Substances exemplify the second case of objects and are proved to enjoy essential identity. In so arguing, Aristotle endorses the following thesis:

Identity Thesis: a substance is one and the same as its essence.

Most of the chapter is a survey conducted on a reputable case of substances: Plato's Forms. Roughly, it consists of an indirect proof: it is impossible for Forms not to be one and the same as their essences; therefore, the essential identity must obtain for every substance.[10] Contrary to some interpretations, the purpose of Z.6 is not to overcome some difficulties of Plato's metaphysics, like the Third Man Regress.[11] From the start, Aristotle makes it clear that his discussion will

[10] Aristotle does not consider the move to be fallacious because the arguments would be valid 'even if they [i.e. substances] were not Forms'. See Z.6, 1031b14-15.

[11] For this reading, see Owen (1966: 133-139) and Woods (1974-75). A different interpretation is advocated by Frede-Patzig (1988: 87-103) and Irwin (1988: 219-222), who take Z.6 to prepare

contribute to the enquiry into substance; for to specify the cases of essential identity can contribute to the examination of substance as essence and, thus, to establish the principle of metaphysics. To show that this contribution is to reveal the primacy of substance, I will firstly explore the notion of identity at work in Z.6. This will be illustrative of a scientific condition that Aristotle is trying to posit in Z.6 and assumes in Z.4 in order to carry out his project of demonstrative science.[12]

3.2.1 Identity in Z.6

The examination of the accidental objects has been a matter of an intense debate among scholars. Aristotle advances two arguments to demonstrate that an accidental object, pale human, is not identical with its essence. The central idea is that such an identity would lead to two absurd consequences:

i) being pale human = being human;
ii) being pale = being musical.

Basically the essences of pale human and of pale turn out to be identical with the essences of human and of musical, respectively. What is odd is that Aristotle resorts to two fallacious deductions to infer (i) and (ii). The first fallacy is to infer essential identity from two different forms of identity: accidental identity (pale human = human) and essential identity (human = being human).[13] The second fallacy is to infer essential identity from two cases of accidental identity (musical human = human; pale human = human).[14] These moves seem to invalidate his

for the identity between an individual form and its essence; for the only case in which an object is identical with its essence is the numerically distinct form of the member of a species. For a different approach see Wedin (2000).

[12] Menn (2001) suggests that the identity thesis is functional to showing that substance is not a further item beside the object, such as Plato's Forms, and that this conclusion is finally achieved in Z.7-9. My point is instead that Z.6 is not concerned with the identity between an object and its substance, but with the identity that an object (i.e. a substance) holds with the content signified by its definition. My reconstruction is then closer to Code (1985) and Loux (1991: 90-108). (Loux, however, stresses the theoretical role of the identity thesis for the development of a proper metaphysics and neglects its significance for metaphysics qua science. Cf. Lewis, 2013:145-146).

[13] His first argument can be illustrated as follows:
i) pale human = human (accidental identity);
ii) human = being human (essential identity);
iii) being pale human = being human (absurd identity).
On this fallacy, see *Soph*. *El*. 5, 166b29-36.

[14] i) musical human = being musical human;
ii) musical human = human (accidental identity);
iii) pale human = human (accidental identity);

conclusion. How can Aristotle hope to reject the identity between such objects and their essence? I confine myself to a quick answer: given his awareness of the fallacies, Aristotle seems to believe that our understanding of the absurdities presupposes our understanding of the forms of identity involved in the arguments; this indeed enables us to unmask the fallacies. In view of this, he prioritizes the examination of other objects, which can be illustrative of the notion of essential identity. Namely, he urges us to look at the case of per se objects.[15]

This new task is undertaken through the survey on Plato's Forms. Six arguments are advanced to prove that it is impossible for a Form not to be one and the same as its essence.[16] As already said, the case of Forms is functional to the discussion inasmuch as they are substances. Within the argument of Z.6, however, Forms do exemplify per se objects. In conducting his survey, Aristotle is in fact concerned with whether there is identity between a per se object and its essence. What is remarkable is that this entails focusing on substances, such as Plato's Forms (1031a28-31). Given this picture, there are two interesting things to notice. First of all, *Aristotle does not rely on any distinction between senses of per se*. The identity between an object and its essence is supposed to obtain in every case in which the object corresponds to a per se statement. Accordingly, the object and its essence are the same thing that is signified by the per se statement. This makes an essence the per se characterization of its object. But not every per se characterization of an object is its essence. Aristotle makes this explicit in Z.4 and often separates the per se predicates that essentially belong to a subject from those that do not.[17] A second interesting thing is that *Aristotle restricts his argument to substances*. It could be said that in Z.6 to prove the essential identity in the case of per se objects is equivalent to proving the

iv) pale human = being pale human;
v) pale human = musical human;
vi) pale = musical (essential identity).
On this fallacy, see *Soph. El.* 24, 179b1-4.

[15] A technical version of this reading is suggested by Dahl (2003), who argues that Aristotle's conclusion does not follow from the arguments but from the diagnosis of their invalidity. In doing so, Aristotle realises that the substitution fails in referentially opaque contexts; namely, pale human can be identical with its essence only under the description 'pale human'. Lewis (2013: 130-141), by contrast, argues that Aristotle simply fails to make his case. A different reconstruction is proposed by Halper (1989: 76-80), who contends that pale human is in fact identical with its essence (i.e. being human in Halper's view). This view is unsupported by the text.

[16] i) 1031a31-b3; ii) 1031b3-10; iii) 1031b11-18; iv) 1031b18-28; v) 1031b28-1032a2; vi) 1032a2-5.

[17] See Z.4, 1029b13-22 and Section 3.2.3 below. Cf. *An. Post*. I.4, 73a34-b32; *Metaph*. Δ.18, 1022a25-35.

essential identity in the case of substances, i.e. the identity thesis.[18] In this way, the notion of per se turns out to be implicitly narrowed. For Aristotle has in mind the per se characterization that is signified by the statement accounting for a substance.

These observations are crucial to spell out the form of identity that is at work in Z.6. Indeed, *the essential identity is the identity obtaining between a substance and one of its per se characterizations*. On this score, it can be insightful to match this conception with the forms of identity reviewed in *Topics* I.7. In Z.6, Aristotle can hardly have in mind specific and generic identity; for neither of them applies to an object that is one and the same as its per se characterization. Specific identity applies to two distinct individuals (e.g. Socrates and Callias are the same in species); generic identity applies to two distinct species (e.g. human and horse are the same in genus). In all likelihood, Aristotle has in mind some sense of numerical identity: identity in accident, identity in property, identity in definition. The point is to isolate the sense in which the numerical identity obtains between a substance and its per se characterization. Arguably, Aristotle has already rejected the sense of identity in accident at the start of the chapter; for this is the form of identity obtaining between either i) an object and its accidental characterizations (e.g. human = pale), or ii) two accidental characterizations of the same object (e.g. pale = musical). It is also easy to reject the sense of identity in property. Indeed, this form of identity obtains between an object and a characterization that is not its essence; for example, the triangle is one and the same as what is 2R because 2R is proper, though not essential, to every triangle. By way of exclusion, the form of identity that obtains between a substance and its per se characterization must be **the identity in definition**.[19]

If this is correct, the purpose of Z.6 is to show when a definiendum is one and the same as its definiens. This is the case in which the definiendum is a substance and the definiens is its per se characterization, namely, its essence. I already remarked that the identity in definition is just a way to cast the unity of definition: a definition is one statement signifying one single object and not many.[20] For one thing, this is a technical feature of definitions, which the dialectician has to examine; if a definition fails to be one, some dialectical difficulties will question its

[18] On this point see also Frede-Patzig (1988: 89).
[19] A suggestion of this insight is found in Code (1985; 1986).
[20] See Section 1.2.1 and *Metaph*. Δ, 1018a4-9.

validity. For another thing, this can be a central issue for the treatment of the principles of a science; if a definition fails to be one, it will not ground the demonstrations about its object. Indeed, a scientist always assumes her definitions and, thus, their unity. It is then reasonable to say that the endorsement of the identity thesis is linked to the function of substance within a demonstrative science. More precisely, since the identity between a substance and its essence must be understood in terms of identity in definition, and since the identity in definition is assumed for the primary objects of a science, Z.6 is the treatment of a condition needed to ground metaphysics.

3.2.2 From Identity to Primacy

My contention is that the purpose of Z.6 is to introduce in metaphysics a condition that applies to every demonstrative science. This is the condition according to which essential identity obtains in the case of the primary objects of a science. Since substance is the genus of the primary objects of metaphysics, Aristotle comes to endorse the identity thesis. In fulfilling a condition for the foundation of metaphysics, the identity thesis reveals the primacy of substance.

Let us closely look at Aristotle's arguments. A passage at 1031b3ff. reports the main argumentative lines in favour of the identity between a substance and its essence.

> And if substances and their essence are separated from one and another, then (I) the former will be unknowable, and (II) the latter will not be an entity. […] for first, we know each object when we know its essence; and second, the case of Good itself is no different from any other, so that if the essence of Good is not good, nor will the essence of Being be an entity, nor the essence of One be one (1031b3-9, Bostock's translation slightly modified).

> καὶ εἰ μὲν ἀπολελυμέναι ἀλλήλων, τῶν μὲν οὐκ ἔσται ἐπιστήμη τὰ δ' οὐκ ἔσται ὄντα (…)· ἐπιστήμη τε γὰρ ἑκάστου ἔστιν ὅταν τὸ τί ἦν ἐκείνῳ εἶναι γνῶμεν, καὶ ἐπὶ ἀγαθοῦ καὶ τῶν ἄλλων ὁμοίως ἔχει, ὥστε εἰ μηδὲ τὸ ἀγαθῷ εἶναι ἀγαθόν, οὐδὲ τὸ ὄντι ὂν οὐδὲ τὸ ἑνὶ ἕν·

The first argumentative line is centred on the impossibility of the knowledge of substances, whereas the second argumentative line is centred on the non-

existence of essences. Since Z.6 is supposed to contribute to the examination of substance as essence, we can better understand the endorsement of the identity thesis in the light of the first argumentative line. On the contrary, the secondary argumentative line appears to be tailored to Plato's Forms. The idea is that to question the identity between Plato's substances and their essences is to question the existence of the latter; for anything that is other than the Form of Being would not exist at all.[21] But not only does Aristotle believe that an essence is an entity, he also thinks that it is the entity treated in Z, i.e. substance.

More interestingly, Aristotle argues that since the knowledge of an object is the knowledge of its essence, there will be no knowledge of substances, unless these are identical with their essences. At first sight, this does not seem to prove the identity between a substance and its essence; it only suggests that a substance possesses an essence. In order to infer the identity thesis, Aristotle must be thinking that the only way in which a substance possesses an essence is by being identical with it; thus, this identity means its knowability. Since the identity thesis is conceived as identity in definition, Aristotle appears to assume that the knowledge of a substance is knowledge by definition. Consequently, the identity thesis must be presupposed for the knowledge of a substance just as the identity between the definiens and the definiendum is presupposed for the knowledge of the definiendum. There is another interesting aspect in the argument. Aristotle makes it explicit that the knowledge of a substance is scientific; namely, for a substance to be knowable means being object of a demonstrative science (ἐπιστήμη).[22] We could then rephrase the argument as follows: there will be no demonstrative science of substances, unless these are identical with their essences. Remarkably, since the demonstrative science of being is reduced to the demonstrative science of substance, the identity thesis turns out to be presupposed for the possibility of metaphysics itself.

In sum, the endorsement of the identity thesis is inferred from the fact that i) the knowledge of a substance is knowledge by definition, and that ii) the knowledge of substance implies the possibility of the demonstrative science of

[21] That is, something that does not participate in the Form of Being. Cf. Frede-Patzig (1988: 95-96).
[22] Cf. Z.6, 1031b4; b6; b20-21.

the totality of entities.[23] Therefore, *the identity between a substance and its essence is a condition for the foundation of metaphysics*. In what does this condition consist? To answer this question, it is crucial to see that the knowledge of substance does not exhaust the demonstrative science of the totality of entities. The reason is simple: substance is the subject-matter, while the remaining entities are its demonstrable attributes; indeed, metaphysics is the demonstrative science consisting of the knowledge of substance and the knowledge of other entities. In this way, metaphysics conforms to the general structure of the other sciences. The knowledge of a definition does not exhaust any demonstrative science; indeed, a demonstrative science consists of knowledge by definitions and knowledge by demonstrations. Aristotle establishes this separation in *Posterior Analytics* II.9. He distinguishes between two objects of knowledge: the A-objects and the B-objects.[24] The A-objects are identical with the cause that accounts for them; the B-objects instead are other than their cause. For example, in astronomy the A-objects are celestial bodies, while the B-objects are their demonstrable attributes, such as eclipse. Aristotle tells us that the A-objects are known by definition because their account is immediate; namely it does not refer to any other cause but to the object itself (e.g. the account of moon does not refer to anything but to what moon is). The B-objects, instead, are known by demonstration because their account is mediated; namely, it refers to a cause that is other than the object itself (e.g. the account of eclipse refers to the screening of sun by earth). What is relevant to us is that the *Analytics*' distinction implies the possibility of any demonstrative science just as Z.6's identity thesis implies the possibility of metaphysics. At a general level, the enquirer is able to develop a demonstrative science only if her knowledge by definition is separated from her knowledge by demonstration; that is, some objects are one and the same as their cause. At a specific level, the Z's enquirer is able to develop metaphysics only if her knowledge of substances is separated from her knowledge of other entities; that is, substances are one and the same as their essences.

[23] With the first 'substance', I refer to any instance in the genus of substances; with the second 'substance', I refer to the genus itself and, thus, to the principle of metaphysics. In fact, the difference lies only in the position occupied within the hierarchy of substances in the genus.
[24] See Section 1.3.2.

In the light of this parallel, we can easily explain the endorsement of the identity thesis. In order to secure the possibility of a demonstrative science, the knowledge by demonstration must be grounded in the knowledge by definition. Basically, the separation between A-objects and B-objects is the separation between primary and secondary objects studied by a science; the former being the genus and the sub-genera studied, the latter being their demonstrable attributes. Aristotle endorses the identity thesis because substances must be the primary objects of metaphysics; for the knowledge of substance will be the knowledge of the definition grounding the knowledge of the demonstrations. Therefore, *the identity thesis turns out to reveal the primacy of substance*. That a substance is one and the same as its essence can be inferred from the fact that metaphysics includes knowledge of some primary objects and such primary objects are identical with the cause accounting for them. This condition applies independently of what substances are, whether Platonic Forms, or bodies, or some suprasensible substances.

There is a complication in this picture. In Z.6, Aristotle connects the identity thesis with the function played by substance in metaphysics. Thus, Z.6 fulfils a condition for the development of metaphysics: in the sciences there is identity between the primary objects and the cause stated to account for them. From this perspective, *the endorsement of the identity thesis is subordinate to the assumption that substance is a principle*. It could be said that the identity thesis reveals but does not ensure the primacy of substance. To that end, Aristotle needs to effectively separate the primary from the secondary objects of metaphysics. This result is not achieved in Z.6. In the case of accidental objects, essential identity does not obtain; in the case of per se objects, essential identity obtains and this is proved by assuming their primacy. What Aristotle lacks is a procedure to distinguish between substances and non-substances. Before arguing that this distinction is established in Z.4, I will show that his analysis of the concept of essence relies on the same notion of identity at work in Z.6.

3.2.3 Identity in Z.4

Much of the argument of Z.4 is a treatment of essence in terms of per se. The notion of per se, I noted, designates some of the predicates that belong to a

subject.[25] The statement of such a predication signifies a characterization of an object; for example, odd belongs per se to number and the statement 'a number is odd' signifies a characterization of number. In Z.6, the essence is the per se characterization signified by the statement accounting for a substance. In Z.4, Aristotle holds a similar approach: the essence of an object, says Aristotle, is 'what is said in itself [of the object]' (1029a13-14). Again, this is totally in line with the logical strategy of the enquiry. For his treatment of the essence Aristotle shifts from examining objects to examining their corresponding statements. This means examining the belonging of some predicate(s) to a subject that is stated to account for the object. However, while the argument of Z.6 does not rely on any distinction among senses of per se, the argument of Z.4 is firstly designed to spell out the notion according to which **a per se characterization is the essence of an object** (henceforth per se*).[26]

> The essence for each object is what is said in itself. [1] For being for you is not being for the musical; for you are not musical in yourself. So your essence is what you are in yourself. But not everything in itself is essence. For example, [2] what is in itself in this way, like pale for surface, as being for the surface is not being for the pale. [3] Nor again is it the composite of both, i.e. pale surface, for here it itself is being added on. Wherever then the formula expressing an object does not include the object itself, this is the formula of the essence for the object. Consequently, if being for a pale surface is the same as being for a smooth surface, then being for a pale thing and being for a smooth thing will be one and the same. (1029b13-22, Bostock's translation slightly modified)

> ὅτι ἐστὶ τὸ τί ἦν εἶναι ἑκάστου ὃ λέγεται καθ' αὑτό. οὐ γάρ ἐστι τὸ σοὶ εἶναι τὸ μουσικῷ εἶναι· οὐ γὰρ κατὰ σαυτὸν εἶ μουσικός. ὃ ἄρα κατὰ σαυτόν. οὐδὲ δὴ τοῦτο πᾶν· οὐ γὰρ τὸ οὕτως καθ' αὑτὸ ὡς ἐπιφανείᾳ λευκόν, ὅτι οὐκ ἔστι τὸ ἐπιφανείᾳ εἶναι τὸ λευκῷ εἶναι. ἀλλὰ μὴν οὐδὲ τὸ ἐξ ἀμφοῖν, τὸ ἐπιφανείᾳ λευκῇ, ὅτι πρόσεστιν αὐτό. ἐν ᾧ ἄρα μὴ ἐνέσται λόγῳ αὐτό, λέγοντι αὐτό, οὗτος ὁ λόγος τοῦ τί ἦν εἶναι ἑκάστῳ, ὥστ' εἰ τὸ ἐπιφανείᾳ λευκῇ εἶναί ἐστι τὸ ἐπιφανείᾳ εἶναι λείᾳ, τὸ λευκῷ καὶ λείῳ εἶναι τὸ αὐτὸ καὶ ἕν.

[25] See Section 1.1.1.

[26] Aristotle offers two reviews of senses of per se: *Posterior Analytics* I.4 and *Metaphysics* Δ.18. Unfortunately, these lists do not perfectly match with one another. Moreover, Aristotle tends to illustrate some of the senses of per se with reference to the concept of essence (cf. *Metaph.* Δ.18, 1022a25-26).

Aristotle proceeds with discarding three types of characterizations. The idea is that in the statements of [1], [2], and [3] the predicates do not belong per se* to the subject. Correspondingly, these statements are not definitions.

To start with, Aristotle contrasts the per se characterization with the accidental characterization (1029b14-16). The essence of an object is not what is said accidentally of the object. To illustrate,

> 'You are not per se musical', therefore Not [1] you $=_{def}$ being musical

In the statement of an accidental characterization, the predicates do not belong to the subject in any sense of per se. The fact that you are musical does not indicate anything of what you are in yourself; for musical is an attribute that may or may not characterize you.[27] Therefore, [1] fails to be the essence of an object and, correspondingly, its statement fails to be a definition. It is important to note that the accidental characterization rejected here is not the characterization of the accidental objects in Z.6. Whereas in Z.6 Aristotle implicitly restricts the sense of per se in order to oppose the objects so characterized to accidental objects, in Z.4 he attempts to refine the restriction. The characterization of accidental objects in Z.6 is wider than the accidental characterization treated in Z.4.

Having rejected [1], Aristotle makes another remarkable point: 'Not everything in itself is an essence' (1029b16). More simply, *there is an asymmetry between the notion of per se* and the notion of per se*. Although what is said per se* of *X* must be said per se of *X*, the converse is not the case. Thus, there can be per se characterizations that are not the essence of an object. Namely, there can be a per se statement about an object that is not its definition. This possibility is exemplified by [2]. The text admits two readings:

> i) 'Surface is per se pale', but Not [2i] surface $=_{def}$ being pale
>
> or,
>
> ii) 'Pale is per se surface', but Not [2ii] pale $=_{def}$ being surface

The problem that leads commentators to endorse either [2i] or [2ii] is that Aristotle does not make it explicit of which object he intends to discard the per se

[27] Cf. Δ.30, 1025a14-25. Bostock (1994: 87) remarks that since there is no definition of particular entities, it is awkward to talk about 'your essence' and takes it to be an unnecessary complication. For a slightly different approach see Peramatzis (2010).

characterization. According to [2i], surface is the subject of the statement and Aristotle rejects being pale as the essence of surface.[28] Namely, the statement 'surface is per se pale' is not the definition of surface. This option is certainly closer to Aristotle's common way of phrasing this idea.[29] It is unclear, however, why being pale could be mistaken for the essence of surface. According to [2ii], pale is the subject of the statement and Aristotle rejects being surface as the essence of pale.[30] Namely, the statement 'pale is per se surface' is not the definition of pale. Despite its unusual formulation, this option offers a better sense of the passage: since whatever is pale must be a surface, being surface could be a per se characterization of pale. The point is that being surface is not the essence of pale. An interesting solution is to consider the statement 'surface is pale' as a case of per se^2 predication. Aristotle is then admitting that pale belongs per se^2 to surface; thus, being surface occurs in the definition of pale, while being pale does not occur in the definition of surface.[31] Hence, [2] being pale fails to be the essence of surface.

At 1029b18, Aristotle considers those characterizations that result from coupling the subject and its predicate, such as [3] being pale surface. Again, there are two readings available:

> Not [3i] surface $=_{def}$ being pale surface
>
> or,
>
> Not [3ii] pale $=_{def}$ being pale surface

Aristotle tells us that [3] fails to be the essence of the object because it results from an addition (πρόσεστιν). Intuitively, since either surface or pale is added to the definiens, the statement is not the definition of the object. Commentators take this move to cause the circularity of the definition. Since the definiendum occurs

[28] For this option see Aquinas (*Expositio*: L.3, 1311), Ross (1924: 168) and the Burnyeat et al. (1979: 17-20).
[29] If pale were the subject of the statement, it would be reasonable to read ὡς ἐπιφανείᾳ τὸ λευκόν. Cf. *An. Post.* I.22, 83a1-14.
[30] For this option see Frede-Patzig (1988: 59-61). A third option is suggested by Woods (1974-75), who takes Aristotle to be rejecting being pale as the essence of pale surface.
[31] See *An. Post.* I.4, 73a36-b2. Gill (1989: 116ff.), for example, argues that to discard the sense of per se^2 will be functional to removing the matter of a composite from the essence. In her view, Aristotle is comparing the case of pale to the case of sensible composites, such as snubness. Surface must be mentioned in the account of pale because surface is the proper subject in which pale is realized (Δ.18, 1022a29-31).

in the definiens, the statement fails to be a correct definition of the object; therefore, [3] fails to be an essence.

Given this reconstruction, what is the most promising reading of the argument? According to [3i], the definition is rejected because of the addition of surface to pale in defining surface. But this implies that pale occurs in the definition of surface and, thus, contradicts the rejection of [2]. Undoubtedly, [3ii] looks more reasonable. The definition is rejected because of the addition of pale to surface in defining pale. Since pale belongs per se^2 to surface, one may think that the essence of pale is being pale surface; namely, that pale should be defined as pale surface. Given its circularity, the statement is not a definition and, correspondingly, the characterization is not an essence. There is still something puzzling in this reconstruction. Aristotle seems to conclude that being surface is the essence of pale, though the definition of pale is not exhausted by surface. More generally, it is unclear why Aristotle focuses on the circularity of definition after having discarded the notion of per se^2? How does the rejection of [3] contribute to elucidating the notion of per se*?

Arguably, the final lines can shed some light on the motives behind the overall argument. Aristotle warns us that being pale and being smooth turn out to be one and the same thing, if the essence of the former is being pale surface and the essence of the latter is being smooth surface (1029b21-22). First of all, we can confirm the general reading of pale as the object of which [2] and [3] fail to be the essence. Since being pale surface and being smooth surface exemplify the incorrect essence, pale and smooth must be the objects to which the two characterizations pertain. What is more interesting is that Aristotle does not motivate the rejection of [3] with the circularity of the definition. The absurd character of the conclusion lies in the identity between two distinct objects, pale and smooth; for their alleged essences are found to be one and the same characterization. Therefore, it is not the addition of pale in the definition of pale that leads to rejecting being pale surface. It is the addition of surface in the definition of both pale and smooth that lead to rejecting their characterizations, such as being pale surface.

Let me reformulate the argument. Aristotle rejects being pale surface as the essence of pale because its statement results from the addition of surface to the definiens of pale. A consequence of this move is that, since being surface is common to both pale and smooth, the essences of pale and smooth are one and

the same characterization; therefore, pale and smooth turn out to be one and the same object.[32] In rejecting [3], Aristotle is then concerned with the cases in which a per se characterization fails to be an essence in that it is not one and the same as its object; that is, the cases in which there is no identity between the object and its essence. Clearly, this is the essential identity that is conceived in terms of identity in definition in Z.6; there must be identity between an object and its essence just as there is identity between a definiendum and its definiens. In Z.4, Aristotle relies on **the identity in definition** in order to reject some per se characterizations. Accordingly, what he summarizes at b19-20 is not a requirement of non-circularity, but a requirement of appropriate identity: the definition of an object is a statement in which nothing other than the object itself is included.[33] If a statement results from an addition, it fails to be a definition because there is no identity between the definiendum and its definiens; for example, pale cannot be defined as pale surface because something other than the definiendum, i.e. surface, is added to the definiens. Correspondingly, being pale surface fails to be an essence because there is no identity between pale and its per se characterization.

What is remarkable is that Z.4's treatment of essence is initially based on the identity in definition. Aristotle rejects [1], [2], and [3] because their statements, more or less manifestly, fail to be identical with their object. In [2], there is no identity between being surface and pale; in [3], there is no identity between being pale surface and pale. In order to elucidate the concept of essence, Aristotle insists on the identity that must obtain between the object and its per se

[32] My reconstruction concurs with the criticism of this Democritean conclusion found in the *De Sen.* 4, 442b4-17. Since Democritus takes the sensations that are common to different senses as proper to those senses, he ends up with identifying distinct sensations, such as pale and smooth. However, despite being common to both, smooth is proper to touch and pale is proper to sight. Arguably, in Z.4 the case of [3] is rejected because being surface is taken to be proper to pale and smooth, whilst being only common.

[33] This reading however requires two textual emendations. At b19, αὐτό (transmitted by Ab) must be replaced with αὕτη (transmitted by J). At b20, the first αὐτό (transmitted by J and E and omitted in Ab) must be replaced with ἄλλο. Cf. Frede-Patzig (1988: 61)

characterization. And this is nothing but examining the identity that must obtain between the definiendum and its definiens.

3.3 The Essential Dependence

In the previous section, I argued that the identity thesis is conceived in terms of identity in definition. Its endorsement enables Aristotle to introduce a condition that applies to every demonstrative science: there must be identity between the primary objects of a science and their causes. The primary objects are indeed known by definition (i.e. definienda) and are identical with the essence stated to account for them (i.e. its own definiens). Hence, a substance is one and the same as its essence insofar as it is a primary object in metaphysics. The argument of Z.6, however, reveals but does not ensure the primacy of substance; for the identity thesis is not supported by an effective separation of the primary objects from the secondary objects of metaphysics. I suggested that this task is accomplished in Z.4. From the start, Aristotle rejects those characterizations that are not stated by definitions and, thus, fail to be the essences of their objects. In doing so, he relies on the identity in definition that is at work in Z.6. The argument of Z.4, I shall argue, ensures the primacy of substance because it separates substances from non-substances in terms of essential dependence.

The essential dependence is the form of ontological dependence that is elaborated in the main body of Z.4. This phase is traditionally understood as an extensional treatment of the concept of essence. Basically, commentators take Aristotle as shifting from asking ‘what is essence?’ (1029b13-22) to asking ‘what things do have an essence?’ (1029b22-1030b13). On this reading, the intensional treatment is merely provisional and superseded by an attempt to delimit the range of the objects having an essence. In particular, Aristotle is taken to consider three types of objects:

1. Substances
2. Non-substances
    2a. Attributes
    2b. Composites

Substances are the instances of the first genus of being and correspond to sensible substances studied in physics, such as human and horse. Attributes are non-substances that belong to other genera of being, such as pale. Composites are non-substances that consist of an attribute plus a substance, such as pale human.

At 1029b22, Aristotle interrupts his intensional phase to examine whether composite objects possess an essence. However, nothing in the text suggests that the two treatments are to be kept separated. Not only does the transition happen very smoothly, but the ἐπεί at b22 links the new phase to the latest conclusion achieved: essence is not a composite characterization. Presumably, Aristotle turns to see whether there is an essence for a composite object because this is expected to possess some composite characterization. There are further reasons to defend the argumentative unity of Z.4. Our analysis showed that Aristotle attempts to spell out the concept of essence on the basis of the identity obtaining between an object and its per se* characterization; that is, the identity between a definiendum and its definiens. In this attempt, he rejects [2] being surface, and [3] being pale surface as essences of pale. I am inclined to think that the extensional treatment of essence will pursue this examination; for it is meant to separate the objects whose characterization is per se* from the objects whose characterization is only per se. This is the distinction that is not embodied in the argument of Z.6 and that will complete Z.4's examination. From this perspective, the traditional division into two phases conceals the continuity of the argument. To ask what essence is and to ask what objects possess an essence is a matter of one single examination that has to spell out the per se* characterization.

The essential dependence enables Aristotle to complete this picture. The argument of Z.4 presents two versions of his essentialism:

Austere view: essence belongs to substances exclusively (1029b29-1030a17);

Liberal view: essence belongs to substances primarily (1030a17-1030b13).

According to the austere view, essence is a per se characterization that is exclusive to substances; thus, non-substances do not possess an essence at all. According to the liberal view, essence is a per se characterization of both

substances and non-substances, though in different ways; for substances possess an essence absolutely, while non-substances possess an essence in a qualified way. My contention is that in either case Aristotle attempts to secure the dependence of the non-substances upon the essence of substances (essential dependence). Given this separation, Aristotle is able to set out his essentialism and to ensure the primacy of substance. The central idea is that *if substance is essence, substance turns out to be primary*. This is a promising result to ground the demonstrative science of the totality of entities.

There is a capital issue to consider. What are the objects treated in the argument of Z.4? It is common to think that the austere and the liberal views separate different things. Whereas the austere view separates substances from composite objects (e.g. pale human), the liberal view separates substances from attributes (e.g. paleness). The result is an ontological hierarchy in which the first level is occupied by substances, the second level is occupied by attributes, and the third level is occupied by composites; for essence is possessed by substances primarily, by attributes secondarily, and by composites through the composition of the others.[34] The distinction between attributes and composites, I will argue, is not genuinely ontological. Both attributes and composites correspond to a per se characterization of a substance. To use our example from astronomy, both the attribute eclipse and the composite eclipsed moon correspond to the same entity that is a per se characterization of moon. Aristotle is simply separating substances from non-substances. The point is that non-substances can be defined as attributes and not as composites; for example, we can define an eclipsed moon only in terms of eclipse. What is salient is that non-substances–regardless of how these are accounted for as–are the entities essentially dependent upon substances.

3.3.1 The Austere View

The remainder of Z.4 is also in line with the logical strategy inaugurated at the start of the chapter. In order to discuss the objects possessing an essence, Aristotle focuses on the objects that are accounted for as by the statement of an essence; namely, the objects of definitions. His conclusion is that essence and

[34] See Loux (1991: 75-77; 104-108; Ch. 7) and Halper (1989: 49-74).

definition belong to substances either exclusively or primarily.[35] In examining whether a composite object can ever have an essence, he is then examining whether a composite object can ever have a definition.

> For example, [we must see whether there is an essence of] pale human. Suppose 'cloak' to be a name for this; what, then, is the essence of cloak? It may be said that this is still not one of the things that are said in themselves (τῶν καθ' αὐτὸ λεγομένων). On the one hand, what is not said in itself is in two ways: one is what is from addition and the other is from not addition [i.e. subtraction]. In the one case, 1) what is being defined is accounted for as by being added to something else, as for instance would happen if the definer expressed the essence of pale through the statement of pale human; in the other case, 2) what is being defined is accounted for as not by being added to something else, as for instance would happen if cloak were to signify pale human, but the definer defines it as pale. (In fact a pale human is pale, but pale human is not the essence of pale). (1029b27-1030a1, Bostock's translation slightly modified)

> οἷον λευκῷ ἀνθρώπῳ [τί ἦν λευκῷ ἀνθρώπῳ]. ἔστω δὴ ὄνομα αὐτῷ ἱμάτιον. τί ἐστι τὸ ἱματίῳ εἶναι; ἀλλὰ μὴν οὐδὲ τῶν καθ' αὑτὸ λεγομένων οὐδὲ τοῦτο. ἢ τὸ οὐ καθ' αὑτὸ λέγεται διχῶς, καὶ τούτου ἐστὶ τὸ μὲν ἐκ προσθέσεως τὸ δὲ οὔ. τὸ μὲν γὰρ τῷ αὐτὸ ἄλλῳ προσκεῖσθαι λέγεται ὃ ὁρίζεται, οἷον εἰ τὸ λευκῷ εἶναι ὁριζόμενος λέγοι λευκοῦ ἀνθρώπου λόγον· τὸ δὲ τῷ ἄλλο αὐτῷ, οἷον εἰ σημαίνοι τὸ ἱμάτιον λευκὸν ἄνθρωπον, ὁ δὲ ὁρίζοιτο ἱμάτιον ὡς λευκόν. τὸ δὴ λευκὸς ἄνθρωπος ἔστι μὲν λευκόν, οὐ μέντοι <τὸ> τί ἦν εἶναι λευκῷ εἶναι.

The aim of the passage is to argue that there is no per se* characterization to account for composite objects. Thus, these objects possess neither an essence nor a definition. I already mentioned that a composite object is traditionally believed to consist of two categorially distinct entities: a substance and a non-substance; for example, pale human consists of human and pale. It is important to note that Aristotle does not have in mind cases of accidental composition (i.e. pale accidentally belongs to human).[36] First of all, the treatment of accidental objects could hardly be relevant to a demonstrative science. Its body of knowledge is constituted by the statements of some per se predicate(s) belonging

[35] Cf. Z.4, 1030a4-7; b4-7; Z.5, 1031a12-14.

[36] Since Z.4 is concerned with the per se* belonging of an essence to an object, commentators are not explicit on what belonging underlies composite objects. Cf. Aquinas (*Expositio*: L.3, 1318); Bostock (1994: 88); Loux (1991: 80-81); Peramatzis (2010); Galluzzo (2013a: 68-69); Lewis (2013: 83-84).

to a subject. Moreover, the treatment of accidental objects undermines the argumentative continuity of the chapter. Aristotle is still concerned with the sense of per se* according to which a characterization is an essence. In the intensional phase, he rejected composite characterizations of an object (i.e. pale $=_{def}$ pale surface); in the extensional phase, he intends to see whether a composite object (i.e. pale human) can have a per se* characterization rather than the composite characterization, as one could expect.[37]

If this is correct, the shift from the extensional phase to the intensional phase is merely a change of perspective. Aristotle is still trying to clarify when a per se characterization is not per se*; namely, when a characterization fails to be the essence of an object.[38] Interestingly, this is equivalent to clarifying when an object does not possess an essence; namely, when an object is not accounted for as by a definition, but by the statement of some other per se characterization. To this end, the passage introduces a twofold criterion: *a statement fails to be the definition of an object because it is obtained either by addition or by subtraction* (τὸ μὲν ἐκ προσθέσεως τὸ δὲ οὗ).[39] In other words, addition and subtraction are two procedures to state a per se characterization of an object that is not an essence. Correspondingly, the objects that are accounted for as in this way possess neither essence nor definition.

Let me start with a brief sketch. Aristotle begins with the procedure of addition, which is thus exemplified,

1) pale $=_{def}$ pale human *by addition*.

In defining pale, pale is added to human so that pale human is the definiens of pale. Thus, being pale human is the per se characterization that is supposed to be the essence of pale. The procedure by **subtraction** is slightly more obscure.

[37] The choice of 'pale human' as example can be deceptive. It is important to realize that Aristotle employs it to postulate its identity with 'cloak'. As often happening with Aristotle's examples, the use of 'pale human' is arbitrary and may not exemplify a real case of per se characterization (though black and white could be per se attributes of the species human). In the absence of any certainty about the subjects of metaphysics (i.e. substances), there cannot be any certainty about the demonstrable attributes (i.e. the attributes of substances qua substances).

[38] Indeed, the meaning of καθ' αὐτὸ at 1029a29-30 is limited to the notion of per se*.

[39] Literally, Aristotle speaks of addition and non-addition. As will be clear, the negation of addition is nothing but what is labelled subtraction (ἀφαίρεσις) in the rest of Z.4 and elsewhere (cf. Z.4, 1030a33; *Topics*, III.3, 118b10-19; VII.1, 152b10-15; *Metaph*. I.1, 1052b35f.). On this point, see Ross (1924: 169), Frede-Patzig (1988: 63), and Bostock (1994: 89). Cf. Bonitz (1870: 539).

Aristotle assumes that ‘cloak’ indicates the composite object ‘pale human’.[40] Thus,

2) cloak [pale human] $=_{def}$ pale *by subtraction*.

In defining cloak, pale is not-added to human so that pale exhausts the definiens of cloak. Namely, human is subtracted from cloak. Thus, being pale is the per se characterization that is supposed to be the essence of cloak.

In general, the idea is that a statement fails to be a definition because it either does or does not include something in accounting for the object. This sounds very familiar. At 1029b18-20, Aristotle rejects the composite characterization because its statement results from the addition of something other than the object; in particular, being pale surface fails to be the essence of pale because its statement results from the addition of surface to pale. Since this undermines the identity between the definiendum and its definiens, there is no identity between the per se characterization and its object; therefore, the per se characterization is not an essence.[41] Arguably, at b31 Aristotle is specifying the very same case of a composite characterization failing to be an essence. Since something other than pale is added in its definition, there is no identity between pale and either pale human or pale surface; therefore, neither pale human nor pale surface is stated by a definition and is the essence of pale. In this regard, there are a couple of things to notice. Firstly, the procedure of addition is illustrative of cases in which a definition is rejected; thus, we can conjecture that its application requires some expertise in the dialectical treatment of definitions found in the *Topics*. Since in Z.4 the procedure of addition is effective on fake cases of identity in definition, Aristotle is likely to have in mind the dialectical schemes on identity; for these will help to indicate those characterizations that are not stated by a definition and, thus, fail to be an essence.

The schemes on which Aristotle relies in Z.4 are presented in *Topics* VII.1.[42] One scheme is to consider whether in a statement something is added to its

[40] Aquinas (*Expositio*: L.3, 1317) suggests that the identity cloak = pale human can be compared to the identity human = biped animal. See also Ross (1924: 169) and Frede-Patzig (1988: 62), who insist that this manoeuvre is to ensure the ontological import of the discussion (i.e. cloak and pale human are not arbitrarily but ontologically related).
[41] See Section 3.2.3 above.
[42] See *Top*. VII.1, 152b1011 for addition and VII.1, 152b11-16 for subtraction. Since Aristotle is insisting on the identity between the object and its essence, it is not relevant to ask whether the

object; for this prevents the statement from being identical with the object. Clearly, the subject of the addition is the object whose definiens includes something identical with the object *plus* something different. In Z.4's example, pale is defined as being pale plus human (which is different from pale). The procedure by **addition** can then be summarized as follows: **the statement accounts for its object by adding the object to something else** (1029b31-33). Correspondingly, the characterization stated is not an essence in that it 'exceeds' what the object is. The other scheme is to consider whether the same thing can be subtracted from two statements; if the remainders signify two different objects, there is no identity between the statements. For example, 'the double of half' and 'the multiplication of half' are not identical because, given the subtraction of 'half', being double is not identical with being multiple. In Z.4, Aristotle is not concerned with the identity between two statements, but with the identity between an definiendum and its definiens. This requires him to assume that the term 'cloak' signifies pale human and is defined as being pale minus human (which still constitutes what cloak is); consequently, the subtraction prevents the statement from being identical with the object. The procedure by **subtraction** can then be summarized as follows: **the statement accounts for its object by subtracting something from what the object is** (1029b33-34).[43] Correspondingly, the characterization stated is not an essence in that it 'shrinks' the object. What is salient to see is that in *Topics* VII.1 the schemes are employed to test statements, while in Z.4 they are employed to indicate the objects possessing no essence. These will be the objects that are accounted for as by statements obtained by either addition or subtraction.

In view of this map of non-per se* statements, Aristotle is now in the position to spell out the concept of essence. This will be the characterization that is stated by neither addition nor subtraction, but by definition. In doing so, he endorses the austere view.

> But is the essence of cloak an essence at all? Or maybe not? Indeed an essence is just what a thing is. And when a thing is predicated of another, this is not what a this-something is; for example, pale human is not what a this-something is, if

failures of the statements are due to the definiens (Ross, 1924: 169) or to the definiendum (Halper, 1989: 56-59); for statements by addition and by subtraction will correctly account for objects that do not possess definitions.

[43] This requires the addition of οὔ at 1029b33. Cf. Frede-Patzig (1988: 63).

> indeed thisness belongs only to substances. (1030a1-6, Bostock's translation slightly modified)

> ἀλλὰ τὸ ἱματίῳ εἶναι ἆρά ἐστι τί ἦν εἶναί τι [ἢ] ὅλως; ἢ οὔ; ὅπερ γάρ τί ἐστι τὸ τί ἦν εἶναι· ὅταν δ' ἄλλο κατ' ἄλλου λέγηται, οὐκ ἔστιν ὅπερ τόδε τι, οἷον ὁ λευκὸς ἄνθρωπος οὐκ ἔστιν ὅπερ τόδε τι, εἴπερ τὸ τόδε ταῖς οὐσίαις ὑπάρχει μόνον.

Given that the essence is the content signified by a definition, Aristotle is in fact refining his previous criterion: *a statement fails to be the definition of an object because it accounts for something predicated of something else* (ἄλλο κατ' ἄλλου λέγεσθαι). Correspondingly, a characterization is not an essence when it consists of something in relation to something else. In all likelihood, the criterion applies to any statement rejected so far; that is, to the characterizations indicated by addition and subtraction. To illustrate, both pale and cloak do not possess an essence and a definition because they are accounted for as pale in relation to human; accordingly, neither being pale human nor being pale is an essence. Since the criterion applies to every object in metaphysics but substances, Aristotle is able to conclude in favour of the austere view: essence belongs to substances exclusively.

At the core of this reasoning is **the notion of τόδε τι**. In a science, I observed, τόδε τι indicates any object that is one indivisible subject of demonstrable attributes; thus, its existence is not grounded in anything else. On the contrary, the existence of other objects is grounded in the existence of a τόδε τι.[44] In metaphysics, the objects that are τόδε τι are substances. Aristotle has indeed explicated that the science of the totality of entities can be reduced to the science of substance insofar as every non-substance depends upon substance; namely, the existence and the nature of the latter is grounded in the former. On this score, Z.4 shows that the statement accounting for a τόδε τι does not account for something in relation to something else; that is, it is obtained neither by addition nor by subtraction. The point is that there is no other statement to mediate the statement accounting for a τόδε τι just as there is no other object to ground its existence and nature. The statements of being pale human and being pale, for example, are mediated by the relation of their object with what is added to or subtracted from the statement. What matters to us is that the statement

[44] See Section 2.2.1, esp. note 55.

accounting for a τόδε τι is a definition and the characterization signified is an essence. Therefore, substances are the only entities to possess definition and essence; for they are not accounted for as something in relation to something else.

At this point, it is not difficult to show that the austere view is conceived to ensure the primacy of substance. The argument of Z.4 enables Aristotle to effectively separate substances from non-substances. This separation is established through a form of ontological dependence, which I label essential dependence:

> **Essential Dependence:** an entity depends upon a substance because the account of the former is related to the essence of the latter by either addition or subtraction.

In other words, the fact that there is an entity can be stated either by adding a substance to or by subtracting a substance from the statement itself. By looking at the procedures of addition and subtraction, Aristotle attempts to establish the *Analytics*' distinction between objects of knowledge. A substance is an object of definition because its account is immediate; namely, it does not require implicit reference to any other cause but to the substance itself. A non-substance is an object of other statements because its account is mediated; namely, it requires implicit reference to a substance. Since non-substances depend upon substances insofar as the account of the former depends upon the definition of the latter, substances turn out to be the primary objects of metaphysics.

This point was totally missed by the examination of the subject in Z.3. If substance is accounted for as subject, substance fails to be primary; for it must be accounted for as in terms of some characterization.[45] Consequently, the subject does not represent a valid solution to establish the principle of metaphysics. This solution is instead offered by the examination of substance as essence. *If substance is accounted for as essence, substance turns out to be primary*; for it is accounted for as by a definition and, thus, as an immediate characterization. Basically, the statement accounting for a substance and the

[45] Indeed the hylomorphic analysis leads to identifying substance with an indeterminate matter (Z.3, 1029a20-30).

characterization signified are not related to any other object; by contrast, the statements accounting for non-substances and the characterizations signified are always related to a substance.

But what exactly are the primary and the secondary objects of metaphysics? That is, what does the metaphysician account for by definition and by addition/subtraction, respectively? Unfortunately, Aristotle is not very explicit on this point. The austere view establishes that substances are the primary objects accounted for as by definition. Since Z's enquiry is focused on (though not necessarily confined to) sensible substances, these are likely to be the primary objects of physics, i.e. bodies. In Z.4, Aristotle refers to these entities as the εἴδη of a genus (1030a11-12). Given the ambiguity of the term, there are two options available.[46] On one reading, the εἴδη are identified with either the forms of sensible substances, such as human soul, horse soul, etc.; after all, Aristotle will identify substance and essence with form in Z.10-11. Alternatively, the εἴδη are identified with the species into which a genus divides; these are then kinds of sensible substances, such as human, horse, etc. Be that as it may, it is not unrealistic to think that Aristotle is playing with the ambiguity of the term.[47] The central point is that the εἴδη will be the objects of the definitions to which the statements accounting for other objects are related. Nothing prevents these items from being identified with the forms of sensible substances in Z.10-11 and examined as universal species in Z.13-14. As already highlighted, Aristotle is indeed able to develop his essentialism without any concern for the ontological status of the possessors of the essences; for these are primarily regarded as objects of scientific knowledge.[48]

Things are more complicated in the case of the secondary objects of metaphysics. Commentators, I noticed, tend to identify them with composites and attributes. The composites are the objects accounted for as by addition. Since a composite results from two entities, it is accounted for as by composing two essences; for example, pale human is accounted for as by composing the essence of the subject plus the essence of the attribute. The attributes are the

[46] Driscoll (1981: 141-158) argues that εἶδος is ambiguous and that Aristotle is able to separate the εἶδος as constitutive cause from εἶδος as species. This, however, does not mean that Aristotle wants to separate the two senses here.
[47] The first option is favoured by Frede-Patzig (1988: 66) and Wedin (2000: 230-236), while the second option is favoured by Ross (1924: 170-171), Bostock (1994: 91-92), Burnyeat (2001: 25). Loux (1991: 82) suggests that the ambiguity is functional to Aristotle's argument.
[48] See Section 3.1 above.

objects accounted for as by subtraction. Although an attribute is an entity that depends on its subject, it is accounted for as by separating its essence from that of the subject; for example, pale is accounted for as being pale despite pale depending on human (or surface).[49] The nature of such an object, however, is likely to be clarified in the second half of Z.4. For Aristotle will offer a liberalized version of his essentialism in which non-substances can be defined. Thus, we can postpone the treatment of this issue and wait for the details that Aristotle provides through his liberal view.

3.3.2 The Liberal View

The austere view ensures the primacy of substance. In the first half of Z.4, Aristotle works out a concept of essence that enables him to introduce a form of ontological dependence separating substances from non-substances. Non-substances are accounted for as by either addition or subtraction and, thus, their characterization is related to something else. Substances, by contrast, are accounted for as by definition and their characterization is not related to something else; namely, they possess an essence. This means that substances hold primacy over the other objects of metaphysics. From 1030a17, Aristotle proposes an alternative version to the austere view. The concept of essence is not to be restricted to the characterization of substances, but can be extended to the characterizations of other entities. His following discussion will yield the liberal view: *essence belongs to substances primarily and to other entities secondarily*. Arguably, the endorsement of the liberal view is linked to a general difficulty of his previous treatment. Within the austere view, metaphysics appears to be exhausted by the definitional knowledge of substance. In other words, since the knowledge of an object is mainly the knowledge of what the object is (τί ἐστιν), and since what an object is is stated by a definition, there seems to be no knowledge of non-substances; for these are not accounted for as by definition. Yet, metaphysics is not supposed to be the knowledge of substances exclusively, but the knowledge of the totality of entities. Arguably, the liberal view is meant to revise the examination of the essence in a way that is more functional to

[49] According to Gill (1989: 116-120), addition is the procedure to account for composites, while subtraction is the procedure to account for attributes. The reverse view is advocated by Halper (1989: 64-74).

grounding metaphysics. In this attempt, Aristotle reconceives the essential dependence in order to separate substances from non-substances. The result is again a doctrine that ensures the primacy of substance.

Admittedly, the argument for the liberal view is highly controversial. Following his initial suggestions, commentators connect the multiplicity of what-it-is (τί ἐστιν) with the multiplicity of being. The idea is that the account of an object in metaphysics is multiple because the object of metaphysics is itself multiple; being is indeed a genus that is pluralized into different kinds (substance, qualities, quantities, etc.). Accordingly, since the statement of the τί ἐστιν of an object is the definition signifying its essence, and since the object of metaphysics is the totality of entities, Aristotle finds it reasonable to account for every entity by stating its τί ἐστιν; consequently, every entity is entitled to have a definition and an essence.[50] To illustrate, not only are there definitions of substances, such as human and horse, but also of qualities and of quantities, such as pale and double. The enquiry to ground metaphysics will ultimately be concerned with what substance is, what quality is, what quantity is, and so on for the remaining kinds of being. If this is so, the liberal view is conceived to supersede the austere view.[51] The early examination turns out to lack accuracy because it neglects the intrinsic feature of the object of metaphysics. This reconstruction is often coupled with the idea that Z.4 alternates a dialectical treatment and a scientific treatment of essence. In the second half of the chapter, Aristotle hastens to revise his results by looking at 'how things are' rather than 'how we speak of things'.[52]

Nevertheless, Aristotle does not seem to contrast the austere and the liberal views. His main conclusion is that essence belongs to substances either exclusively or primarily; in fact, both views are regarded as valid attempts to examine substance as essence.[53] Moreover, we should bear in mind that Z.4 can hardly contrast a dialectical with a scientific discussion.[54] Since Z's enquiry is

[50] See Bostock (1994: 92-94). Loux (1991: 77-90) insists on these semantic observations and argues that Aristotle is recognizing the ambiguity of the '**is**' that is part of every statement of what-it-***is***.

[51] According to Halper (1989: 64), for example, Aristotle is bound to the liberal view because it is simply unreasonable to believe that an object can be accounted for as by a statement without having an essence.

[52] See Z.4, 1030a27-28. Cf. Owen (1960: n. 189); Irwin (1988: 211-212).

[53] See Z.5, 1031a12-14. The structure of Z.4 concurs with this insight. After his introductory phase on the concept of essence, the examination divides into two branches by the disjunctive conjunction ἢ at 1029b29 and 1030a17.

[54] See the observations on the notion of λογικῶς in Section 2.3.1.

aimed at establishing the principle of a demonstrative science, Z.4 can be neither dialectical nor purely scientific; for dialectic is not meant to establish anything, and science is to be based on the results of the ongoing enquiry. Rather, there is another aspect that can help us to understand the shift. Despite recalling the multiplicity of being, Aristotle focuses on two senses in which an object is defined: on the one hand, the τί ἐστιν signifies a substance and a this-something (τόδε τι); on the other, the τί ἐστιν signifies either qualities, or quantities, etc. (1030a18-20).[55] Presumably, the first sense is that at work in the austere view. Aristotle is indeed able to infer that substances possess an essence from the fact they are not accounted in relation to something else and, thus, their characterization is immediate. The second sense, instead, is supposed to emerge from the liberal view, in which every entity possesses an essence. The crucial point is that the characterization stated to account for substances must be separated from the characterizations stated to account for non-substances. From this perspective, the new examination is not thought to supersede the previous results. Its central task is to shed light on the peculiar way in which a non-substance can be defined and possesses an essence.

Let me speculate more on this. If Aristotle intends to clarify the second sense of τί ἐστιν as opposed to the first one, he is likely to look for a statement that is not immediate; for its object is not a τόδε τι and the characterization stated is not the per se* characterization presented in the austere view. Thus, Aristotle is looking for a statement that is derivative; for its object is accounted in relation to something else. In a science, I argued, the distinction between immediate statements and derivative statements does separate immediate definitions from demonstrative definitions; the former accounting for the subjects of scientific knowledge (e.g. human, moon), the latter accounting for their demonstrable attributes (e.g. capable of learning, eclipse).[56] My contention is that *in Z.4 Aristotle distinguishes two senses of* τί ἐστιν *in order to separate the primary from the secondary objects of metaphysics*. Whereas the primary objects are those

[55] According to Frede-Patzig (1988: 67), κατηγορουμένων refers to the predicates that can be attributed to a substance. Given the uniformity between ontological and predicative categories in metaphysics (cf. Section 1.1.1), I agree with them. The point is that in the absence of this uniformity Aristotle would be separating an entity (i.e. substance) from its predicates, (what-it-is-like, how-much-it-is, etc.) and this can hardly be the case.

[56] See Section 1.3.2. Capable of learning and eclipse are secondary objects *in physical sciences* because they are per se attributes of human and moon, which are two sensible substances studied qua sensible substances.

possessing immediate definition and essence, the secondary objects are those possessing derivative definition and essence. In Z's enquiry, the primary objects are substances, while the secondary objects are non-substances. The reasons to connect the multiplicity of what-it-is with the multiplicity of being are then rooted in the scientific character of metaphysics. The totality of entities is the object of a demonstrative science because substances are the subjects of scientific knowledge and the remaining entities are their demonstrable attributes. Therefore, the knowledge of substances is expressed by definitions, while the knowledge of non-substances is expressed by demonstrations (i.e. demonstrative definitions, if re-arranged). If this hypothesis is sound, Aristotle endorses the liberal view in order to ensure the primacy of substance within the scientific project of metaphysics.

At 1030a21, Aristotle introduces his distinction between statements of the τί ἐστιν of an entity.

> Like the 'is' belongs to everything, though not in the same way, but for one thing primarily and for the others secondarily, in this way also the what-it-is belongs to substance absolutely and in some other way to the other entities. (1030a21-23, Bostock's translation slightly modified)

> ὥσπερ γὰρ καὶ τὸ ἔστιν ὑπάρχει πᾶσιν, ἀλλ' οὐχ ὁμοίως ἀλλὰ τῷ μὲν πρώτως τοῖς δ' ἐπομένως, οὕτω καὶ τὸ τί ἐστιν ἁπλῶς μὲν τῇ οὐσίᾳ πὼς δὲ τοῖς ἄλλοις.

In Z.1, metaphysics turns out to be the demonstrative science of the totality of entities because it is the study of substance, which is the cause of why other entities are. Therefore, substance is expected to hold primacy over the other entities. In the passage, we can see a correspondence between the separation established in Z.1 and the separation to be established in Z.4. For one thing, Aristotle pairs the primacy of substance with the absolute character of its τί ἐστιν; for another thing, he pairs the posteriority of non-substances with the indeterminate character of their τί ἐστιν. Given the logical strategy of the chapter, Aristotle is in fact opposing the statement of what a substance is to the statement of what a non-substance is.

What does it mean that some statements are absolute and others are indeterminate? In *On Generation and Corruption* I.3, Aristotle tells us that 'absolute' (ἁπλῶς) indicates 'what is primary in each predication of being'; in

other words, what is absolute is the primary subject to which some predicates belong within the same genus of being.[57] This could be a substance, as in physics, or a quantity, as in mathematics, etc. In metaphysics, what is absolute is a substance, which is the primary subject to which some per se predicates belong. In Z.4, Aristotle is then remarking that the definition of a substance is absolute insofar as it is the statement that accounts for the primary subject of predicates in metaphysics. The statements accounting for non-substances, instead, are not absolute, but in some other way (πὼς). As conjectured above, the remainder of the Z.4 is meant to clarify the second sense of τί ἐστιν listed at 1030a18-20.

To that end, Aristotle moves to reconsider the procedures to account for the objects of metaphysics. Unfortunately, this review is expounded in one of the most debated passages of the *corpus*.

> In these cases [i.e. non-substances], it will not be essence in absolute, but essence of quality or of quantity. For we must say that these are said to be entities either by homonymy or by addition and subtraction, like the unknown is said to be known. And in fact what is right is neither said by homonymy nor in such a way, but like medical is said with reference to one and the same thing, and it does not mean one and the same thing, and nor yet by homonymy. Indeed a body, an operation or an instrument are said to be medical neither by homonymy nor in virtue of one thing but with reference to one thing (1030a31-b3, Bostock's translation slightly modified)

> ὥσπερ καὶ τὸ τί ἐστιν, οὐχ ἁπλῶς τί ἦν εἶναι ἀλλὰ ποιῷ ἢ ποσῷ τί ἦν εἶναι. δεῖ γὰρ ἢ ὁμωνύμως ταῦτα φάναι εἶναι ὄντα, ἢ προστιθέντας καὶ ἀφαιροῦντας, ὥσπερ καὶ τὸ μὴ ἐπιστητὸν ἐπιστητόν, ἐπεὶ τό γε ὀρθόν ἐστι μήτε ὁμωνύμως φάναι μήτε ὡσαύτως ἀλλ' ὥσπερ τὸ ἰατρικὸν τῷ πρὸς τὸ αὐτὸ μὲν καὶ ἕν, οὐ τὸ αὐτὸ δὲ καὶ ἕν, οὐ μέντοι οὐδὲ ὁμωνύμως· οὐδὲ γὰρ ἰατρικὸν σῶμα καὶ ἔργον καὶ σκεῦος λέγεται οὔτε.

Firstly, Aristotle points to two procedures to account for non-substances: a) by homonymy; b) by addition/subtraction. Homonymous is the predicative relation that obtains between two objects sharing the name and differing in what they

[57] That is within the same vertical category. See *De Gen. et Cor.* I.3, 317b5-8 and Rashed (2005: 112).

are.[58] Thus, if we account for a non-substance by homonymy, our statement signifies two different natures. To illustrate,

a) picture of a human $=_{def}$ human *by homonymy.*

Although a picture of a human and a human can be both named 'human', the statement of what a picture of a human is must be different from the statement of what human is. One possibility to account for non-substances is to state their τί ἐστιν homonymously; for each of them, despite being named 'entity', possesses one nature that can be studied independently of any other nature.

Addition and subtraction are clearly the procedures introduced by Aristotle earlier in the chapter. These procedures enable the metaphysician to indicate the characterizations that are not essence; for these characterizations consists of something in relation to something else. To illustrate,

b.1) pale $=_{def}$ pale human *by addition*;

b.2) pale human $=_{def}$ pale *by subtraction*;

As already seen, pale can be accounted for as pale plus human, while pale human can be accounted for as pale minus human. In either case, the objects are accounted in relation to something else; therefore, their statements are not definitions and their characterizations are not essences. This possibility amounts to stating the τί ἐστιν of non-substances by either adding a substance to or by subtracting a substance from the statement.

What is the appropriate procedure to account for non-substances? In the passage, Aristotle compares the procedures of addition/subtraction with a procedure to deliver an apparent syllogism. The non-substances are accounted for as by addition/subtraction just 'as the unknown is known' (1030a33-34). Aristotle has in mind is a classic fallacy examined in the *Rhetoric* and in the *Sophistical Refutations*:[59]

The unknown is known to be unknown,

[58] On homonymy see Ackrill (1963: 71-72).
[59] See *Soph. El.* 25, 180a32-38 and *Rhet*. II.24, 1402a2-6. Ross (1924: 171) and Frede-Patzig (1988: 68) take it to be a reference to Plato's *Sophist*.

Therefore,
The unknown is known.

The syllogism is fallacious because the absolute belonging of a predicate to a subject is inferred from the belonging of the same predicate to the same subject in a qualified way. The confusion between absolute and qualified belonging follows from the omission of something in the statement about 'the unknown'. In order to illustrate the indeterminate character of the τί ἐστιν of non-substances, Aristotle refers to this fallacy at 1030a25-27 too. The account of what a non-substance is is 'as some logically speak of what is not that is what is not, and not absolutely'. To illustrate:

What is not is what is not,
Therefore,
What is not is.

What Aristotle seems to suggest is that, unlike homonymy, the procedure of addition/subtraction enables the metaphysician to state the τί ἐστιν of non-substances. The reason is quite simple: if non-substances are accounted for as by homonymy, the statement is related to a name; by contrast, if non-substances are accounted for as by addition/subtraction, the statement is related to a substance. Therefore, the statement of the τί ἐστιν by addition/subtraction is not absolute, but qualified. By recalling the two fallacies, Aristotle intends to illustrate the contrast between absolute statements and qualified statements; for this is akin to the contrast between the definition of substances and the definition of non-substances in metaphysics.

Nevertheless, at 1030a34 Aristotle urges the metaphysician to consider a key fact: the πρὸς ἕν relation to substance. According to the traditional reconstruction, Aristotle is abandoning the previous procedures in favour of an account based on his solution to the multiplicity of being. Basically, it is possible to state the τί ἐστιν of a non-substance insofar as this is related to the τί ἐστιν of a substance; for example, the τί ἐστιν of pale is related to the τί ἐστιν of paleness just as the τί ἐστιν of a medical thing (e.g. an operation, a tool, etc.) is related to the τί ἐστιν of

medicine (1030b2-3).[60] The metaphysician will not account for a non-substance unless she relies on the πρὸς ἕν relation to substance over both homonymy and addition/subtraction. Earlier, I showed that the πρὸς ἕν relation is not conceived to solve the multiplicity of being. Rather, it is one of the predicative relations constituting a demonstrative science; in particular, it is the relation obtaining between the subject of knowledge and its demonstrable attributes. With the πρὸς ἕν relation to substance, Aristotle is remarking the demonstrative character of metaphysics; for substance is the subject of knowledge, while non-substances are its demonstrable attributes.[61]

There are two salient things to notice. Firstly, a demonstrative science consists of καθ' ἕν relations and πρὸς ἕν relations to one single nature. Accordingly, metaphysics consists of καθ' ἕν relations and πρὸς ἕν relations to substance; the former expressing what a substance is, the latter expressing what a non-substance is. In Z.4, Aristotle is arguing that the statement of what a non-substance is is qualified because of its relation to the subject of which non-substances are demonstrable attributes. If this is correct, Aristotle is attempting to establish a form of dependence of every entity upon substance in order to separate the demonstrable attributes from the subjects of scientific knowledge. What is crucial is that this dependence applies to the τί ἐστιν of the objects of metaphysics and, thus, to the essences signified by their statements.

> **Essential Dependence:** an entity depends upon a substance because the essence of the former is related to the essence of the latter.

To explicate this relation as a causal connection between subject and demonstrable attribute,

> **Essential Dependence (Z):** an entity depends upon a substance because the essence of the former is caused by the essence of the latter.[62]

Since the statement of the τί ἐστιν of non-substances is related to the statement of the τί ἐστιν of substance, there are definitions depending upon other definitions.

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[60] See Ross (1924: 171-172), Owen (1960: 179ff.), Frede-Patzig (1988: 70-71), Loux (1991: 82-94), Bostock (1994), Lewis (2013: 90-92). See Section 1.1.1.
[61] See Section 1.1.1.
[62] That corresponds to the ontological dependence (Z) introduced in Chapter One.

Correspondingly, there are essences depending upon other essences; the former are the essences that are related to the essence of substances, while the latter are the essences of substances. To say that non-substances possess a qualified definition is to say that their essence depends upon the essence signified by an absolute definition. This is the essence of the substance to which the non-substances are related.

On this score, Aristotle is able to infer the liberal view: *essence belongs to substance primarily and to other entities secondarily*. This conclusion can be achieved only if we separate substances from non-substances in terms of essential dependence. Its major contribution is to better ground metaphysics; for the demonstrative science of the totality of entities consists of both the knowledge of substances and the knowledge of non-substances. The point is that a substance is known by an immediate definition because its τί ἐστιν is absolute (not related to a substance), while non-substances are known by derivative definitions because their τί ἐστιν is qualified (related to a substance). In this way, Aristotle effectively establishes the *Analytics*' distinction between objects of knowledge. Substances are the primary objects of metaphysics; for they represent the subject of demonstrations (i.e. A-objects). Non-substances are the secondary objects of metaphysics (i.e. B-objects); for they represent the demonstrable attributes of substances. The definition of non-substances is then the demonstrative definition that is grounded in the definition of their subject. To use the example of physics, the definition of eclipse (which is a per se attribute of a celestial body) is the demonstrative definition that is grounded in the definition of the moon. In a nutshell, substance holds primacy over the other entities insofar as its definition holds primacy over the demonstrative definitions in metaphysics. If this is correct, we can conclude that the liberal view does not supersede the austere view. In both contexts, Aristotle conceives his essentialism in order to ensure the primacy of substance: if substance is essence, then substance is primary. The liberal view, however, is more functional to grounding a demonstrative science; for it ensures the primacy of substance by separating its primary definitions from the other definitions within metaphysics.

At this point, we are in a good position to clarify the nature of non-substances. Since non-substances are demonstrable attributes, these must be per se accidents and per se properties characterizing the genus of substance. In other words, non-substances are the objects of metaphysics whose existence and

nature is inferred from a demonstration about substance. Although substances are to be identified with the sensible substances, namely bodies (e.g. moon), non-substances cannot be identified with the demonstrable attributes of sensible substances, namely motions (e.g. eclipse); for these are objects of physics and not of metaphysics. Metaphysics must be concerned with the per se attributes of substance qua substance, whereas physics is concerned with the per se attributes of sensible substance qua sensible substance (perhaps, the per se attribute that signifies the quantity of a substance could be its unity). Whatever these can be, Z.4 provides us with a map of the attributes of substances. For the definitions of non-substances will differ from one another according to their causal relation with substance. How can we spell out the causal relation that obtains between a non-substance and a substance? In all likelihood, the answer is given by the procedures of addition and subtraction. After the separation between definitions in the liberal view, these procedures turn out to be valid ways to state what an object is. The point is that their derivative definition is grounded in the immediate definition of the substance to which they belong.

The procedure of addition consists of adding what the object is to a substance (e.g. pale $=_{def}$ pale human). Aristotle explicitly admits this procedure in Z.5.[63] Addition is necessary to define *differentiae* and *per se properties*; for the account of such attributes requires a reference to the subject that is such characterized. For example, female is a differentia of animal and can be accounted for as only by addition to animal; likewise, snub is a property of the snub nose and can be accounted for as only by addition to nose (indeed, snub is the nose that is concave). In metaphysics, the per se properties can be any non-substance (i.e. qualities, quantities, etc.) that characterizes the genus of substance;[64] the differentiae, instead, can only be qualities that characterize the genus of substance. In both cases, these attributes are defined by adding the attribute itself to the subject of their characterization. The procedure of subtraction consists of subtracting a substance from what the object is (e.g. pale human $=_{def}$ pale). Subtraction is necessary to define per se accidents; for the account of such attributes does not require a reference to the subject that is characterized, but to the cause of the characterization. The case of eclipse can be illustrative of this

[63] See Z.5, 1030b14-16.
[64] See *Topics* V.3, 132a10f. in which Aristotle points out that what is first provided in the treatment of a per se property is the genus characterized.

procedure. Although an eclipse is an eclipsed moon, the astronomer defines it as ‘loss of light because of the screening of sun by earth’. In metaphysics, the per se accidents can be any non-substance (i.e. qualities, quantities, etc.) that characterizes a specific substance. The substance is the subject of the demonstrable attribute and grounds its existence; the non-substance is the demonstrable attribute that is brought about by an external cause.

3.4 Aristotelian Essentialism Grounding Metaphysics

Aristotelian essentialism is the doctrine according to which substance is defined as essence. At the core of this doctrine, I argued, is the primacy of substance: if substance is essence, substance turns out to be primary. The examination of Z.4-6 then offers a promising solution to ground metaphysics; for the definition as essence enables Aristotle to establish a principle that can be credited with the primacy of definition. To put it in another way, the genus of substances includes those entities that possess and are identical with their own essence; the other genera, instead, include those entities that possess an essence only in relation to the essence of a substance. Therefore, the principle of metaphysics must be the primary substance whose essence grounds the essences of other entities. This picture becomes evident in the light of the correspondence between substance and definition. Aristotle himself comes to his central conclusions by looking at the statements accounting for the objects of metaphysics. Firstly, he infers the identity between a substance and its essence (identity thesis) from the fact that there is identity between an object and what is signified by its definiens. This is indeed a condition applying to every demonstrative science. If metaphysics is a science studying substance and its demonstrable attributes, there must be identity between a substance and its essence insofar as a substance is object of definition. Secondly, he infers that every substance possesses an essence either exclusively or primarily from the possession of a definition. In other words, since the statements accounting for substances are immediate, while the statements accounting for non-substances are derivative, essence is the characterization stated to account for substances; for in the

account of a substance there is no reference to other objects but to the substance itself. To this end, Aristotle conceives a form of ontological dependence that separates substances from non-substances: an entity depends upon a substance because the essence of the former is related to the essence of the latter (essential dependence). Namely, the essence of the substance grounds the essence of other entities. In order to complete the development of essentialism and, thus, of metaphysics, Aristotle has to identify substance with the entity that holds absolute primacy over any other entity. This is the task undertaken in Z.10-11 with the analysis of the constitution of definitions.

Chapter Four

Definition and Primacy (II)

Aristotelian essentialism is conceived to ground the demonstrative science of being by defining substance as essence. This doctrine turns out to be particularly promising because the definition as essence ensures the primacy of substance: substance holds primacy over other entities insofar as the latter essentially depend upon the former. In Z.4-6, Aristotle develops his essentialism through an analysis of the statements accounting for entities. An essence is the immediate characterization of objects that is signified by their definitions; since substances possess immediate definitions, substances possess and are the same as their essence. In line with the logical strategy, *Z.10-11 complete the development of essentialism by examining the constitution of definitions*. Aristotle attempts to identify the entity that is signified by the definition of a substance. At the centre of these chapters is the application of hylomorphism. The definition of a substance must indicate either form, matter, or the composite of both. Accordingly, the constitution stated makes up an essence and ultimately corresponds to the principle grounding the other entities.

Chapter Four argues that Aristotle endorses a formalist essentialism: *substance, if defined as essence, is the form of substances*. Since form holds primacy over other entities, form grounds other entities just as its immediate statement grounds derivative statements in metaphysics. In so arguing, I will tackle a long-term debate about what parts of an object are parts of its definition. The formalists argue that a definition contains only the formal parts of its object. The anti-formalists, instead, admit the inclusion of material parts for specific types of object; the definitions of animals, for example, require the inclusion of some material parts, while the definitions of mathematicals do not. Different theses about the constitution of a definition lead to different theses about essence and thus to different solutions to Z. My contention is that in Z.10-11 Aristotle takes an absolute view on the problem according to which no material part is part of a

definition. More precisely, there is no distinction between types of objects or types of matter that applies to his conclusion; therefore, the form exhausts the constitution of definitions and is to be identified with substance as essence. This treatment does not yield a fully Platonist metaphysics. In Z.11, Aristotle makes it clear that matter must be somehow included in the definition of natural objects. I shall argue that matter is part of the statement signifying a property. The constitution of this statement does not make up an essence, but a per se attribute of a substance. The ontological relation between form and matter must be understood as the scientific relation between the subject of metaphysics and one of its demonstrable attributes.

4.1 The Riddle of Z.10-11

The problems treated in Z.10-11 can be reduced to one single question: *what parts of an object are parts of its definition as a whole?* Although Aristotle never explicitly formulates this riddle, his main concern throughout the chapters is to spell out the constitution of a definition. In metaphysics, to examine the constitution of a definition is to examine the constitution that makes up a substance defined as essence. This makes of Z.10-11 a salient phase in the enquiry into substance; for Aristotle is carrying out a logical analysis that can contribute to establishing the principle of metaphysics. His strategy becomes evident since the very start: i) a definition is a statement, and ii) a statement contains parts, therefore, iii) the correspondence between a statement and an object is the same as the correspondence between the parts of the statement and the parts of the object (1034b20-22).[1] Namely, the enquiry into substance has to examine the parts of its definition because these indicate the parts that make up the object grounding metaphysics. From this perspective, Z.10-11 appear to engage with the sixth aporia of book B: *whether the principles are the genera* (τὰ γένη) *or the constitutive elements of an object* (ἐξ ὧν ἐνυπαρχόντων).[2]

[1] Aristotle often separates the notion of λόγος from the notion of ὁρισμός. However, this distinction is not at work in Z.10-11, which is mainly concerned with the parts of a statement (λόγος) insofar as these are parts of the statement accounting for a substance, i.e. definition (ὁρισμός).
[2] See B#6, 995b27-29 and 998a20-b14.

Since the genera are thought to be principles inasmuch as they are elements of definitions, Aristotle might be addressing the second horn of the aporia by showing that some elements do not hold primacy over other entities.[3] That is, they do not make up an essence.

This introductory framework raises the first question to be addressed in the chapters (Q_1): *whether the definition of the parts of the object is contained in its definition as a whole or not* (1034b22-24).[4] The aporetic character of (Q_1) stems from the fact that some definitions contain the parts of the whole object, whereas some others do not. Aristotle provides two case studies to clarify this point:

(a) circle – segments;

(b) syllable – letters.

In case (a), the segments are not contained in the definition of circle; by contrast, in case (b), the letters are contained in the definition of syllable. Nevertheless, both segments and letters, says Aristotle, are the parts into which the wholes, circle and syllable, respectively divide.

In the following lines, Aristotle moves from introducing (Q_1) to introducing (Q_2): w*hether the parts are prior to the whole* (1034b 28). Again, he presents us two further case studies:

(a_1) right angle – acute angle;

[3] The significance of B#6 is defended by Menn (2001), who takes Z.10-11 and 13-16 to address each horn. In his view, Z aims to show that there is no further substance–whether partial or not–existing over and above an object (cf. Section 2.3.2 note 82). Thus, Z.10-16 is an argument to discard both Pre-Socratic and Platonist views on principles. My reading can make better sense of the significance of definition and its connection with the examination of the essence, whilst not neglecting its contribution to establish a principle.

[4] Literally, Πότερον δεῖ τὸν τῶν μερῶν λόγον ἐνυπάρχειν ἐν τῷ τοῦ ὅλου λόγῳ ἢ οὔ. Since Aristotle focuses on the 'definition' of the parts, it might be argued that the problem opens the way to a sort of regress: the definition of the parts risks containing the definitions of other wholes, which in turn contain other parts, and so on (cf. Burnyeat et al., 1979: 78-80). Frede-Patzig (1988: 167-168) consider the singular case of the term τὸν λόγον to rule out the regressive version of the question (Aristotle would have spoken of 'the definition-s of parts', indeed). Mensch (1996) suggests that the parts of a definition are implicit definitions and not complex expressions (for a similar view, see Peramatzis, 2011: 43 n. 4). At any rate, the problem of the regress in the definition of the parts would arise if the parts were themselves substances and, thus, essences to be stated in definitions. In Chapter Five, I will argue that this possibility is taken into consideration in Z.13-14 and raises serious difficulties for the entire enquiry (See Z.13, 1038b16-23; b30-34; 1039a3-4).

(a_2) animal/human – finger.

In either case, the parts are posterior to the whole to which they belong. To paraphrase, right and human are prior to acute and finger, respectively (1034b28-32). Given the examination of the essence in Z.4-6, it is not difficult to understand what sense of priority is at work. Aristotle speaks of priority in definition (τῷ λόγῳ) and in being (τῷ εἶναι) in order to introduce the ontological dependence governing metaphysics: a part depends upon the whole because the essence of the former is caused by the essence of the latter. The priority in definition is understood in terms of constitution. Namely, the definition of the whole is constitutive of the definition of the parts; for example, right is contained in the definition of acute. Therefore, what a whole is is the cause of what a part is insofar as its essence is included in the essence of the part.[5] Though less straightforward, the priority in being is simply another way to cast the priority in definition. Indeed, what the whole is grounds the fact that there is a part; for example, what right is is presupposed to establish the existence of acute. Therefore, what a whole is is the cause of why there is a part.[6]

This is not the conclusion one might expect, though. Since acute and finger are parts into which right and human respectively divide, they are expected to be the elements contained in the definition of the whole objects; that is, the definition of the whole object is expected to state these parts. The crucial point is that essentialism commits us to the opposite view. Since the parts are essentially dependent upon the whole, the parts are not prior to and are not stated in the definition of the whole. Rather, the definition of the parts contains the definition of the whole.

[5] It is important to note the strength of this understanding of the priority in definition. What is prior in definition is not simply *presupposed* by but is *constitutive* of what is posterior. This stronger version is already hinted at in Z.1 (cf. Z.1, 1028a31-b1 and Section 1.1.2). The point is that the constitutive construal only applies to objects within the same genus of entities (e.g. animal – human; colour – white), and not to objects belonging to different genera. Since metaphysics is concerned with the first genus of entities, the priority in terms of constitution will be relevant to the treatment of substances, while the priority in terms of presupposition will be relevant for the treatment of their demonstrable attributes.

[6] This reading makes sense of how right is ontologically independent of acute, although the subtraction of an acute angle from a right angle implies the destruction of the right angle (on this problem see Ross, 1924: 196, and Frede-Patzig, 1988: 170). A similar reading of this priority is found in Scaltsas (1994b: 85-87) and in Peramatzis (2011: 23-25; 42-44). Peramatzis conceives his so-called priority in being as a relation of asymmetric independence that is corresponded to by the priority in definition: 'A is prior to B just in case A is defined without mentioning B, but B is not defined without mentioning A'. The priority in being must be distinct from the priority in existence and understood as priority in essence. According to Peramatzis, this is the priority favoured by Aristotle.

At this point, we are in a good position to see how (Q_1) and (Q_2) generate the riddle of Z.10-11. As recognized by commentators, Aristotle does not seem to address different philosophical questions.[7] (a_1) and (a_2) are nothing but other instances of (a), i.e. the case in which the parts of an object are not contained in its definition. Just as the definition of circle does not contain the segments into which the circle divides, the definitions of right and human do not contain acute and finger, respectively. It could be said that (a_1) and (a_2) work as counterexamples to (b); for they show that the parts of an object are not prior to it and, thus, do not constitute its definition. From this perspective, we can look at (Q_2) as an alternative formulation (Q_1) in terms of priority.[8] The treatment of (Q_2) is functional to the treatment of (Q_1) because it examines whether the parts that are supposed to constitute the definition of an object are in fact prior to it. In other words, (Q_2) is aimed at assessing a positive answer to (Q_1) through **a priority test**: *if the parts of an object are stated in its definition, then these parts must be prior to the whole object defined*. The interconnection of the two questions concurs with our initial insight. The puzzle turns out to concern the constitution of a definition because this signifies an essence. The riddle is particularly pressing for Z's enquiry. Since substance is defined as essence, and since essence is stated by definitions, we are unable to understand what substance is unless we spell out the constitution of a definition in metaphysics, i.e. the definition of a substance; for this means grounding metaphysics by establishing its ultimate principle.[9] The difficulty with this task is that the parts into which a whole object divides are not always stated by its definition.

For his solution to the riddle, Aristotle resorts to his hylomorphism. In physics, a sensible substance is defined as some material substratum with a formal organization; the principle grounding this science is indeed nature, which is understood both as matter and as form.[10] Since Z's enquiry is focused on sensible

[7] Cf. Burnyeat et al. (1979: 78-80); Frede-Patzig (1988: 166-170); Bostock (1994: 145). Contra Ross (1924: 196).
[8] Two salient signposts confirm this reading. First, at 1035b3-4 Aristotle claims to have illustrated the truth and to return to the question to offer better clarification of it (cf. Frede-Patzig, 1988: 184-185, although they motivate this claim with different reasons). Second, in the final summary (Z.11, 1037a21ff.) Aristotle refers only to (Q_1).
[9] More directly, one could say that since the definition of a substance is the statement of an essence, we are unable to understand what substance is unless we spell out the constitution of its definition. This approach to Z.10-11, however, plays down its connection with Z.4-6. Perhaps it confirms the original independence of these chapters.
[10] See Section 2.1.3. Cf. *Phys.* I.7, 190b9-191a22; II.1, 193a9-193b5.

substances, the principle of metaphysics is likely to correspond to one of the principles of physics. The treatment of the riddle is meant to spell out the constitution of a definition in metaphysics in terms of matter and form. The answer will indicate substance as essence and, thus, the principle of the totality of entities. Whereas modern metaphysicians have seldom tackled the riddle, commentators have debated about the answer given by Aristotle.[11] Roughly, they split into two broad camps: i) those arguing that the definition of a substance contains only its form, henceforth *formalists*; ii) those arguing that the definition of a substance contains its matter in the case of sensible substances, henceforth *anti-formalists*. On the face of it, what is at stake is whether Aristotle considers matter to be part of the definition of substances. The philosophical significance of this problem is that if matter is found to be part of the definition of sensible substances, an essence turns out to be the combination of the form and the matter of its object. In a nutshell, the development of an Aristotelian essentialism cannot be accomplished unless we clarify the constitution of the primary objects in metaphysics, so far exemplified by natural objects.

Despite the wide range of positions defended, it is fruitful to distinguish the following three theses:

T.1: The definition of a substance states only its form;[12]

T.2: The definition of a substance states its form and some 'material' parts;[13]

T.3: The definition of a substance states its form and its specific matter.[14]

Let me review each of them.

T.1 is the traditional version of the formalist view mainly defended by Michael Frede. According to T.1, the form is the only element stated in the definition of a substance. To illustrate, the definition of human is the statement of the human soul. This interpretation rests on two claims: i) form is the only object of definition; ii) matter can be implied–though not mentioned–by the definition of the form. The fundamental insight of Frede's thesis is that to define a substance is to define a

[11] In modern debates, it is matter of dispute what parts of an object are parts of its essence, which is in fact the final upshot of Z.10-11. I will present some positions below.
[12] Cf. Frede-Patzig (1988: esp. 166-220); Frede (1990); Mensch (1996).
[13] Cf. Whiting (1991); Deslauriers (2007: esp. 138-156); Peramatzis (2011: esp. 38-54, 173-200); Devereux (2011).
[14] Cf. Aquinas (*Expositio*: L.9-11); Ross (1924: 194-205); Morrison (1990); Loux (1991: 168-196); Bostock (1994: 141-175).

form. Thus, *although a substance is a sensible composite of form and matter, its definition exclusively concerns its formal constitution*;[15] the matter of a sensible substance, by contrast, can be inferred from the fact that some forms can only be realized in fixed types of material substratum. For example, since human is_{def} human soul, and since human soul must be realized in a portion of flesh&bone, from the definition of human we can infer the material constitution of the substance, i.e. flesh&bone. This thesis squares with the general interpretation of Z proposed by Frede-Patzig in their commentary: every substance ultimately is its form and this makes form the primary substance enquired in Z.[16] Consequently, an essence never includes matter, but is entirely identified with the form of a substance.[17]

T.2 is an attempt to explain how some reference to matter can be included in the definition of a substance. Thus, it can be classified as a version of the anti-formalist view. According to T.2, the form is the only element stated in the definition of a substance and can include parts specifying the material organization. This applies to the case of natural objects, such as animals. To illustrate, the definition of human is the statement of its human soul and indicates some features of its body. For the treatment of the riddle, T.2 is generally based on a distinction between types of matter: homogeneous matter (flesh&bone; bronze) and functional matter (e.g. hand, leg).[18] Whilst Aristotle argues against the inclusion of the former, he recognizes the contribution of the latter to determine what a sensible substance is. It is important to note that *T.2 defends the inclusion of a conceptual reference to the material parts and not the inclusion of the parts themselves*. This fact increases the variety of strategies for the defence of T.2. Besides the functional understanding,[19] Michael Peramatzis

[15] To paraphrase Frede (1990: 122), a composite substance is definable insofar as it possesses a form; 'for what a composite substance really is is this form'.
[16] See Frede-Patzig (1988: 40-41).
[17] A similar approach is found in Lowe (1998: 199-203; 209), who suggests getting rid of the notion of matter just as in modern physics. Since a form works as both the criterion of identity and as principle of individuation for concrete individual objects, every substance can be reduced to its form; for this is its essential status qua entity.
[18] In his physical works, Aristotle often applies a distinction between the homogeneous parts (ὁμοιομερῆ) and the heterogeneous parts (ἀνομοιομερῆ) of a body. Cf. *De Gen. et Cor.* I.5, 321b17-22; *Met.* IV.12, 389b26-28; *De Part. An.* I.1, 640b20-29.
[19] Firstly suggested by Whiting (1991: 626-631), this view has been recently defended by Devereux (2011), who considers such parts as the formal account of the material parts performing biological functions (e.g. hand, leg).

proposes to consider the defining parts of an object as ways or modes of being. In his view, the constitution of a definition includes both formal (e.g. rationality) and material features (e.g. growth, locomotion) and excludes token and type items (e.g. chunks of flesh&bone; the kind flesh&bone).[20] Similarly, Deslauriers takes the material parts of a form as the potential way of being that is actualized by the remaining parts; the former is signified by the genus, while the latter is signified by the differentia.[21]

T.3 represents the standard interpretation of Aristotle's views on definition. According to T.3, both form and matter are stated in the definition of a substance, if this is a natural object. To illustrate, the definition of human is the statement of human soul and flesh&bone. For the treatment of the riddle, T.3 is then based on a distinction between specific matter and individual matter.[22] The specific matter is the type of matter that is common to the instances of a species and generally corresponds to the proximate matter; for example, human flesh&bone. In other words, *the specific matter is the substratum for the realization of a form and is included in the definition of composite substances*. The individual matter is instead the portion of matter that belongs to a particular instance and is subject to change; for example, Socrates' flesh&bone.[23].

The common feature of T.2 and T.3 is the endorsement of **a distinction between types of objects**.[24] The anti-formalist view consists in separating those objects

[20] This solution is developed within Peramatzis' interpretation of Aristotle's ontology, which, he claims, separates (A) token and type entities from (B) attributes and ways of being. Individual compounds, individual portions of matter, universal compounds and universal portions of matter are instances of (A), while essential and non-essential accidents are instances of (B) (cf. Peramatzis, 2011: esp. 3-6; 40-54). Admittedly, no passage in the Aristotelian corpus testifies to the presence of such a categorial distinction.

[21] Deslauriers's interpretation tackles the debate about the genus-as-matter doctrine according to which Aristotle explains the unity of definition by taking the genus-differentia structure as a kind of hylomorphic composite. For Deslauriers, the inclusion of the material parts is functional to ensuring unity. I will return to the problem of the genus-as-matter in Chapter Six.

[22] This distinction is inspired to the Aquinas' distinction between *materia non signata* (i.e. common) and *materia signata* (i.e. particular). See Aquinas (*Expositio*: L.9, 1467ff.).

[23] Gill (1989) offers a view along the lines of T.3. Although Gill relies on T.2's distinction between functional matter and homogeneous matter, she concludes that both types of matter are contained in the definition of the compound, though not in the definition of the form. In her view, the nature of functional matter (e.g. organic body) is identical with the form (e.g. human soul), while the nature of homogenous matter (e.g. flesh&bone) is totally independent of form, despite providing appropriate conditions for its realization. For a modern defence of the inclusion of matter in the essence of objects, see Loux (2006) and Oderberg (2007: 62ff.).

[24] This approach is perfectly outlined in the anti-formalist reply made by Morrison (1990) against Frede's formalist thesis. Cf. Deslauriers (2007: 144-145); Peramatzis (2011: 44); Devereux (2011: 169-170).

that are essentially enmattered from those objects that are essentially matter-free. Indeed, there must be a type of matter that is stated in a definition inasmuch as some definienda are essentially dependent on it. To illustrate, the definition of natural objects contains the form and the matter in which the form is realized; for such matter determines the conditions of the realization of the form. The definition of mathematicals, instead, contains their form only; for there is no type of matter that determines the conditions of realization of the form.[25] This conception squares with some important texts in the corpus. Aristotle often remarks on the distinction between the objects of physics and the objects of mathematics. Mathematicals are studied after subtracting matter from sensible objects and, thus, turn out to be purely formal in character; by contrast, natural objects (especially living entities) are studied with reference to both their form and their matter.[26] In Z.11, Aristotle attacks Socrates the Younger and in doing so further clarifies this distinction. Socrates' comparison between human and circle is rejected because it makes the former a purely formal entity. This criticism seems to imply some reference to matter in the definition of natural objects. The defenders of T.2 and T.3 exploit this distinction to conclude in favour of an anti-formalist answer: the definition of a substance has to state some type of matter that is characteristic of natural objects as opposed to mathematicals.

However, it is important to observe some peculiarities of each thesis. According to T.2, it is the form of a natural object that is essentially enmattered. That is, the form of a substance depends upon the material features expressing its organization. Therefore, the constitution of a definition is exhausted by the form, which includes both material and formal features.[27] According to T.3, it is the natural object itself that is essentially enmattered. That is, a composite substance depends upon the specific matter that is common to the members of its species. Consequently, the constitution of a definition consists of both matter and form only if the definiendum is a composite; if the definiendum is a form, the constitution of a definition consists of form exclusively. For example, the definition of human states the form and the matter of human, while the definition of human

[25] 'deffinitio autem substantiarum naturalium non tantum formam continent sed etiam materiam, aliter enim deffinitiones naturales et mathematice non different' Aquinas (*De Ente*: 2.14-17).
[26] The key passages are *Physics* II.2 (193b31-194a12), *On the Soul* II.1-2, *Metaphysics* E.1 (1025b30-1026a10), Z.11 (1036b21-33), and H.2 (1043a11-26).
[27] Thus, T.2 agrees with T.1 that the definition of an object contains only its form, but it disagrees on the characterization of such a form.

soul states only the form of human.[28] Since Z's enquiry is focused on sensible substances, substance as essence must be identified with the form and some type of matter, which is either constitutive of the form (T.2) or constitutive of the composite (T.3). In light of this, it is not difficult to understand the anti-formalist strategy for the treatment of the riddle: the constitution of a definition is established on the basis of a distinction between types of objects. In order to put this strategy into effect, the defenders of T.2 and T.3 endorse **a distinction between types of matter**. The inclusion of matter in the definition of an object requires that we specify the type of matter on which the object essentially depends. Since the substances mainly examined in Z are the substances studied in physics, the constitution of a definition must include some 'material' element.

In the remainder of this Chapter, I intend to defend a version of T.1 and to show that Aristotelian essentialism leads to a formalist solution to Z. My strategy is as follows: since a distinction between types of object presupposes a distinction between types of matter, I shall argue that *no distinction between types of matter applies to Aristotle's conclusion in Z.10-11*. Consequently, the defenders of anti-formalist views are not allowed to admit any material element in the definition of a substance, whether natural or not. On the contrary, the definition of a substance states only its form and this is the constitution that makes up a substance defined as essence. Put it in another way, I will defend the absolute character of Aristotle's conclusion: the constitution of a definition always consists of the formal parts, independently of the nature of the definiendum. The material parts are all and only the parts that are not stated in a definition, whereas formal parts are all and only the parts that are stated in a definition. Therefore, although the substances studied in metaphysics are prima facie natural objects, the definition of substances is the definition of their forms and states the parts of their forms.

4.2 Parts, Wholes, and Definitions

[28] Thus, T.3 agrees with T.1 that the definition of a formal object (i.e. the form of a natural object or a mathematical) is the statement of a form only, but it disagrees on the definition of a composite object.

Starting from 1034b34, Aristotle reconsiders the relation between the whole and its parts in terms of form and matter. His argument is thought to give an answer to (Q_1). Although the discussion lasts until 1035b3, Aristotle's solution emerges in the very middle.

> For this reason, (a) the definition of circle does not contain that of the segments, while (b) the definition of syllable does contain that of the letters; for the letters are parts of the definition of the form, and are not matter of the syllable, whereas segments are in this way parts as matter on which the form is realized. (1035a9-12, Bostock's translation slightly modified)

> διὸ ὁ μὲν τοῦ κύκλου λόγος οὐκ ἔχει τὸν τῶν τμημάτων, ὁ δὲ τῆς συλλαβῆς ἔχει τὸν τῶν στοιχείων· τὰ μὲν γὰρ στοιχεῖα τοῦ λόγου μέρη τοῦ εἴδους καὶ οὐχ ὕλη, τὰ δὲ τμήματα οὕτως μέρη ὡς ὕλη ἐφ' ἧς ἐπιγίγνεται.

Aristotle returns to the cases of circle and of syllable in order to clarify why the statement of the parts is contained in the definition of the latter but not in that of the former. The difficulty is solved as follows: if the parts constitute the material substratum on which the form of the object is realized, these are not stated in the definition of the whole object. To illustrate, (a) since the segments are the matter on which the form circle is realized, the segments are not stated in the definition of circle. On the contrary, (b) since the letters are not the matter in which the form syllable is realized, the letters are stated in the definition of syllable. These observations do not simply clarify whether the parts of an object are parts of its definition; it is indeed plain that the parts are included. They also show us what parts are to be stated. As suggested by commentators, Aristotle's answer consists in separating case (a) from case (b) through an opposition between 'material parts' and 'formal parts'.[29] What is interesting to note is that the concept of formal part is equivalent to the concept of non-material part (a11); thus, Aristotle seems to suggest an absolute separation: whatever is not among the material parts of the object is a formal part, while whatever is not among formal parts is a material part. In so arguing, no distinction between types of matter applies to the argument; for *it suffices to establish whether a part is material or not to establish whether it is included in a definition*. In the absence of a distinction between types of matter, Aristotle cannot be committed to any distinction between

[29] Cf. Bostock (1994: 148-149).

definienda. Rather, he is bound to endorse an absolute view: the definition of an object states only its non-material parts. These are the parts of the form and exhaust the constitution that makes up an essence.

Things are not so easy, though. The defenders of T.2 and T.3 could reply that Aristotle does not introduce any distinction between types of matter because he is concerned with the definition of formal objects. Namely, circle and syllable exemplify those objects that are not essentially enmattered; for their forms can be realized in any type of matter (e.g. bronze, stone, ink etc.).[30] With the definition of natural objects, Aristotle will introduce the type of matter on which the object essentially depends. Clearly, the defenders of T.2 argue that the statement of material parts is excluded because the forms of circle and of syllable are not characterized by those material features that determine what each of them is. The defenders of T.3, instead, argue that the statement of material parts is excluded because circle and syllable are not characterized by the specific material substratum that allows the realization of their forms. Admittedly, two elements confirm that Aristotle has here in mind the definition of the forms of these objects. At a11, the letters are explicitly said to be 'the parts of the definition of the form' (τοῦ λόγου μέρη τοῦ εἴδους); at a12 the segments are said to be the parts on which circle is realized (ἐφ' οἷς ἐπιγίγνεται). More or less explicitly, it is the form of circle that is the subject of Aristotle's reasoning. Therefore, the possibility of an anti-formalist answer to the riddle is still open. Since the distinction between types of objects presupposes a distinction between types of matter, we need to examine whether Aristotle's argument relies on a review of material elements. If it were so, the answer given at 1035a9-12 should be downgraded to an explanation of the cases of circle and syllable only.

In the reasoning preceding our passage, Aristotle implements his hylomorphic conception of substances by focusing on the **ambiguity of 'part'**. His strategy is pretty clear: once the sense of 'part' that is relevant to the discussion is isolated, it should be possible to answer (Q_1). Indeed, the inclusion of the parts in the definition of an object may well depend on what the term 'part' means. To this effect, the discussion, says Aristotle, must not consider what is part as 'measure of quantity', but what is part as a 'constituent of substance' (ἐξ ὧν δὲ ἡ οὐσία ὡς μερῶν). Namely, there is a sense of 'part' (μέρος) that amounts to the sense of

[30] For T.3 these objects need only to be forms, while for T.2 these must be the forms of non-natural entities.

‘constituent’ (ἔκ τινος) and is the sense according to which form and matter could be parts of a substance. After all, Aristotle has already remarked that the constitution of a definition corresponds to the constitution that makes up a substance; for a substance is promisingly defined as essence and an essence is stated by a definition. On this point, Aristotle advances the following hypothesis: (I) in one sense matter is part of something, whereas (II) in another sense matter is not part (1035a2-3). Therefore, *matter is not part of a whole in every sense of ‘part’*. The point is that there is no way to disentangle these senses except by separating the material parts from the non-material parts. Again, such a distinction seems to commit Aristotle to an absolute conclusion. There is no distinction between types of matter that applies to the argument. Simply, the material parts are those parts that do not constitute a substance because these are the parts that do not constitute its definition as a whole.

However, the examples listed in the text give us a different insight into the reasoning. Rather than relying on the ambiguity of ‘part’, Aristotle appears to rely on the **ambiguity of ‘whole’**. To illustrate, whereas flesh is not part of concavity, it is part of snubness; for, unlike concavity, snubness is the whole of which flesh is a material part. Likewise, whereas bronze is not part of the statue as form, it is part of the statue as composite; for the statue as composite is the whole of which bronze is a material part. Accordingly, the distinction between material parts and non-material parts can be understood with reference to the senses of ‘whole’. Since *matter is not part of a whole in every sense of ‘whole’*, the constitution of a definition is spelled out by separating the composite ‘whole’ from the formal ‘whole’. The defenders of T.2 and T.3 look at this overarching distinction as a piece of evidence in favour of an anti-formalist answer to the riddle. Since Aristotle is committed to a distinction between wholes, he might explain the case of (a) circle and the case of (b) syllable with reference to their formal character. Basically, the inclusion of matter in a definition is relative to the type of whole, i.e. the type of object, of which matter is part.

How is the distinction between wholes and the distinction between parts connected within the argument of Z.10? While insisting on the sense of constituent part of substance, Aristotle does not refer to any sense of whole. The defence of anti-formalist theses can be then accomplished only if the sense of ‘constituent part’ is subordinate to a distinction between senses of ‘whole’. In *Metaphysics* Δ, Aristotle devotes chapters 24 and 25 to the treatment of the

notions of ἔκ τινος and μέρος, respectively.[31] In the review of Δ.25, there is only one sense of 'part' that is clearly meant to apply to form and matter: 'part is that into which something divides or from which something is constituted, this being either a form or what possesses a form (i.e. composite)' (1023b19-20). Remarkably, Aristotle employs the notion of 'constituent' to illustrate the sense of 'part' at issue. In doing so, he makes reference to a distinction between wholes. The idea is that something is part insofar as it constitutes either a form or a composite. Therefore, this sense of 'part' encompasses two senses according to which something is a constituent: constituent of the form and constituent of the composite. Aristotle illustrates the distinction between these two senses of 'constituent' in Δ.24.

> In another sense, the form is constituted by its parts, as for instance a human is constituted by biped and a syllable by letter. This is indeed different from the way the statue is constituted by bronze; for a composite substance is constituted by sensible matter, but also the form is constituted by the matter of the form. (1023a35-b2, Kirwan's translation modified)[32]

> τὰ δὲ ὡς ἐκ τοῦ μέρους τὸ εἶδος, οἷον ἄνθρωπος ἐκ τοῦ δίποδος καὶ ἡ συλλαβὴ ἐκ τοῦ στοιχείου· ἄλλως γὰρ τοῦτο καὶ ὁ ἀνδριὰς ἐκ χαλκοῦ· ἐκ τῆς αἰσθητῆς γὰρ ὕλης ἡ συνθετὴ οὐσία, ἀλλὰ καὶ τὸ εἶδος ἐκ τῆς τοῦ εἴδους ὕλης.

Aristotle opposes the material sense of constitution to the formal sense of constitution.[33] To illustrate, a lump of bronze constitutes the statue because it is the sensible constituent into which the composite statue divides, i.e. its matter; by contrast, the letters constitute the syllable because these are the formal constituents into which the syllable divides, i.e. its form (1023a35-b2). As

[31] For a detailed analysis see Menn (2001: 110-115).

[32] Unlike Kirwan (1993), I translate of ἔκ τινος with 'being constituted' rather than with the expression 'out of'. Also, at b2 I refer ἀλλὰ καὶ to the fact that, contrary to what one may expect, the form too is subject to being constituted.

[33] Literally, Aristotle talks about 'sensible matter' as opposed to the 'matter of the form'. Some defenders of T.2 take this passage as the proof of the presence of material features in the form (cf. Peramatzis, 2011: 50-54). This is an over-interpretation of Aristotle's claim. Firstly, Aristotle is here contrasting two types of constitution; thus, the 'matter of the form' is likely to mean the sum of the constitutive elements making up a form as opposed to the sum of those making up a composite. This analogical use of the hylomorphic notions is found elsewhere in the *corpus* (cf. *De Cael.* IV.3, 310b14-15; 311b12-15; *De Part. An.* I.3, 649a25; *Metaph.* Δ.6, 1016a25-28; Δ.28, 1024b6-8; I.8, 1057b37-1058a25). Secondly, since this type of matter is the unique constituent mentioned by Aristotle to illustrate the constitution of the form, it can hardly signify a type of matter; for the form cannot be constituted by material parts only (cf. H.3, 1043b10-14). Thirdly, none of the examples of 'matter of the form' provided by Aristotle corresponds to the material features of T.2.

expected, Aristotle associates the distinction between constituents with the distinction between wholes; for the material constitution and the formal constitution pertain to the composite and to the form, respectively. However, this does not mean that the distinction between parts is subordinate to the distinction between wholes. It is worth noting that the two distinctions yield equivalent domains. In Aristotle's reasoning, it is only the material constitution that is ascribed to the composite whole, whereas it is only the formal constitution that is ascribed to the formal whole. If the same result obtains whatever is separated, the distinction between parts does not depend on the distinction between wholes. There is one more remarkable fact we can infer from the passage. In analysing the senses of 'constituent', Aristotle is concerned not with the parts of a definition, but with the parts of a whole. Thus, the distinction between composite whole and formal whole contributes to clarifying whether the constitution is material or formal. But this does not mean clarifying whether the constitution of a definition is material or formal. That is, Aristotle is not separating the composite whole from the formal whole to separate two types of definiendum.

The application of the notion of 'constituent' in the argument of Z.10 follows the approach outlined in Δ.24. The distinction between parts does not depend on the distinction between wholes because they yield equivalent domains. For this reason, Aristotle can easily shift from one to the other: the material parts make up the constitution of the composite wholes; the formal parts make up the constitution of the formal wholes. To be the material part of an object is to make up the constitution into which a composite whole divides, whereas to be the formal part of an object is to make up the constitution into which a formal whole divides. The key point is that *the inclusion of matter concerns the constitution of an object and not the constitution of a definition*.[34] In other words, the concept of 'whole object' is not equivalent to the concept of 'definiendum'; for there are whole objects that are not definienda. Aristotle makes this clear starting from 1035a25. The material constitution is the reason why composite objects (συνειλημμένα) undergo a process of dissolution; for example, snubness and bronze circle dissolve insofar as they divide into flesh and bronze, respectively. On the

[34] Lines 1035a22-23 seem to speak against this conclusion and to include matter in the definition of some objects, but they can hardly be reliable. Not only is the text clearly corrupted (the verb ἐνεῖναι does not take the genitive, as reported by the β-reading), but his final remark is likely to be a later addition with illustrative purposes. On this point see, Jaeger (1917). For the presence of interpolations for didactic purposes, see Primavesi (2012: 424-456).

contrary, formal objects do not undergo such a process insofar as they do not divide into material parts. If this is correct, there is no distinction between types of objects of definition applying to the argument. Therefore, Aristotle ends up giving an absolute answer to the riddle: all and only material parts are not parts of a definition. In case (a), the segments are not parts of the definition of circle because they make up a material constitution. In case (b), the letters are not parts of the definition of syllable because they make up a formal constitution. It could be said that the constitution of a definition always includes the formal parts just as the form is the sole whole that is object of a definition.

Does the same conclusion obtain in the case of substances? The defenders of anti-formalist views may indeed reply that the definition of a substance states both formal and material parts because substances are natural objects (at least those studied in Z). Namely, sensible substances essentially depend upon their material substratum. The point is that Aristotle discarded the inclusion of matter for concrete wholes, such as individual human and statue. These objects are subject to change and, thus, indefinable. However, the introduction of some general concept of matter would turn the distinction between wholes into a distinction between definienda. For the defenders of T.3, the introduction of specific matter is necessary to define composite substances as opposed to formal substances. For the defenders of T.2, the introduction of some material features is necessary to define the forms of sensible substances as opposed to the forms of mathematicals.

In order to conclude in favour of T.1, we need to show that the argument of Z.10 applies to substances as much as it does to any object of definition; that is, independently of the fact that substances are natural objects. Thus, there is no distinction between types of definienda. At 1035a17-20, some observations may confirm my hypothesis.

i) If human and line are divided;
ii) human divides into flesh&bone, and line divides into halves.
iii) flesh&bone and halves are material parts;

Therefore,

iv) flesh&bone and halves are not part of the definitions of human and line.

Aristotle compares the case of a mathematical, line, to the case of a natural object, human. This comparison is meant to clarify the new understanding of the cases of circle and syllable. In the previous lines, Aristotle points out that the material constitution of a mathematical can be identified with either its intelligible constituents (e.g. the semicircles of a circle) or its sensible constituents (e.g. the lump of bronze of a bronze circle). This implies a distinction between intelligible matter and sensible matter.[35] If Aristotle bases the deduction on this assumption, we can conjecture that flesh&bone of human are equated to any sensible constituent of a natural object. Likewise, the halves of line are equated to any intelligible constituent of a mathematical. The key point is that Aristotle concludes that neither flesh&bone nor halves are stated by a definition.

This not only does show that Aristotle does not rely on the distinction between intelligible and sensible matter to infer his conclusion. More importantly, it also testifies that he does not take into consideration any other distinction between definienda for his answer to the riddle. The case of human is particularly illustrative in this regard. Indeed, human exemplifies a substance and, thus, one of the objects of definition in metaphysics. The salient point is that the constitution of this substance does not include its material parts (i.e. flesh&bone) and, consequently, these material parts are not stated in its definition. Aristotle is not opposing the form human to the composite human as if they were two types of definienda. Rather, he is opposing the form human to the composite human in that the former is substance and object of definition and the latter is not.[36] Therefore, the definition of a substance states only its form, whose constitution makes up substance as essence.

This argument is particularly effective on T.3. Since flesh&bone of human are compared to the halves of line, they are regarded as the repeatable constitution that is common to the instances of a kind. Arguably, flesh&bone exemplify the specific matter of human. In order to establish his conclusion, Aristotle does not

[35] Aristotle is perhaps anticipating his observations at 1036a9-12. Roughly, the intelligible matter is peculiar of mathematicals (or of formal objects) and must be understood as product of division (e.g. the segments of a triangle). For this reason, it is contrasted with sensible matter of bodies, which is a principle of their motions. Cf. Frede-Patzig (1988: 195-196) and H.6, 1045a33-36.

[36] Thus, I agree with Ross (1924: 197) who identifies human with the human soul. However, he argues that the σύνολον at a20 is any whole containing matter: i) the intelligible individual (e.g. circle); ii) the universal compound (e.g. Human); iii) a sensible individual (e.g. Callias, a bronze circle). In his view, Aristotle still includes matter in the definition of these composite objects. But in the passage, Aristotle specifies that matter is part of these objects, not of their definition. Cf. Frede-Patzig (1988: 177).

separate the specific matter from the particular matter; he simply excludes the matter of human inasmuch as it is not a formal part and, thus, is part neither of a definition nor of a substance. Nevertheless, Aristotle may still have in mind a distinction between functional and homogeneous matter. This leaves open the possibility of his commitment to T.2. Admittedly, the material constitution excluded by definition is precisely the homogenous type of matter in which a form is realized (e.g. flesh&bone, bronze, etc.). Aristotle could then separate the material features indicated by functional parts from both the homogeneous matter of natural objects and the intelligible matter of mathematicals.

This possibility cannot be entirely ruled out. There is nonetheless an interesting feature in the deduction above. In order to infer (iv), it suffices to show that (iii) flesh&bone and halves are the material parts of human and line, respectively. This means that Aristotle is able to infer (iv) by giving an absolute character to his argument. In other words, for each object it suffices to separate the material parts from the non-material parts in order to give its definition. Since Aristotle has not explicitly introduced any distinction between types of matter applying to his argument, the unique alternative premise by which we can replace (iii) is:

iii*) flesh&bone and halves are not formal parts;

(iii*) indeed presupposes that the definition of any object corresponds to the statement of a form. Accordingly, the definition of a substance states only its form and its constitution is exhausted by formal parts. From this perspective, we can better appreciate the opposition at 1035a11-12, on which the argument of Z.10 is clearly built. The *material constitution* is not simply contrasted with the formal constitution. Rather, it is contrasted with the *constitution of the definition of the form*. Basically, the material parts that constitute a whole are disjointed from the parts that constitute a definition. The fundamental insight is that the whole that is constituted by material parts is not a definiendum and, accordingly, is not a substance; for substances are the primary definienda in metaphysics and are identical with the essence signified by their definitions.

4.3 The Priority Test

If the parts of an object are stated in its definition, then these parts must be prior to the whole object defined. This is the priority test that Aristotle undertakes with (Q_2). Earlier, I pointed out that the notion of priority introduces the ontological dependence governing metaphysics and is understood in terms of constitution. An entity is prior to another entity because the definition of the former is constitutive of the definition of the latter. Namely, the latter essentially depends upon the former. Since the parts of a definition indicate the parts that make up an essence, the parts stated must be prior to the whole object.[37] The priority test represents the second step in the treatment of the riddle. Having proposed an answer in terms of hylomorphic notions, Aristotle confirms its validity by testing the priority of the defining parts over the whole. Accordingly, if Aristotle endorses a formalist view on the riddle, the formal parts will be the sole parts to pass the test. On the contrary, if Aristotle endorses an anti-formalist view, some type of material parts will also be prior (i.e. T.2's material features or T.3's specific matter).

If my reconstruction of the argument of Z.10 is correct, the priority test demonstrates that the definition of a substance states only its form (T.1). Whereas the formal parts are always prior to the whole, the material parts turn out to be posterior. In this section, I will argue for **the posteriority of the matter** on the basis of its essential dependence upon substance. In accordance with my overall strategy, I contend that no distinction between types of matter or types of definiendum applies to the argument. Therefore, Aristotle comes to defend an absolute conclusion: the matter of a substance is essentially posterior.

[37] It could be argued that the priority test clashes with the identity thesis. Since the parts of a definition are the parts of the definiens, and since there must be identity between the definiens and the definiendum, the parts cannot be credited with priority over the whole. To avoid this consequence, Peramatzis (2011: 27ff.) plays down the identity in definition which would undermine the irreflexive character of the notion of priority: an object cannot be prior to itself. Nowhere does Aristotle speak of the irreflexive character of priority. As noted in Section 1.2, Aristotle holds that the parts of a definition (i.e. genus and differentiae) are prior to the definiendum and that there is one single object signified by the totality of these parts and the definiendum. I find it more reasonable to say that the parts of a definition are prior to the whole defined if separately taken; for example, animal and rational are prior to human, in that each of them is constitutive of the definition of human. In addition, it must be noted that Z.10-11 are concerned with the priority of the parts inasmuch as it is illustrative of the constitution of a definition and, thus, of what substance is. This priority might clash with the identity thesis if the parts turns out to be substances themselves. This possibility, I will show, is taken into consideration in Z.13-16 and will lead to the failure of Z's enquiry.

Conversely, the form of a substance is essentially prior to other entities and is ultimately identified with the principle of metaphysics.

At the beginning of the test, the relations of priority and posteriority are not saturated by any term. Namely, Aristotle does not make explicit what the parts must be prior or posterior to.[38] Provisionally, we can address the priority and the posteriority of the parts with respect to the whole defined. After all, that is the initial formulation of (Q_2).

> The parts of the definition, into which the definition is divided, are prior–all or some of them. I) the definition of acute angle is not part of the definition of right angle, but conversely, for the definer of acute angle makes use of right angle: acute angle is indeed <defined as> what is less than right angle. The same is true of circle and semicircle, since semicircle is defined by reference to circle; and similarly finger is defined by reference to its whole, as such-and-such part of human. II) Thus, those parts that are material, and into which something is divided as into matter, are posterior; whereas those that are parts of the definition and of the substance according to definition, are prior–all or some of them. (Bostock's translation modified, 1035b4-14)

> ὅσα μὲν γὰρ τοῦ λόγου μέρη καὶ εἰς ἃ διαιρεῖται ὁ λόγος, ταῦτα πρότερα ἢ πάντα ἢ ἔνια· ὁ δὲ τῆς ὀρθῆς λόγος οὐ διαιρεῖται εἰς ὀξείας λόγον, ἀλλ' <ὁ> τῆς ὀξείας εἰς ὀρθήν· χρῆται γὰρ ὁ ὁριζόμενος τὴν ὀξεῖαν τῇ ὀρθῇ· "ἐλάττων" γὰρ "ὀρθῆς" ἡ ὀξεῖα. ὁμοίως δὲ καὶ ὁ κύκλος καὶ τὸ ἡμικύκλιον ἔχουσιν· τὸ γὰρ ἡμικύκλιον τῷ κύκλῳ ὁρίζεται καὶ ὁ δάκτυλος τῷ ὅλῳ· "τὸ" γὰρ "τοιόνδε μέρος ἀνθρώπου" δάκτυλος. ὥσθ' ὅσα μὲν μέρη ὡς ὕλη καὶ εἰς ἃ διαιρεῖται ὡς ὕλην, ὕστερα· ὅσα δὲ ὡς τοῦ λόγου καὶ τῆς οὐσίας τῆς κατὰ τὸν λόγον, πρότερα ἢ πάντα ἢ ἔνια.

In section (I), Aristotle takes up the test with the case studies introduced at the outset of Z.10: (a) circle is prior to semicircle; (a_1) right angle is prior to acute angle; (a_2) human is prior to finger. This is not surprising; for these cases call into question the statement of the parts in the definition of the whole. Rather, they suggest that the whole is stated in the definition of the parts and, thus, prior to them. A valid answer to the riddle–whether formalist or anti-formalist–must then explain away these controversial cases. In section (II), Aristotle tells us how to perform the priority test in terms of form and matter. His hylomorphism enables him to show that each case study in fact illustrates the priority of the parts.

[38] Cf. Z.10, 1035b4-6; b12; b14.

Let me go into the details. The reason why (a) circle is prior to semicircle, (a_1) right angle is prior to acute angle, and (a_2) human is prior to finger is that the definition of what is prior is constitutive of the definition of what is posterior. To illustrate:

a) semicircle $=_{def}$ half of a circle;

a_1) acute $=_{def}$ angle less than right;

a_2) finger $=_{def}$ such-and-such a limb of a human.

In a nutshell, the definitions of semicircle, acute, and finger require a reference to circle, right, and human, respectively. The latter are in fact parts of the definitions of the former. This notion of priority introduces the essential dependence. To illustrate, the essence of semicircle depends upon the essence of circle because the essence of circle is constitutive of the essence of semicircle.[39] This means that the definition of circle grounds the definition and the existence of semicircle. Thus, the priority ascribed to the wholes (circle, right, and human) is still **the priority of the parts of the definition**. Correspondingly, the posteriority ascribed to the parts into which the wholes divide (semicircle, acute, and finger) is **the posteriority of the wholes defined**.

Does the hylomorphic treatment of the riddle work with the priority test? At 1035b11-13, Aristotle recalls the twofold opposition between senses of 'part' and senses of 'whole'. The material parts are the parts into which an object divides, while the defining parts are the parts into which a substance divides. Again, the point is that the material parts are not constitutive of a definition. Likewise, the whole object dividing into material parts is not a definiendum. If Aristotle endorses a formalist view, the defining parts are all and only the parts of a form; for their statement does not require any reference either to the material features or to the specific matter of a sensible substance. The priority test will confirm this conclusion if such material parts turn out to be posterior to the substance defined. It is possible to develop two arguments for the posteriority of the matter.

[39] This form of dependence is close to the essential dependence subscribed in modern metaphysics: an entity *X* depends upon an entity *Y iff Y* fixes the identity of *X*. This can be understood as 'the essence of *Y* is constitutive of the essence of *X*' (cf. Fine, 1995b) or as *Y* performs a function that makes *X* what *X* is (cf. Lowe, 1997: 147-151).

A first argument draws on the absolute character of Aristotle's argument. In other words, *there is no distinction between types of matter according to which some matter is prior to the substance defined*. As suggested by the text, semicircle, acute, and finger are instances of material parts that are not stated in a definition. More precisely, semicircle and acute are parts of mathematicals (i.e. circle and right); thus, they exemplify the intelligible matter excluded from the definition of line above.[40] Finger, instead, is a part of a natural object (i.e. human); thus, it exemplifies the sensible matter excluded from the definition of human. For one thing, this aligns finger with a functional part of human; like arm, finger is a part performing a function within a whole natural object. For another thing, this aligns finger with the homogeneous matter of human; like flesh&bone, finger is a material element into which the whole natural object divides.[41] Overall, the idea is that a definition includes the statement of neither functional nor homogeneous matter. In other words, there is no conceptual reference to some material part that is constitutive of the definition of the whole object. That Aristotle has in mind statements and not concrete material parts is clear from his application of homonymy. If a material part is severed from the whole object, what the material part is is stated homonymously; once severed, a material part is a mere chunk of matter, despite retaining its name. For example, if a finger is severed from a human, the essence of finger can be stated only homonymously (1035b23-25).[42] Aristotle takes the homonymy of the part to be a sign of its posteriority. Basically, the essence of a material part can be stated–even homonymously–only with reference to the essence of the whole; thus, the material part is posterior to the whole object insofar as the essence of the former depends upon the essence of latter. What is relevant to us is that this argument applies both to the statement of functional parts and to the statement of homogenous parts.[43] Since the performance of the priority test is not relative to the type of matter tested, Aristotle is committed to an absolute argument: matter is always posterior to the whole object defined, and the whole object defined in metaphysics is substance; therefore, matter is always posterior to substance.

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[40] Cf. Z.10, 1035a17-21.
[41] Cf. Z.10, 1035a18-21.
[42] Cf. Z.11, 1036b31-32.
[43] See *Met.* IV.12, 389b31-390a4, in which Aristotle makes it clear that homonymy applies to different material objects (hand, corpse, flesh&bone, flute), despite it being more evident for those objects whose functions are immediately evident. Cf. *De Gen. et Cor.* I.5, 321b17ff.; *De Gen. An.* II.1, 734b24-37.

A second argument draws on the constitutive understanding of Aristotle's priority. In other words, *since the definition of substance is constitutive of the definition of matter, matter is always posterior to the substance defined*. Within his essentialism in Z.4-6, Aristotle appears to endorse a hierarchy of objects of metaphysics.[44] The basic level of this hierarchy is occupied by substances, which are the primary objects possessing an essence absolutely; the higher levels are occupied by non-substances, which are the secondary objects possessing an essence derivatively. Non-substances essentially depend upon substances because the essence of the latter grounds the essence of the former (e.g. the essence of moon grounds the essence of eclipse). In Z.10-11, Aristotle is concerned with the basic level of the hierarchy; for he intends to spell out the constitution of a definition in metaphysics, i.e. the definition of a substance. Accordingly, if the definition of a substance is constitutive of the definition of some parts, such parts essentially depend upon the substance defined; that is, such parts are not the defining parts of a substance. To illustrate:

a_2) finger $=_{def}$ [part of hand [$_{def}$ part of arm [$_{def}$ part of …[$_{def}$ human]]]]

The definition of finger states the definition of hand; and the definition of hand states the definition of arm and so on until the definition of human, which is a substance. Thus, the definition of human is constitutive of the definition of finger. Consequently, finger essentially depends upon human. The key point is that every instance of matter essentially depends upon a substance. Consider T.2's material parts. Growing, for example, is thought to be a material feature that is part of the definition of animal. However, it is the definition of animal that is constitutive of the definition of growing; for growing is a per se attribute of the genus of animals, which is studied by physics and its subordinate sciences. To put it in general terms, what matter is depends upon what a substance is because the definition of the latter grounds the definition of the former.

The same result can be inferred indirectly. If the definition of a material part is part of the definition of a substance, the definition of the substance turns out to be regressive. To illustrate:

[44] See Section 3.3. On this point, see also Loux (1991: 94-104; 236ff.).

If human $=_{def}$ [animal, plus two arms, etc., body],

Then,

human $=_{def}$ [animal, plus two arms [$_{def}$ limb of human [$_{def}$ animal, plus two arms, etc.] etc., body];

Basically, if the definition of a substance states some material parts, the definition is regressive in that this definition will be stated in the definition of the parts themselves. This means that the essence of the matter will be constitutive of the essence of the whole substance, despite the essence of the whole substance being constitutive of the essence of the matter. In fact, any statement of the material parts of an object must be referred to the substance defined. Correspondingly, matter represents an entity that is essentially dependent upon a substance; for what the substance is is constitutive of what matter is. Therefore, matter is always posterior to substance.

The priority test confirms that the defining parts of a substance are all and only the parts of a form. More precisely, the constitution of a definition is exhausted by the formal parts that make up a substance as essence; by contrast, the material parts are never stated in a definition and, thus, do not make up a substance as essence. This conclusion follows from the posteriority of the material parts; namely, matter essentially depends upon a substance because the essence of the latter is constitutive of the essence of the former. From this perspective, the definition of a material part is akin to the definition of coupled objects, like snubness; for its definition requires stating the subject that is materially characterized.[45] What is remarkable is that this subject is nothing but the form of a sensible substance. At a lower level of discussion, this marks the endorsement of a formalist answer to the riddle. At a general level, this marks the endorsement of a formalist solution to Z's enquiry: *the form of sensible substances is substance defined as essence*. In metaphysics, the definition of a form represents the definition of a substance and, thus, the immediate statement

[45] A similar suggestion is found in Gill (1989: 114-116; 128-138). Gill maintains that the definition of natural objects faces the difficulties of the definition of coupled objects highlighted in Z.5; for their definition entails a repetition of the term. However, she does not take this to point to a formalist view on definition in metaphysics.

grounding derivative statements about other entities. Ultimately, the form of sensible substances is then the principle of metaphysics.[46]

There is, however, a certain ambiguity looming over the priority test. At 1035b22-23, Aristotle tells us that in one sense matter is posterior, while in another sense matter is prior to the composite. This ambiguity could weaken the formalist answer to the riddle and admit cases in which some objects essentially depend upon their material parts; consequently, the constitution of a definition may include some type of matter. To avoid this consequence, it suffices to remark that *the posteriority of matter is not established in relation to the composite, but in relation to substance*, i.e. form. In other words, since the whole to which some material parts are prior is not a definiendum, the priority of matter does not imply its inclusion in the definition of a substance. But what does Aristotle mean by crediting matter with priority over the composite? Plainly, there are different options available. The ambiguity might concern the senses of:

1) matter;
2) composite;
3) priority.

If Aristotle is separating different senses of ‘matter’, he is likely to have in mind the corresponding senses of ‘part’ and ‘whole’.[47] Basically, the distinction may concern (1a) the concrete material parts and (1b) their repeatable version. To illustrate, flesh&bone could indicate either the material elements constituting a human or the specific matter of human. The priority of matter is not ascribed to the parts into which a composite divides, but to the parts into which the definition of a composite divides; thus, the specific matter of human is prior to the composite human, which is defined as human soul plus flesh&bone. This reading would then agree with T.3 on the inclusion of matter in the definition of a composite, though such a definition would not be the definition of a substance.

If Aristotle is separating different senses of ‘composite’, the distinction may concern (2a) the composite as form and (2b) the composite as union of matter

[46] See Z.10, 1035b14-16, in which Aristotle explicitly identifies the substance logically conceived (κατὰ τὸν λόγον) with the form of a given body.
[47] Frede-Patzig (1988*:* 187-188) limit themselves to saying that parthood is already a form of priority. However, they are not clear as to whether this form of priority entails their inclusion in a definition.

and form. To illustrate, human could signify either human soul or the composite of human soul and flesh&bone. Again, this reading would agree with T.3 on the inclusion of matter in the definition of a composite. According to options (1) and (2), some matter is prior to the composite because the composite essentially depends upon this matter. That is, what matter is is constitutive of what the composite is.

If Aristotle is separating different senses of 'priority', the priority of matter over the composite will not be relevant to metaphysics. Indeed, a single notion of matter could not introduce the essential dependence of the composite upon its material parts. The argument of Z.10 has repeatedly ruled out this possibility. In this case, Aristotle might be thinking of the priority of the parts from which a composite comes into existence and into which it dissolves.[48] This sense of priority is not relevant to metaphysics; for generation and corruption are types of change studied by physics. While physics studies sensible substances (i.e. bodies) qua sensible substances, metaphysics studies substances (i.e. bodies, in particular) qua substances.

Be that as it may, Aristotle takes an absolute view on the constitution of a definition in metaphysics. The definition of a substance states only the form and its parts make up a substance as essence. The priority test confirms the formalist answer by showing the posteriority of matter: every type of matter is posterior to substance insofar as the former essentially depends upon the latter. Despite being somehow prior to the composite, the priority of matter does not mark its inclusion in the definition of a substance. Arguably, some material parts are to be stated in accounting for a composite. This issue, I will show, is at the core of Z.11's discussion.[49]

[48] For a distinction of senses of priority see Ross (1924: 198-199), Gill (1989: 128), and Loux (1991: 174-175).

[49] There is a last interesting aspect of the priority test. For three times, Aristotle claims that the priority pertains to 'all or some' of the formal parts (ἢ πάντα ἢ ἔνια). While the first two relations are not saturated, the third relation establishes that 'all or some' of the formal parts are prior to the composite (b18-19). In this regard, Aristotle argues that some material parts are simultaneous to the whole because they represent the location of the form (Z.10, 1035b25). For example, heart and brain are those parts of an animal the elimination of which would cause the death of the

4.4 Identifying Matter: Socrates' Comparison

The rejection of Socrates' comparison is undoubtedly the strongest piece of evidence in favour of the anti-formalist views. In this passage from Z.11, Aristotle counters the equivalence between mathematicals and natural objects and suggests the inclusion of matter in the definition of the latter. If matter is part of the definition of substances (which are indeed natural objects), matter makes up the constitution of a substance as essence. This insight is traceable in other texts in which Aristotle endorses a distinction between types of definiendum. In *Physics* II.2, Aristotle makes it clear that natural objects are defined in the way of 'snubness'. Since the physicist studies natural objects and their motions, her definitions state an essence only if they specify the matter undergoing change; snubness is indeed the concavity realized in a nose. Mathematicals, by contrast, are defined in the way of 'concavity'. Since the mathematician studies the limits of natural objects and is not concerned with their motions, her definitions state an essence by abstracting from the matter (194b31-a12). Roughly, the same point is made in his overview of theoretical sciences in *Metaphysics* E.1. Some definienda are essentially enmattered, while some others are essentially matter-free. Consequently, the study of natural objects, which is conducted by physics, requires accounting for a sensible substance in terms of form and matter.[50]

At the outset of Z.11, Aristotle resumes his previous discussion by positing (Q_3): *what parts are parts of the form, and what parts are not, but are parts of the combined whole* (1036a26-28). A few lines below, Aristotle reformulates (Q_3) as follows: *what parts are parts as matter, and what parts are not* (1036a29-30). In the previous sections, I showed that Aristotle can easily shift from a distinction between parts to a distinction between wholes. The central task of Z.11 is outlined in view of the absolute opposition between the parts into which the form divides,

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animal; for it would not be ensouled anymore (cf. Ross, 1924: 199; Frede-Patzig, 1988: 188; Deslauriers, 2007: 142, n. 24). Things are less clear with the first two cases (b5-6; b13-14). Here the 'all or some' clause is more likely to concern the priority of the formal parts over the whole substance, i.e. the form itself. On the assumption that the parts of a form are its genus and differentiae, Ross (1924: 198) conjectures that the last differentia is in fact simultaneous to the form (cf. Loux, 1991: 172-175). This is the view advocated by Aristotle at Z.12, 1038a19, but in Z.10-11 this understanding of the defining parts is not explicit. Frede-Patzig (1988: 186-187) and Bostock (1994: 153) propose an interesting alternative. Since Aristotle is talking of the parts of a soul, he might have in mind the faculties of nutrition, perception, locomotion and reasoning described in his *On the Soul*; therefore, the totality of the faculties is in fact equivalent to the whole soul they constitute. Both these possibilities are indeed compatible with my formalist answer to the riddle.

[50] See E.1, 1025b30ff.

the formal parts, and the parts into which the composite divides, the material parts. In what does this discussion then differ from that of Z.10? Aristotle tells us that, since definition pertains to form, a failure in separating these parts is a failure in defining an object.[51] Accordingly, the purpose of Z.11 is not to answer the riddle, but to ensure the correctness of the process to identify the parts of the definition.[52]

The significance of such a process emerges in a much debated section. Aristotle introduces some case studies, each of which, presumably, points to a level of difficulty in performing the separation:

x) Any circle is realized in either bronze, or stone, or wood etc.;

y_1) Every circle is realized in bronze (hypothetical);

y_2) Every human is realized in flesh&bone (actual).

(x) exemplifies those cases in which a form can be realized in different types of matter. To illustrate, mathematicals, like circle, are reproducible in a wide range of material substrata. There is no particular difficulty in this case; for the formal parts can be easily separated from the material parts. Problems arise with (y_1) and (y_2). Arguably, Aristotle equates these cases to illustrate the difficulty at issue in Z.11: *some forms are always and only realized in the same type of matter*.[53] To illustrate, for the form of human there is only one type of material substratum, flesh&bone. The process of separation is then hindered by such a fixed sensible realization; for the formal parts cannot be immediately distinct from the material parts.

In view of (y)'s cases, Aristotle considers two alternatives:

I) The matter in which a form is realized is in fact a formal part;

[51] If a definition pertains only to a form, and if the parts of an object can be either formal or material, the parts of a definition are the parts of a form. This is in line both with T.1 and with some versions of T.2 (cf. Devereux, 2011). According to Peramatzis (2011), instead, Aristotle ontologically separates the definiendum, the form of sensible substances, from the definiens, the formal and material ways of being of the form.

[52] Contra Burnyeat et al. (1979: 93-94), who suggested that Z.11 is an early version of Z.10. Alternatively, Bostock (1994: 173) argues that Z.11 is a reconsideration of the argument of Z.10 in which Aristotle takes into account the definition of the species, a composite resulting from form and universal matter. I shall return to this point.

[53] For the debate concerning this section of Z.11, see Chiaradonna (2014).

II) The matter in which a form is realized is a material part, but is impossible to be separated.

Basically, the problem is to establish whether the substratum of the (y) cases is among their material or their formal parts; that is, for example, whether flesh&bone are parts of the composite human or parts of the form human. On the face of it, option (I) means rejecting the conclusions of Z.10, whereas option (II) means reconsidering the separation between form and matter for certain objects in metaphysics.[54]

The (y) cases are very likely to correspond to the objects studied by physical sciences. In Z.8, Aristotle points out that their generation implies **a τόδ' ἐν τῷδε characterization**: an object is this form in this matter. A bronze sphere, for example, results from the form of sphere in a lump of bronze.[55] However, in Z.11 Aristotle does not seem to be concerned with the generation of natural objects, but with the definition of their forms; for these are identified with the substances studied by metaphysics. The point is that the forms of natural objects are exclusively realized in a given type of matter. To put it in another way, Z.11 does not puzzle over the inclusion of matter into the definition of a substance; rather, it puzzles over the material character of those parts in which a form is realized. To tackle this problem means either (I) acknowledging their formal character (T.2), or (II) confirming their material character in spite of our incapability to identify them (T.1). From this perspective, the endorsement of T.3 appears to be a remote possibility. What is relevant to us is that Aristotle has not rejected his conclusion about what parts are parts of a definition. The remainder of Z.11 is indeed aimed at reconsidering what parts are to be identified with those contained in the definition whenever this is not evident.

After his introduction, Aristotle reviews some incorrect approaches to the problem. For sake of brevity, I am not going to examine the positions held by these thinkers, who are generally identified with some Platonist philosophers. It suffices to say that they fail in separating the material parts because they assimilate the case of mathematicals to the case of natural objects; to illustrate, they separate the lines from the form of the triangle just as they separate the flesh&bone from the form of human. What is wrong with this procedure? A first

[54] Cf. Bostock (1994: 159-160).
[55] Cf. Z.8, 1033b11-19.

answer could be that Platonists exceed in removing parts from a definition. In other words, they eliminate some formal parts, which indeed make up a substance as essence. This reading concurs with T.2; there are some parts of a form that are mistaken for material parts as they indicate material features of the form.[56] A second answer could be that natural objects cannot be assimilated with mathematicals because their forms hold different relationships with the corresponding material parts. This reading seems to admit the endorsement of T.3. Basically, natural objects are composites resulting from matter and form and, thus, both formal and material parts are to be stated in their definition. Therefore, the form and its specific matter make up a substance as essence.

The criticism of Socrates' comparison is to be addressed against this context. In the passage, Aristotle complains about the consequences of the Platonist approach and focuses on the separation of matter.

> Now, we said that there is some difficulty concerning definitions and why this is so. For this reason, it is superfluous to reduce everything in this way and to remove the matter; for some objects presumably are one thing in another or certain things in such a state. And the comparison about the animal, which Socrates the Younger used to draw, is incorrect; for it is misleading and makes one suppose that there could be a human without his parts, as there can be a circle without bronze. But this is not the same. For an animal is a sensible entity and cannot be defined without motion, nor therefore without a certain state of its parts. (Bostock's translation partially modified, 1036b21-30)

> Ὅτι μὲν οὖν ἔχει τινὰ ἀπορίαν τὰ περὶ τοὺς ὁρισμούς, καὶ διὰ τίν' αἰτίαν, εἴρηται· διὸ καὶ τὸ πάντα ἀνάγειν οὕτω καὶ ἀφαιρεῖν τὴν ὕλην περίεργον· ἔνια γὰρ ἴσως τόδ' ἐν τῷδ' ἐστὶν ἢ ὠδὶ ταδὶ ἔχοντα. καὶ ἡ παραβολὴ ἡ ἐπὶ τοῦ ζῴου, ἣν εἰώθει λέγειν Σωκράτης ὁ νεώτερος, οὐ καλῶς ἔχει· ἀπάγει γὰρ ἀπὸ τοῦ ἀληθοῦς, καὶ ποιεῖ ὑπολαμβάνειν ὡς ἐνδεχόμενον εἶναι τὸν ἄνθρωπον ἄνευ τῶν μερῶν, ὥσπερ ἄνευ τοῦ χαλκοῦ τὸν κύκλον. τὸ δ' οὐχ ὅμοιον· αἰσθητὸν γάρ τι τὸ ζῷον, καὶ ἄνευ κινήσεως οὐκ ἔστιν ὁρίσασθαι, διὸ οὐδ' ἄνευ τῶν μερῶν ἐχόντων πώς.

The very content of the comparison is not known to us.[57] Generally, it rests on the assumption behind Platonist metaphysics: the case of human can be

[56] According to Devereux (2011: 177-178), Aristotle considers two types of failure: (1) to eliminate formal parts thinking that they are material (Platonists); (2) to include material parts thinking that they are formal. Cf. Frede-Patzig (1988: 205-206).

[57] Almost nothing is known about Socrates the Younger. He was a mathematician who was close to Plato's Academy and is the interlocutor of the Eleatic Visitor in the *Statesman.* See also *Theaet.* 147c; *Soph.* 218e.

assimilated to the case of circle. The comparison, says Aristotle, makes one believe that the existence of a human without parts is as possible as the existence of a circle without bronze. First of all, it is unclear whether the comparison applies to the forms or to composites. According to T.3, human and circle are composites resulting from a form in a certain type of matter. Aristotle is then rejecting the separation of those material parts upon which a whole composite essentially depends; these are the specific matter that guarantees the realization of the form of natural objects.[58] Consequently, the definition of such substances must include both formal and material parts. According to T.2, human and circle are forms realizing in material substrata. Thus, Aristotle is rejecting the separation of some material parts upon which a whole form depends; these are the material features that indicate the organization and the functions of the form of natural objects. Although the definition of substances includes only the parts of a form, some of these parts signify the material characterization of the form defined.[59]

Be that as it may, Aristotle seems to endorse an anti-formalist answer to the riddle: the constitution of a definition consists of form and some material parts, whenever these parts determine the realization of the form, as with natural objects. In order to defend T.1, Michael Frede proposes to apply the comparison to the two types of form and to reconsider the criticism in three main aspects:[60]

i) The criticism is focused on the possibility of definition;
ii) Matter is implied by but not stated in the definition;
iii) The comparison is invalid and not firmly rejected.

Firstly, Frede understands the rejection in modal terms. Accordingly, Aristotle is not concerned with the definition of natural objects, but with the conditions for their *definability*. The possibility of defining an animal is actualized by the availability of some parts to perform a certain function. Parts like hand, leg and arm are necessary to the existence of a natural object, but are not constitutive of its essence, which is purely formal.[61] Secondly, Frede resorts to Aristotle's

[58] Cf. Loux (1991: 175-176); Gill (1989: 126-138).
[59] Cf. Deslauriers (2007: 145-146).
[60] See Frede (1990: 118-122).
[61] Contrary to all manuscripts, Frede suggests emending αἰσθητόν with αἰσθητ<ικ>όν in order to highlight the function of perception that is peculiar to animals and requires material support (cf. Frede-Patzig, 1988: 210-211). For some criticism of this emendation, see Granger (2000). Cf. *De Sen.* 1, 436b6-12.

psychology to argue that the definition of the form of natural objects entails their matter. In *On the Soul* II, a soul is described as a hierarchical set of functions (nutrition, perception, memory, etc.) and some of these enable us to infer the type of matter that is 'ensouled'.[62] Finally, since the largest portion of Z.10-11 leads to a formalist conclusion, Frede limits the criticism to the validity of the comparison itself. In other words, the target of Aristotle's argument is unlikely to be the formalist answer to the riddle and should be rather identified with the consequences following from the comparison.[63]

Unfortunately, Frede's interpretation is too speculative to be effective against T.2 and T.3. The problem is that the rejection of Socrates' comparison is explicitly connected with the subtraction of matter operated by Platonists; this implies that some material parts are to be stated in the definition of some objects. In order to defend T.1, I will show that Aristotle does reject the comparison and yet does not admit the inclusion of any material part in the definition of substances. My contention is that Socrates' comparison misconstrues the relationship between form and matter. The matter of a natural object is a property of the form and, thus, must be part of a statement that signifies a composite characterization. For this reason, the separation of material parts from human, if assimilated to the separation from circle, is incorrect; for human can be defined as human soul realized in such flesh&bone. This is not the definition of human. It is a derivative statement signifying a property of human and grounded in the immediate definition of its form.

Let me start with some general observations. The criticism levelled by Aristotle concerns the definitions and is summarised by the charge of incorrectness (οὐ καλῶς). Now, the incorrectness is one of the main criteria applied in the *Topics* to evaluate definitions. The schemes in book VI are indeed centred on either the essentiality or the correctness of the statement. This is already very remarkable: if some material parts are parts of a definition and, thus, make up an essence, Aristotle would not charge the statement with incorrectness but with non-essentiality. There are two sources of incorrectness that can be relevant to the criticism in Z.11: a) the statement is obscure (μὴ σαφῶς); b) the statement is obtained through some superfluous procedure (περίεργον).[64] The addition of

[62] See *De An.* II.2, 413a21-b11.
[63] Against this interpretation, Burnyeat (2001: 40, n. 74) points out that the expression οὐ καλῶς indicates the full rejection of the thesis.
[64] See *Top*. VI.1, 139b6-18.

something is superfluous if its subtraction does not prevent one from still stating what an object is; for example, the addition of 'capable of learning' to 'rational animal' is superfluous because, if subtracted, the remainder still indicates what human is. The subtraction of something is superfluous if the remainder no longer indicates what the object is; for example, the subtraction of 'number' from 'number that moves by itself' is superfluous because the remainder does not indicate what soul is anymore.[65]

Before addressing the comparison, Aristotle explicitly argues that the subtraction of matter operated by Platonists is superfluous (1036b22-24). What he has in mind is that the remainder of the statement accounting for an object does not indicate what the object is; for there are objects of definition that are 'one thing in another or certain things in a certain state' (τόδ' ἐν τῷδ' ἐστὶν ἢ ὠδὶ ταδὶ ἔχοντα). As already said, the τόδ' ἐν τῷδε characterization is traditionally ascribed to natural objects and, thus, marks the separation of these definienda from mathematicals.[66] However, if Aristotle is separating two ways to account for different objects, the τόδ' ἐν τῷδε clause does not simply specify the characterization of the object, but the statement accounting for it. The question we need to answer is whether such a statement is a definition of a substance. If so, the subtraction of matter invalidates the definitions of the primary objects in metaphysics (either the forms [T.2] or the composites [T.3]); namely, the constitution that makes up a substance as essence turns out to consist of form and matter.

There is more than one reason to rule out this possibility. Firstly, *the statement accounting for a* τόδ' ἐν τῷδε *is not an immediate definition*. An immediate definition is indeed the statement accounting for a τόδε τι, which in metaphysics corresponds to the definition of a substance; for the objects that are τόδε τι are only substances.[67] On the contrary, the statement accounting for a τόδ' ἐν τῷδε must be a derivative definition; for it can be mediated by another statement. What are the objects of these derivative definitions? Arguably, these are non-substances whose existence and nature is grounded in the existence and nature

[65] See *Top*. VI.3, 140a33-b15. Of course, the second example assumes Xenocrates' definition of soul (i.e. number that moves by itself) as correct.
[66] The τόδ' ἐν τῷδε is indeed regarded as the structure of the species. See Aquinas (*Expositio*: L.11, 1506); Loux (1991: 147-154); Bostock (1994: 162-163); Devereux (2011: 181) (Devereux takes it to be the structure of the form, though).
[67] See Section 3.3.1. A suggestion of this reading is found in Code (2011).

of a substance just as their statements are grounded in a definition. In Z.10, Aristotle takes into consideration the case of a composite that is a generalized version of individuals; for example, human and horse are generalized versions of Socrates and Bucephalus (1035b27-31). This composite is not a substance and thus the constitution of its definition does not make up an essence; rather, it results from 'this definition and this matter taken universally'. In other words, its characterization is signified by the addition of matter to the definition of a substance. This definition does not account for a τόδε τι, but for a τόδ' ἐν τῷδε. This means that the object at stake in the criticism of Z.11 is a non-substance whose definition signifies a composite characterization. Therefore, *the object that is* τόδ' ἐν τῷδε *is a per se attribute of a substance*.

In sum, the criticism of the Platonist approach to definitions does not mean the endorsement of any anti-formalist view. Aristotle is not remarking on a distinction between definienda to include some material parts in the definition of substances. The subtraction of matter is superfluous and yields incorrect definitions because there are objects that are defined as a form in a certain material substratum. These are not substances, but per se attributes. Indeed, the definition of a per se attribute is a derivative statement that must be grounded in the immediate definition of a substance, which is still the statement of a form. If this is correct, Aristotle does reject Socrates' comparison without admitting the inclusion of material parts in the definition of a substance.

This conjecture is confirmed by the final lines of the passage. At 1036b29-30, Aristotle argues that an animal cannot be defined without motion and 'without the parts being in a certain way' (ἄνευ τῶν μερῶν ἐχόντων πώς). For this reason, human cannot be compared to circle. According to the defenders of T.2 and T.3, these lines establish that some material parts make up the essence of sensible substances. Indeed, Aristotle often refers to the idea of motion and change to separate the objects of physics from the objects of mathematics.[68] Since motion is not relevant to substances in metaphysics, the rejection of the comparison can be better understood with reference to the second idea in the claim: an animal cannot be defined without some parts being in a certain way. Is this a reference to a per se attribute of a substance? A first thing to note is that the nature of these parts is not absolute, but qualified in a certain way. In Z.4, I argued, Aristotle

[68] See *Phys*. II.2, 194a1-12.

refers to definitions of non-substances as qualified statements insofar as what a non-substance is is always related to what a substance is.[69] It is then reasonable to think that the statement of these parts is the definition of a non-substance and, thus, signifies a per se attribute of a substance. The example offered in the following lines can be very illustrative. Aristotle tells us that hand is defined as a part of human as long as it is ensouled (1036b30-32). As already seen, the essence of hand, finger and other material parts depends upon the essence of the whole human; once dead or severed, the essence can only be stated homonymously.[70] The statement of the material parts signifies a characterization that, despite being identical with the object, is not its essence. In sum, **the matter of a substance is a per se property**. Whatever is a material part of an object, it is proper to the object and its essence is grounded in the essence of the object. For example, human is characterized by the property of having hands, and animal is characterized by the property of having flesh&bone.

At this point, it is not difficult to see why Aristotle rejects Socrates' comparison. Natural objects cannot be assimilated to mathematicals because their forms hold different relationships with the corresponding material parts. Consequently, the subtraction of matter cannot be performed in the very same way, as Platonists do. The key idea is that in metaphysics there is a demonstrable relationship between matter and substance; for matter is a per se attribute that belongs to the genus of entities that is the subject of metaphysics, sensible substances. The definition of this per se attribute is a derivative statement that is grounded in the immediate definition of a substance; indeed, it is obtained by addition and signifies a composite characterization. From this perspective, my discussion of Z.11 develops the general insight of Frede's argument for T.1. The incorrectness of the comparison does not concern the definition of substances, but the equivalence suggested by Socrates. The matter of a substance is indeed implied by the form insofar as the definition of the former is grounded in the definition of the latter; namely, a chunk of matter essentially depends upon a form.

[69] See Section 3.3.2.

[70] Devereux (2011) and Peramatzis (2011: 45-54) take the example to show that some 'material' parts are parts of a definition just as the letters are parts of the syllable and are distinct from the formal component, i.e. the arrangement. However, the idea of arrangement is alien to Z.10-11 and is introduced only in Z.17. Moreover, their reading misses the key point in the example: a material part essentially depends upon a form. See Frey (2007), who argues that the attribution of functions to material parts always requires the reference to the unitary function of the whole to which the material parts belong. Accordingly, the application of homonymy is sensitive to the primacy of the unitary functions.

Accordingly, Aristotle is still committed to a formalist answer to the riddle: the definition of substance states only the form. That is, the formal parts are the parts that make up a substance as essence.

4.5 The Primacy of Substance

The enquiry into substance leads to a formalist essentialism: substance, if defined as essence, is the form of sensible substances. This doctrine enables Aristotle to ensure the primacy of substance and thus to establish the principle of metaphysics. Since the form holds primacy over the other entities, the form is the entity grounding the other entities. Correspondingly, its definition is the statement grounding the demonstrations within metaphysics. This conclusion is reached through a logical strategy: firstly, Aristotle separates the statements accounting for substances from the statements accounting for non-substances (Z.4-6), and then he examines the constitution of the statements accounting for substances; that is, the constitution of definitions in metaphysics (Z.10-11). In order to understand what substance is, the enquiry has to focus on the parts of a definition; for these are the parts that make up an essence. In doing so, he resorts to his hylomorphism to establish the following conclusion: *the definition of a substance states only its form and never its matter*.

In Chapter Four, I have been defending this formalist essentialism against anti-formalist views. In particular, I have argued that Aristotle endorses an absolute conclusion according to which there is no type of matter that can be included in the definition of a substance: the parts of a definition are all and only the parts of the form. This thesis is confirmed by the absolute priority ascribed to the formal parts and the absolute posteriority ascribed to matter. The material parts are always posterior insofar as they essentially depend upon a substance; namely, the definition of the substance is constitutive of the definition of its matter. Hence, the constitution of a definition is exhausted by the formal parts that make up a substance as essence. Nevertheless, it must be noted that Aristotle does admit the inclusion of matter in accounting for natural objects, like animals. There are indeed definitions that signify composite characterizations of the object and,

thus, state both the form and the matter; these, however, are not definitions of substances. Since the composite characterization is signified by addition, these definitions turn out to be derivative statements accounting for per se attributes of substances. I suggested that these statements account for the material parts of a substance and indicate one of its properties. For this reason, Aristotle rejects the Platonist approach to the separation of the material parts from objects; if the separation of matter is equally performed on natural objects and mathematicals, we will miss the relationship between substance and one of its demonstrable attributes; that is, the scientific relationship between form and matter.

The formalist essentialism of Z.10-11 is not the end of Z's enquiry. Nor is it Aristotle's final word about the constitution of a definition in metaphysics. My analysis suggests that those texts in which Aristotle admits the inclusion of matter concern either the definitions grounding other sciences (e.g. *Physics* II.2, *On the Soul* II.1-2),[71] or derivative definitions in metaphysics (e.g. *Metaphysics* E.1, Z.11, H.2). However, *if some difficulties prevented the form of substances from grounding other entities, its immediate definition could hardly ground derivative statements*. In the next two chapters, I will argue that the criticism against the definition as universal leads Aristotle to dismiss his formalist essentialism: the form of sensible substances is not what substance is just as its statement is not the definition grounding demonstrations within metaphysics. At a lower level of analysis, his criticism invalidates the formalist answer to the riddle; at a general level, his criticism marks the failure of Z's enquiry. For there is no way to define any substance and to establish the principle of the totality of entities.

[71] My reading concurs with the contextual interpretation advocated by Frede (1990: 129). Devereux (2011), instead, defends a chronological interpretation according to which the texts in which Aristotle admits the inclusion of specific matter are earlier than Z.10-11. It is very unconvincing, though, that these two chapters can be later than Aristotle's views in book E. Cf. Section 2.1.2, note 16.

Chapter Five

Definition and Unity (I)

Substance must show the primacy and the unity that pertain to a definition. Primacy amounts to the immediacy of a definition. Nothing is the cause of substance just as no other statement mediates a definition. Unity amounts to the oneness of a definition. Substance is one object just as a definition is one statement and not a plurality of terms. Aristotelian essentialism, I have argued, ensures the primacy of substance through its definition as essence: if substance is essence, substance holds primacy over the other entities. Accordingly, the form of substances is identified with the principle investigated in Z; for every entity essentially depends upon a form. The next two Chapters are concerned with unity. Chapter Five analyses some of the difficulties raised by the criticism of the universal in Z.13-16; Chapter Six explores the renovated treatment of substance given in Z.17. My contention is that Aristotle is indirectly led to dismiss his formalist essentialism because it fails to ensure the unity of substance. Consequently, Aristotle is compelled to submit a demonstrative definition to envision the principle of metaphysics: substance is the cause of other entities insofar as it explains why something is something else. On the one hand, this marks the failure of Z; the principle is not established by examining sensible substances, which turn out to be derivative objects of metaphysics. On the other, this marks the contribution of Z. Its results allow the enquirer to define sensible substances and to focus the investigation on some suprasensible substance.

At the end of Z.13, Aristotle posits a dilemma according to which if substance is compounded neither of universals nor of substances, then substance is uncompounded. In what follows, I shall discuss the significance of this dilemma for the unity of substance. Since the possibility of establishing the principle of metaphysics is equivalent to the possibility of articulating a constitution of parts that make up a substance as essence (Z.10-11), Aristotle has to avoid the non-composition of substances and to ensure their unity. Given the difficulties raised

in Z.13-14, there is no way to accomplish this task; indeed, *if a substance is credited with a constitution from either universals or substances, the substance turns out not to be one*. Remarkably, this unity is not the individual status of particular substances (e.g. Socrates), but the unity of an essence and, correspondingly, the unity of definition. Thus, the final outcome is that there is no entity–either universal or particular–that can be signified by the statement grounding the demonstrations within metaphysics. This conclusion prevents Aristotle from endorsing any solution to Z's enquiry, including his formalist essentialism.

5.1 A Dilemma in Z's Enquiry

Chapter 13 of *Metaphysics* Z is almost exclusively known for its criticism of the definition of substance as universal. At the end of its battery of arguments, Aristotle introduces the following dilemma.

> But the result holds a difficulty. For if it is not the case that A_1) a substance can be compounded of universals, because it signifies a this-such (τοιόνδε) and not a this-something (τόδε τι), or that A_2) a substance can be compounded of substances in actuality, B) every substance would be uncompounded; consequently, there would not even be a definition of any substance. (1039a14-19, slightly modified translation)[1] ἔχει δὲ τὸ συμβαῖνον ἀπορίαν. εἰ γὰρ @1
>
> μήτε ἐκ τῶν καθόλου οἷόν τ' εἶναι μηδεμίαν οὐσίαν διὰ τὸ τοιόνδε ἀλλὰ μὴ τόδε τι σημαίνειν, μήτ' ἐξ οὐσιῶν ἐνδέχεται ἐντελεχείᾳ εἶναι μηδεμίαν οὐσίαν σύνθετον, ἀσύνθετον ἂν εἴη οὐσία πᾶσα, ὥστ' οὐδὲ λόγος ἂν εἴη οὐδεμιᾶς οὐσίας. ἀλλὰ μὴν δοκεῖ γε πᾶσι καὶ ἐλέχθη πάλαι ἢ οὐσίας.

In fact, it is possible to reconstruct two dilemmas from the passage.[2] One puzzle takes into consideration what type of constitution characterises substances: either (A_1) the constitution from universals, or (A_2) the constitution from

[1] All translations of Z.13 are from Gill (2001: 237-239)
[2] Cf. Lewis (2013: 192-195).

substances.[3] Although Aristotle speaks of 'constitution from 'substances in actuality', there is no reason to weaken his claim. As will be clear in Section 5.3.1, the constitution from substances fails regardless of whether substances are in actuality or in potentiality; for the nature and the existence of something in potentiality is always relative to the nature and the existence of something in actuality. For example, the nature of the leg of a human is relative to the nature of the whole human. This marks their ontological dependence upon something in actuality and thus prevents them from constituting a substance; that is, to make up what substance is. Rather than weakening his argument, Aristotle speaks of 'constitution from substances in actuality' in order to strengthen it. If the constitution at stake corresponds to what the substance is, it cannot be exhausted by elements that are ontologically posterior.

Let me return to the dilemma. Importantly, (A_1) and (A_2) represent two horns of a single thesis (A): substances are compounded; that is, they are characterized by some type of constitution. Thus, the dilemma opposing (A_1) to (A_2) stems from one horn of the larger dilemma in which thesis (A) is opposed to thesis (B): substances are uncompounded. In sum, we can formulate the two dilemmas as follows:

General Dilemma:	whether a substance is (A) compounded or (B) uncompounded.
Specific Dilemma:	whether a substance is compounded of (A_1) universals or (A_2) substances.

Whereas the specific dilemma assumes the composition of a substance, the general dilemma questions it.

It must be pointed out, though, that Aristotle is concerned with one puzzle only. Given the dismissal of both (A_1) and (A_2), the passage is explicitly focused on the general dilemma and appears to suggest the endorsement of (B). The problem with the non-composition of a substance lies in its consequences: if substances are uncompounded, then it is impossible to define them. Since substance is the genus studied by metaphysics and the definitions of substances ground the demonstrations of their per se attributes, the impossibility of definitions means

[3] Aristotle literally says substance cannot be compounded of (A_2) substances *in actuality*. I will return to this formulation in Section 5.3.1 below.

the impossibility of the science of being. If this is correct, the treatment of the dilemma could represent a turning point in the development of Aristotle's metaphysics; for it could sentence the failure of Z's enquiry.[4]

5.1.1 The Significance of the Dilemma

Commentators have often underestimated the content of the final lines of Z.13.[5] The dilemma is traditionally regarded as a 'dialectical stratagem' which can be functional to the Aristotle's argument in different ways. A possibility is to connect the dilemma with an in-depth attack on Platonist metaphysics.[6] At the start of Z.14, Aristotle suggests that the theory of Forms can be rejected on the basis of the foregoing argument; if this involves the dilemma, its goal is to offer a springboard for Z.14's criticism. Along these lines, it is also common to connect it with a positive discussion in hylomorphic terms.[7] The function of the dilemma is to prepare the introduction of the notions of form, matter, and composite; this rhetorical move enables Aristotle to strengthen his metaphysics and to contrast it with other views. Be that as it may, the widespread assumption is that Aristotle is already equipped to deal with the difficulties raised by the dilemma.

Some observations at 1039a21-23 concur with this reading. In some way, says Aristotle, there can be definitions, whilst in some other way there cannot be. This distinction weakens the conceptual difficulty triggered by the dilemma and leads to a deflation of its significance; for it is still possible to define substances and, thus, to ground metaphysics. The preamble of Z.15 is thought to expound this insight. There, Aristotle separates two senses of substance: form and composite.[8] Accordingly, the possibility of definitions is limited to the statement of the form; by contrast, the statement of the composite does not correspond with any definition at all. This reading fits well with the formalist essentialism outlined

[4] While Burnyeat argues that Aristotle tackles the impossibility of definition and, consequently, is able to remove the dilemma, Lewis (2013: 192-195; 225-226) and Gill (2001: 255-260) suggest that Aristotle is primarily concerned with the non-composition of substances, of which the impossibility of definition represents only a derivative difficulty. They indeed identify Aristotle's solution with the treatment of unity in H.6.
[5] Some exceptions are Charles (2000: 283-294) and Menn (2001).
[6] See Frede-Patzig (1988: 265) and Lewis (2013: 224-226; 240-42).
[7] See Burnyeat (2001: 50-52) and Halper (1989: 131-132). Cf. Galluzzo (2013a: 125).
[8] Cf. Frede-Patzig (1988: 263); Burnyeat (2001: 53-54). Ross (1924: 211) admits that the problem is not fully solved.

in Z.10-11. Since the definition of a substance contains only formal parts, the science of being can be grounded in the statement of the form and not in a statement of a composite. Yet, nothing in the argument of Z.15 is concerned with the dilemma. In separating the form from the composite, Aristotle opposes an ingenerated and incorruptible subject of definition to individual objects.[9] Indeed, the problem treated in the chapter is not the constitution of substances, but the impossibility of defining composite individuals, like Socrates and Bucephalus; for these are liable to change and, thus, not an object of scientific knowledge.[10] Moreover, it is dubious that the distinction of Z.15 could match with the distinction of Z.13. When Aristotle prompts his solution to the dilemma, he has in mind two 'ways' (τρόπον) to define a substance and not necessarily two objects (1039a21-23). As already noted, there is only one object that is substance and primary definiendum: the form of sensible substances. If Aristotle intends to overcome the dilemma by considering different ways to account for the form, the treatment of individuals in Z.15 can hardly be helpful.[11] From this perspective, the tendency to underestimate the dilemma is also indicative of another philosophical assumption: the immunity of the form to the criticism of Z.13. Since form is still substance and is not classified as universal, it must be definable. The point is that the dilemma calls into question its definability and, potentially, its immunity.

Undoubtedly, the impossibility of defining substances sounds like a striking conclusion. One of the chief theses posited in Z's enquiry is that definition and essence belong to substances either exclusively or primarily.[12] Metaphysics is indeed the demonstrative science in which the definitions of substances ground the derivative definitions of non-substances; for the essence stated by the latter is caused by the essence stated by the former. Within the totality of entities, substances are the primary objects of definition and knowledge. By Aristotle's own admission, *the conceptual difficulty raised in Z.13 clashes with essentialism*. If substances are not definable, they do not possess any essence; consequently, essence fails to account for substance and fails to be identified with the principle

[9] Remarkably, Aristotle literally separates between σύνολον and λόγος. If the first λόγος refers to individual composites, the term λόγος may encompass the senses of form and of composite outlined in Z.10-11; both of them are indeed objects of knowledge and stated in a definition.
[10] See Z.15, 1039b28-1040b7.
[11] Contrary to the reconstructions of Burnyeat (2001) and Halper (1989: 136-138), the distinction of Z.15 does not weaken the criticism of universals at Z.16, 1040b17-24. This passage leaves open the possibility that the form is either i) particular, thus, indefinable, or ii) definable and, thus, compounded of either universals or substances.
[12] See Section 3.3.

of metaphysics.[13] This, however, is only the surface of the problem. Indeed *the conceptual difficulty undermines the very possibility of metaphysics*. Since substance is the genus of entities on which the remaining entities depend, if substances are not definable, then no other entity will be. In other words, it is impossible to define any entity unless its definition is grounded in the definition of a substance.[14] What matters to us is that the scientific project of metaphysics risks failing in the absence of the definitions of substances; for the demonstrative knowledge of the totality of entities must be grounded in the statements accounting for its primary objects.

Arguably, to overlook the significance of the dilemma means overlooking the significance of the impossibility of definition in Aristotelian science. In the *Analytics*, the possibility of definition is pretty much equivalent to the possibility of demonstrative knowledge; for it corresponds to the possibility of establishing the principles grounding the demonstrations about a specific subject-matter.[15] For example, the impossibility of the definition of animal and, thus, of its inferior genera prevents the enquirer from conducting demonstrations of their per se attributes; that is, from developing the demonstrative science of biology. Certainly, the treatment of this sub-species of Meno's paradox helps Aristotle to illustrate some issues of his theory of science.[16] Nevertheless, it is optimistic to consider Z.13's dilemma as a rhetorical device before having explored its impact on the project of metaphysics.

To sum up, let me recall some crucial steps of Z's enquiry. In order to develop his essentialism, Aristotle drives his examination from entities to statements. This logical turn is found in Z.4 and orientates much of the enquiry. Z.10-11 completes the development of essentialism by examining the constitution of a definition in metaphysics. Since definitions are the statements of an essence, the parts stated in a definition are expected to be the parts that make up a substance as essence. What is salient to see is that *the possibility of defining a substance can be reduced to the possibility of articulating its constitution*. With the logical turn, Aristotle is bound to identify the principle of metaphysics with whatever is signified by the definitions of substances. On the one hand, this move enables him to develop his

[13] See Z.13, 1039a19-20.
[14] See Sections 1.1.1 and 1.1.2 on the possibility of the science of being.
[15] See, for example, *An. Post.* II.7. Cf. Section 1.3.2.
[16] On this point see Bronstein (2016: 79-63).

essentialism; on the other, it compels him to engage with the problems of the composition of substances. The dilemma wedges between these issues: if substances are found to be uncompounded, there will be no definition of substances and, consequently, no derivative definition of any other object of metaphysics.

5.1.2 Composition and Definition

I intend to argue that not only does the dilemma trigger a salient difficulty, but sentences the failure of Z's enquiry, because there is no way to ensure the unity of substance. Basically, if substance is the principle of metaphysics, it must be definable. That is, it must be possible to signify its constitution; but, every type of constitution undermines the unity of substance. Therefore, it is impossible to establish the principle of metaphysics.

In order to argue for this point, it is useful to go into the details of the dilemma. It should be clear by now that Aristotle relies on a twofold correspondence:

Definability : (A) Composition = Indefinability : (B) Non-composition.

The endorsement of (B) implies the impossibility of defining substances insofar as it prevents us from signifying the constitution that makes up a substance as essence. Conversely, the endorsement of (A) implies the possibility of defining substances insofar as it signifies a constitution to be stated in a definition. There is a couple of things to note. Firstly, since the endorsement of (B) directly leads to the failure of Z's enquiry, (A_1) and (A_2) are the types of constitution that, allegedly, enable the enquirer to ground metaphysics. Basically, a solution to Z's enquiry can be found only if we admit the composition of substances and, thus, the possibility of signifying their parts. Secondly, since the dismissal of (A_1) and (A_2) entails the endorsement of (B), Aristotle seems to take them to be exhaustive of any type of constitution. In other words, substances can only be compounded of either universals or substances. This can be made more evident if we think that the concept of universal is equivalent to the concept of non-substance. As is shown by Aristotle, if no universal is a whole substance, the universal could be

understood as a defining part; this means making it either a substance or a non-substance.[17]

Given this framework, I will show that *both the constitution from universals and the constitution from substances are to be rejected because they undermine the unity of substance*. If a substance is compounded of universals, its unity is undermined by the pluralization of its constitutive universal; namely, substance cannot be one object signified by a definition, but is many different objects. If substance is compounded of substances, its unity is undermined by the regressive unity of each constitutive substance; namely, substance cannot be one object, but it is a regressive sum of other substances. Therefore, since no substance is ensured the unity of the principle of a demonstrative science, there is no way to solve Z's enquiry and to ground metaphysics. If this is correct, Aristotle turns out to dismiss his formalist essentialism indirectly. Substance cannot be defined as essence and identified with form because this requires either to indicate the parts that are stated in a definition, or to indicate the very same object. In the first case, the composition of essence and form undermines the unity of the principle; in the second case, the non-composition of essence and form undermines the knowability of the principle.[18]

My argument rests on the idea that the unity of substance is to be conceived as **the unity of definition**. In his criticism of universals, Aristotle does not oppose the unity of an individual (e.g. Socrates, Callias) to the unity of species and genera (e.g. human, animal). Although every individual possesses a kind of numerical unity that can be contrasted with the unity of common items, this is not at stake in the argument of Z.13-16; for an individual must be credited with accidental unity, which does not pertain to the principle of a demonstrative science. Rather, the unity of definition represents a form of numerical unity that must be presupposed for substances; for there must be one single object that is signified by their definition.[19] It could be said that a universal is not simply the

[17] Cf. Section 5.2.1 below.

[18] The indefinability following from the non-composition of substances is a subcase of Antisthenes' criticism of definitions: if the definiendum is uncompounded, and if definiens is compounded, each part in the definiens will not signify any part of the definiendum. Consequently, the definiendum can only be described for what it is like (ποιόν) and not for what it is (τί ἐστιν). Cf. H.3, 1042b23-32.

[19] See Section 3.2 and 5.2.1 below. For a similar suggestion, see Burnyeat et al. (1979: 113). Bostock (1994: 204) thinks that the unity of definition is relevant to the final dilemma exclusively and does not take it to be the counterpart of a problem about substance.

characterization that is repeatable for many objects, but the characterization that is not one and the same as its object.

5.2. *No Substance is Compounded of Universals*

At the start of Z.13, Aristotle advances two arguments to reject the definition as universal. The core idea is that substances cannot be credited with the characters of whatever is so defined. Since a universal is common (κοινόν) to a plurality of objects and a predicable quality (ποιόν/τοιόνδε) of an object, no universal is substance; rather, this definition leads to identifying the principle of metaphysics with some generic entity, like Platonic Forms and, perhaps, the δεύτεραι οὐσίαι of the *Categories*.[20] That said, Aristotle observes that if no universal is substance, then universal might still be one of its parts.

> But is it the case that although the universal cannot be substance in the way essence is, it is present in it, as for example animal in human and horse? (1038b16-18, slightly modified translation)

> ἀλλ’ ἆρα οὕτω μὲν οὐκ ἐνδέχεται ὡς τὸ τί ἦν εἶναι, ἐν τούτῳ δὲ ἐνυπάρχειν, οἷον τὸ ζῷον ἐν τῷ ἀνθρώπῳ καὶ ἵππῳ;

Clearly, the possibility of the constitution from universals rests on the main results achieved in Z’s enquiry: the endorsement of essentialism and the treatment of the constitution of definitions.[21]

[20] The concept of universal can be understood in different ways and, thus, to conceal different targets of Aristotle’s criticism (cf. Galluzzo, 2013b). In general, Aristotle speaks of καθόλου λεγόμενα and understands it as a predicate belonging to many subjects and, thus, common to a plurality (cf. *De Int.* 17a37-b3; *An. Post.* I.4, 73b25-a3; *De Part. An.* I.4, 644a24-28; *Metaph*. B.4, 999b34-1000a1). Just as per se λεγόμενα, it can be taken both as the statement of these predicates and as the characterization signified by the statement (if this exists). Cf. Section 5.4 below.

[21] Gill (2001: 243-244) takes these lines to introduce a Platonist reply to the foregoing criticism (in particular, b16-19 is a reply to b15-16, and b19-23 is a reply to b9-15). Similar suggestions are found in Woods (1967) (who revised his position in Woods, 1991) and in Burnyeat et al. (1979: 118). I agree that Aristotle is trying to restore the idea of substance as universal, though this might imply its immediate rejection.

First of all, *the definition as universal is contrasted with the definition as essence*.[22] The implicit idea is that if a substance is a universal, then the universal also turns out to be an essence; but this is unacceptable within essentialism. We can then conjecture that the initial criticism plays on the characters which not only do prevent universals from being substances, but also from being essences. To deny that universal is substance is to deny that universal is substance as essence. What is more interesting is that *the constitution from universals is meant to be the constitution of a definition*. Since substances are their own essences, the parts of a substance are the parts that are stated in its definition; for a definition is the statement of an essence. Thus, to say that the universal is part of a substance as essence is to say that the universal is part of a definition. In other words, despite not being signified by the whole definition, the universal can still be signified by one of the defining parts. For one thing, this move is in line with the logical strategy inaugurated in Z.4; after having separated the statements accounting for substances (Z.4-6) and examined their constitution (Z.10-11), Aristotle considers the details of their nature. For another thing, the discussion turns out to be relevant to the treatment of the sixth aporia; while Z.10-11 discusses and rejects the primacy of the material elements, Z.13-16 discusses the primacy of the genera stated in definition.[23] In considering the constitution from universal, Aristotle is then conceding the possibility that universals are among these defining parts; namely, the formal parts that make up a substance as essence.

Although Aristotle is never explicit about them, it is reasonable to believe that the defining parts he has in mind are the genus and the differentiae; for these are the predicates that signify the essence of an object by separating it from any other definiendum. Animal and rational, for example, are the parts of the definition of human and signify its essence. If the universal has to be among these parts, it is tempting to identify it with the genus, which represents the primary element in the definition and the subject of its own differentiae.[24] What matters to us is to

[22] This is another proof against Burnyeat's non-linearity. See Section 2.2.
[23] See Sections 2.2 and 4.1. The treatment of B#6 in Z.10-16, however, is incorporated into the general plan of examining different accounts of substance and to endorse a formalist essentialism. For a different reading, see Menn (2001: 120-125).
[24] Some commentators attempted to defend the immunity of the form and the species by taking the genus as the unique target of Z.13-14's criticism. See Owen (1966); Woods (1967); Rapp (1996b). According to Bostock (1994: 197-198; 204-207), some of the arguments of Z.13 used to be part of an early draft exclusively addressing the genus. The final version, instead, extends the criticism to the species.

understand the problems faced by a definition constituted of universals, whether these are genera or not. For these correspond to the problems faced by a substance compounded of universals.

5.2.1 The Pluralization of the Genus (I)

The analysis of the constitution from universals emerges from Z.14, which consists of a direct attack on Plato's theory of Forms. Remarkably, Aristotle claims to be concerned with the difficulties for those who credit Forms, which are assumed to be substances, with a constitution from genera and differentiae.[25] Again, the possibility of the constitution from universals follows from an examination of definitions; for the genus is a defining part that is stated in the definition of two distinct objects (1039a28-30). As in the example given in Z.13, animal is stated in both the definition of human and the definition of horse. The difficulties faced by this conception of substance are expounded in the following passage.

> If then the animal is one and the same in horse and in human, as you with yourself, (1) how will this one be one in separated entities, and why will the animal be separated from itself? Moreover, (2) if it participates in two-footed and in many-footed, there will be an impossible consequence; for the object that is one and a this-something will possess opposite attributes. If it is not the case [that animal participates in two-footed and in many-footed] when one says that animal is two-footed or footed, what sort of way will this be? (1039a33-b5, Bostock's slightly modified translation)
>
> εἰ μὲν οὖν τὸ αὐτὸ καὶ ἓν τὸ ἐν τῷ ἵππῳ καὶ τῷ ἀνθρώπῳ, ὥσπερ σὺ σαυτῷ, πῶς τὸ ἓν ἐν τοῖς οὖσι χωρὶς ἓν ἔσται, καὶ διὰ τί οὐ καὶ χωρὶς αὐτοῦ ἔσται τὸ ζῷον τοῦτο; ἔπειτα εἰ μὲν μεθέξει τοῦ δίποδος καὶ τοῦ πολύποδος, ἀδύνατόν τι συμβαίνει, τἀναντία γὰρ ἅμα ὑπάρξει αὐτῷ ἑνὶ καὶ τῷδέ τινι ὄντι· εἰ δὲ μή, τίς ὁ τρόπος ὅταν εἴπῃ τις τὸ ζῷον εἶναι δίπουν ἢ πεζόν;

Let us start with the first argument. Aristotle holds that if the genus is one and the same part of which different objects are compounded, then the genus turns

[25] See Z.13, 1039a24-26. It is interesting to note that the concept of differentia is alien to Plato's theory of Forms and perhaps coined by Aristotle. This may be a clue that his criticism has a wider target, perhaps including his own notion of form.

out not to be substance. To illustrate, if animal is one and the same part in both horse and human, then animal is not a substance. In a nutshell, the genus is not ensured the unity which it is assumed to possess, but is pluralized by its presence in the constitution of distinct substances.[26] It is worth noting that Aristotle is rejecting the genus as substance and not as part of a substance. Thus, he is likely to rely on the initial criticism of Z.13: since the genus is universal, some of its features prevent it from being a substance. More precisely, Aristotle has in mind the opposition between the common character of universals (κοινόν) and the proper character of substances (ἴδιον).[27] A genus is common to the plurality of objects to which it is universal; by contrast, a substance is proper to one single object of which it is essence.

The majority of commentators, I noticed, understand the proper character in terms of particularized existence in individuals and the common character in terms of the sharable existence of genera and species.[28] In assuming that the genus animal is the same entity in human and horse, the Platonist metaphysician is ascribing the numerical unity of individuals to a generic entity. I think there are reasons to resist this interpretation. It is important to see that Aristotle infers the proper character of substances from the identity thesis of Z.6.[29] To illustrate,

i) A substance is one and the same as its essence (identity thesis);
ii) A substance is the one single object of which it is the essence;
iii) A substance is never common to a plurality of objects;
iv) A substance is always proper to one single object, i.e. itself.

[26] The argument is reminiscent of Plato's *Parmenides* 131a-b, in which Parmenides points out that one whole Form (e.g. Beauty) cannot be participated in by its own instances (e.g. the beautiful things) on pain of separating the Form from itself. However, whereas Plato seems to be concerned with Forms' spatio-temporal conditions of existence in particulars, this is not evident in Aristotle, who focuses on the relation between a genus and its species. Cf. *Phil*. 15a-b.
[27] See Z.13, 1038b10-15.
[28] See, for example, Ross (1924: 210-211), Halper (1989: 120ff.), Loux (1991: 214-217), Lewis (2013: 196.ff.).
[29] Loux (1991: 227-235) and Lewis (2013: 201-210), among others, recognize that the 'ἴδιον argument' is based upon the identity thesis of Z.6. In their reconstructions, Aristotle is indeed showing that the object of which universals are meant to be substances is the plurality to which they are universal. On the contrary, the object of which forms are meant to be substances is an individual. Besides assuming the distinction between substance and substance-of (for my criticism see Section 2.2.2), their reconstructions neglect the definitional import of the identity thesis: a substance must be one and the same as its essence, namely as what is signified by its definition. Alternatively, other commentators play down the strength of the identity implied by the notion of property and understand it in terms of one-to-one correlation (see, for example, Bostock, 1994: 191-193).

A substance is one of those objects that are identical with their essence: a primary object in metaphysics. Consequently, it is always proper to the same object and never common to whatever possesses a different essence. Hence, the proper character is the hallmark of substances insofar as they are essences. This entails two things. Firstly, since the identity thesis is to be understood as the identity between a definiendum and its definiens, the proper character is not simply the hallmark of substances, but also that of the statement accounting for them, the definition. Secondly, since the opposition between characters denies that universals are substances as essence, Aristotle turns out to be opposing the statement of a universal to the definition, which is the statement of an essence.

On this score, we can suggest that the proper character does not indicate the individual(-ized) existence of substances. Rather, it indicates **the requirement of identity** that must be fulfilled by the statements of properties and essences. In the *Topics*, to state something proper (ἴδιον) to an object is indeed a necessary, though not sufficient, condition to state a definition.[30] For example, while 'capable of learning' and 'rational animal' are proper to human, 'animal' is not; for it is part of different statements, i.e. the definitions of human, horse, and all its inferior genera. In the development of metaphysics, a substance must then be proper just as a definition must be the statement of a proper characterization of an object. In the light of this, we are now able to make sense of Z.14's argument against the genus. *The genus is not rejected because it lacks the unity of individuals, but because it lacks the unity of a primary object of science*. This corresponds to the unity of definition and is the oneness of the object signified by the statement of an essence. Since the genus is one and the same part in distinct substances, it cannot preserve their unity and, thus, fails to be substance itself.

What matters to us is whether this argument implies any difficulty for the substances compounded of genera. For this would be a reason to dismiss the constitution from universals. It is not difficult to infer that the impossibility of ensuring the unity of the genus undermines the unity of the substance. If a substance is compounded of universals, such as genera, these will make up a substance as essence and, thus, will be among the parts stated in its definition. Consequently, there must be identity between substance and the totality of its parts, just as there is identity between the definiendum and the totality of the

[30] See *Top*. I.4, 101b19-23; I.5, 102a17-30. Cf. Section 1.2.

predicates in the definiens. However, since the genus makes up the essences of distinct substances, the unity of each substance will clash with the unity of other substance; for both of them will be one and the same with the totality of their parts, among which the genus is included. To illustrate, the unity of human clashes with the unity of horse because each of them is one and the same as animal plus its own peculiar parts. Therefore, *these substances are not ensured unity because each of their definitions does not signify one single object*. In other words, the constitution from universals undermines the unity of a substance insofar as the latter is pluralized by the former.

5.2.2 The Pluralization of the Genus (II)

Let us move to the second argument. Aristotle holds that if the genus participates in its own differentiae, the genus turns out to possess opposite characterizations. Therefore, the genus is not substance. To illustrate, if animal participates in its differentiae, then animal is characterized as both biped and many-footed. Arguably, Aristotle is still relying on his starting premise: that the genus is one and the same part of which different objects are compounded. Thus, despite still being focused on rejecting the genus as substance, the argument is meant to address the genus as part; indeed, genera and differentiae make up the constitution of Platonic Forms, which are cases of substance. If so, this treatment of the genus amounts to the treatment of the constitution from universals.

In general, Aristotle's argument is along the lines of his previous criticism. The genus is not ensured the unity which it is assumed to possess, but is pluralized by multiple and contrasting characterizations (1039b3-4). At the core of this reasoning is the idea of 'participating' (μεθέξει). Basically, the contrasting characterizations of the genus follows from the participation in its own differentiae. This technical notion, I have already remarked, indicates the relation between a definiendum and the elements of its definition; for example, human participates in animal and in biped, which are parts of the statement of what human is.[31] To participate in either a genus or a differentia means being defined in terms of these elements; correspondingly, the essence signified by a definition

[31] The notion of participation amounts to the reverse of a synonymous predication: *A* participates in *B* iff *B* is synonymously predicated of *A*. Cf. Section 1.2.2.

consists of the elements signified by the genus and the differentia, which are the elements in which the object participates. It is then worth noting that the difficulty raised in the passage concerns the genus as substance inasmuch as it concerns the genus as object of a definition. In other words, Aristotle is opposing the statement accounting for a universal to the statement accounting for a substance, i.e. definition.

Once this framework has been clarified, the whole argument sounds quite familiar. The difficulty faced by the genus is triggered by missing **a dialectical requirement**: the differentia must never be predicated of the genus. In *Topics* VI, Aristotle examines this and other requirements in order to introduce some schemes to reject definitions. A definition can be rejected either if the differentia (or the species defined) is predicated of the genus, or if the genus is predicated of the differentia.[32] The key point is that if the genus is defined in terms of its own differentiae, its statement fails to be a definition; for it is pluralized by the opposite predicates. For example, the definition of animal is pluralized by the statement of aquatic and terrestrial, which are meant to account for what animal is. In sum, the predication of the differentia undermines the unity of definition in that it prevents the definition from signifying one single object. What is remarkable is that Aristotle takes this scheme to be effective against Platonist thinkers, who assume the unity of genera.[33] If the argument of Z.14 draws on the dialectical difficulties analysed in the *Topics*, we can conjecture the corresponding consequences for Plato's metaphysics. *The participation of the genus in its own differentiae undermines the unity of the genus in that the latter is pluralized by the former.* In other words, since the essence signified by the definition is pluralized by the contrasting characterizations signified by the defining parts, there is no one single object signified by the definition. Therefore, the genus fails to be a substance because it is not ensured the unity of the primary objects of metaphysics.

The second argument in the passage also generates difficulties for the substances compounded of genera. Thus, it contributes to dismissing the constitution from universals. Just as above, the impossibility of ensuring the unity of the genus undermines the unity of the substance. If a substance is compounded of universals, such as genera, these will make up a substance as essence and, thus, will be among the parts stated in its definition. However, since

[32] See *Top*. VI.6, 143b11-30, and 144a31-b3. See also my comments in Section 1.2.2.
[33] See *Top*. VI.6, 143b29-30.

the genus participates in its own differentiae, the definition of a substance will import every differentia in terms of which its genus is defined; hence, the definition will not be ensured unity because the statement will be pluralized by the contrasting predicates of its genus. For example, the definition of human will not be ensured unity because the statement will be pluralized by aquatic and terrestrial, biped and many-footed etc. belonging to animal. Correspondingly, the essence signified by the definition will not be ensured unity because such a characterization will be pluralized by the contrasting characterizations signified by the defining parts. Therefore, the constitution from universals undermines the unity of a substance insofar as the latter is pluralized by the pluralization of the former.

The arguments above lead to dismissing the thesis that (A_1) substances are compounded of universals. The central idea is that *if a universal is part of a substance, the constitutive universal pluralizes the constituted substance*. Therefore, no substance is ensured the appropriate unity. This is established in the light of the corresponding unity of definition: the statement of a substance as essence is either the statement of a pluralized entity or the statement of contrasting characterizations. Hence, there cannot be one single object that is the principle of metaphysics just as there cannot be one single object that is signified by a definition. In order to ground the demonstrative science of being, the enquirer is not allowed to credit substances with (A_1) a constitution from universals. For this undermines the unity that substances are assumed to possess.

5.3 *No Substance is Compounded of Substances*

Having dismissed the constitution from universals, we need to examine the constitution from substances. There seem to be two routes by which Aristotle comes to consider substances compounded of substances. One route is suggested in the passage that introduces the constitution from universals in Z.13. At 1038b16, Aristotle observes that if no universal is substance, a universal can still be one of its parts. These, I have argued, are the parts that make up a substance as essence and, thus, are stated in its definition; namely, its genus and differentiae.[34] In fact, the idea behind this alternative conception is to restore the definition of substance as universal. If a universal is among the parts of the definition of a substance, the universal itself will be object of definition; thus, the universal will be a substance too. The constitution from universals is, prima facie, treated as a constitution from substances. This is totally unsurprising. In the previous section, I pointed out that the constitution from universals is at the basis of the Platonist theory of Forms, which are cases of substance. Consequently, the treatment of the universal as part of a substance amounts to a treatment of the universal as substance. Aristotle confirms this insight at the beginning of Z.14. The genus and the differentia that are stated in the definition of a substance are expected to signify each of them a this-something and to be separate substances; for example, animal and biped are to signify two distinct substances which make up the essence of human.[35]

Another route is to start from the rejection of the universal as part. Basically, since no universal, even if taken as defining part, is substance, the constitution from universals is equivalent to a constitution from non-substances. However, if a substance is compounded of non-substances, the former turns out to depend upon the latter; for the essence of the non-substances will be constitutive of the essence of the substance. This means that the substance is not primary. Aristotle hastens to rule out this possibility: neither the genus nor the differentiae can ever be substances because they lack the separate existence that the principle of a demonstrative science has; for example, animal and biped are not the causes of other entities (e.g. capability of walking) independently of human.[36] From this perspective, the constitution from substances is treated as the unique alternative to the constitution from universals. That is, the theses of the specific dilemma are

[34] See Section 5.2 above.
[35] See Z.14, 1039a30-33.
[36] Cf. Bostock (1994: 194). See also Z.13, 1038b31-34 (clearly, Frede-Patzig, 1988: 259-260, think Aristotle has in mind the primacy of the particular forms in individuals).

taken to exhaust the ways in which substances can be compounded and, thus, defined in terms of some elements.

If this is correct, the examination of the constitutions of substances is likely to face those difficulties only envisaged in Z.10-11's discussion. As suggested by some commentators, the inclusion of the definition of the parts in the definition of the whole seems to yield some kind of regress: the parts could represent other wholes and their definitions could consist of other definitions and so on. What matters to us is that *the regress can be triggered only if the parts turn out to be substances and not simply wholes*; for each part will be then credited with a constitution from substances. To illustrate, if (i) animal and biped are parts of the definition of human, and (ii) animal and biped are substances, then (iii) animal and biped are definienda whose definitions state some other substances.[37] It is then plausible that the dismissal of the constitution from substances will play on this general regress. My contention is that the regress is illustrative of the impossibility of ensuring the unity of a substance compounded of substances.

5.3.1 Regressive Unity

Aristotle advances a direct argument against the constitution from substances at the end of Z.13. His conclusion paves the way for the non-composition of substances and, thus, yields the final dilemma.

> It is impossible that any substance is compounded of substances present in it in actuality; for things that are two in this way–in actuality–are never one in actuality, but if they are two in potentiality, they will be one (for example, the double is from two halves potentially; for the actuality separates). Consequently, if substance is one, it will not be compounded of substances present in it, at least in the way that Democritus correctly states. (1039a3-9, slightly modified translation)

Before any further observation, some words on the use of the notions of actuality and potentiality are in order. Roughly, actuality and potentiality are two ways to

[37] Cf. Section 4.1, note 4.

account for an entity from a teleological perspective; an entity in actuality is an entity in terms of its fulfilled nature, while an entity in potentiality is an entity in terms of what has the power of fulfilling its nature. For example, the circle is an entity in actuality, while the semicircles of which the circle consists are entities in potentiality.[38] When Aristotle attempts to ground the science of being and to overcome its multiplicity, he highlights that his work has to focus on per se being, being true and false, and being in actuality and in potentiality.[39] Since Z's enquiry is concerned with per se being, which encompasses the totality of entities classified in the categories, the occurrence of these notions is a remarkable feature of Z.13's discussion. Plainly, they serve Aristotle to distinguish two types of constitution: the constitution from substances in actuality and the constitution from substances in potentiality. The distinction, however, is not central in the argument. Aristotle keeps addressing the constitution from substances in actuality and simply neglects the other possibility.

To go into the details, Aristotle holds that if a substance is compounded of two substances in actuality, the two substances will not make up one object. Consequently, no substance will be one. To illustrate, if animal and biped are two substances in actuality of which human consists, animal and biped do not make up one substance; thus, human is not one but two objects, i.e. animal and biped.[40] In a nutshell, *the constitution from substances in actuality prevents a substance from being ensured the unity which it is assumed to possess*. What does bring about this difficulty? An important clue is given by the notion of actuality. Unlike potential objects, an actual object is not accounted for as something other than–though with the power of being–what it is. Accordingly, its definition is an absolute and not qualified statement of what it is; for its nature and existence are absolute and not related to anything else. This enables us to reformulate the problem foreshadowed in Z.10-11: if (i) the parts of a substance are those stated in its definition, and (ii) these parts are objects with an actualized existence that is stated by definition, then (iii) the statement of each part will be a definition. The statements of animal and biped, for example, are definitions which make up the whole definition of human.

[38] On the notions of actuality and potentiality, see Makin (2006: Intro).
[39] See Δ.7, 1017a22-b9 and E.2, 1026a33-b4. Cf. Section 1.1.1
[40] Cf. Frede-Patzig (1988: 261).

Again, we are licensed to understand the unity at issue in terms of unity of definition. The whole definition of a substance is not ensured unity because the definitions of its own parts are statements accounting for the actualized existence of other substances; thus, the constitution of the whole definition makes the statement the sum of other definitions. What is salient is that the difficulty raised for the constitution of substances corresponds to the difficulty raised for the constitution of definitions. Basically, the whole substance is not ensured unity because there is not one single object signified by its definition; rather, there is the sum of the objects signified by the defining parts. Animal and biped, for example, indicate two substances that are constitutive of the whole substance defined, i.e. human. From this perspective, the difficulty lies in **the regressive unity of substances**: every substance is the sum of other substances just as its definition is the sum of other definitions. Every substance turns out to be a plurality of objects each of which is signified by one of its defining parts. But since every defining part signifies a substance, each part of a substance will be a plurality of objects itself. In other words, *the constitution from substances undermines the unity of a substance insofar as the latter is regressively derived from the former*. Hence, no substance is ensured the unity of the principle of metaphysics because every definition signifies a plurality objects.[41]

What about a constitution from substances in potentiality? By now, the problem with this option should be clear. A potential object is defined as something other than what it is, but with the power of being such. Since its existence is relative to something else, its definition is a qualified statement. To illustrate, the semicircles are the potential entities of which an actual entity, i.e. the circle, consists; thus, their potential nature and existence is relative to the actual nature and existence of the circle. If this is so, the definitions of potential substances are not stated in the definition of a substance; for they do not signify the parts that make up a substance as essence. It could be said that the constitution from substances in potentiality ought to be rejected because of their

[41] Since the argument is taken to suggest the non-composition of substances and to concur with Democritus' views, Aristotle is likely to be drawing on his analysis of indivisible bodies in *On Generation and Corruption* I.2. The commitment to indivisible bodies follows from the rejection of two impossible situations: i) a body is divided into bodies; ii) a body is divided into non-bodies (316a14-b16). (i) is impossible because the body would still be divisible; (ii) is impossible because the result would not even be a magnitude. This conclusion, however, rests on the correspondence between generation/corruption and composition/division, which Aristotle will call into question. Arguably, a solution to Z.13's dilemma is to reformulate the correspondence between definability/indefinability and composition/non-composition.

posteriority. That is because substances in potentiality still depend upon substances in actuality. In Aristotle's own words, they are not separate.[42]

The argument above leads to dismissing the thesis that (A_2) substances are compounded of substances. The central idea is that *if a substance is part of a substance, the constitutive substances make the constituted substance a sum of other substances*. Therefore, no substance is ensured unity. This is established in the light of the unity of definition: the definition of a substance is the sum of the definitions of the constitutive substances. Hence there cannot be one single object that is the principle of metaphysics just as there cannot be one single object that is signified by a definition; for the unity of a substance is the regressive unity derived from its constitution. In order to ground the demonstrative science of being, the enquirer is not allowed to credit substances with (A_2) a constitution from substances. For this undermines the unity which substances are assumed to possess.

5.4 A Threat to Essentialism

In the previous sections, I gave an analysis of the two forms of composition presented in the specific dilemma. I argued that both the constitution from universals and the constitution from substances undermine the unity of substance. To put it in another way, substance is not ensured the unity pertaining to the principle of metaphysics and corresponding to the unity of definition: there is one single object that is the principle of a science just as there is one single object that is signified by a definition. The (A_1) constitution from universals triggers the pluralization of the substance because of the common character of the constitutive parts. The (A_2) constitution from substances triggers a regressive unity because of the actual existence of its constitutive parts. Since the specific dilemma exhausts the forms of constitution with which a substance can be credited, the consequences of the general dilemma loom over Z's enquiry: if (B)

[42] See Z.16, 1040b5-16, in which Aristotle concludes that the parts of animals are in fact non-substances because they are potential entities and do not possess the unity of actual entities.

substances are uncompounded, then it is impossible to define them. This, I suggested, could sentence the failure of Z's enquiry. Since there is no entity that can be ensured the primacy and the unity of the principle of a science, the principle of metaphysics cannot be established. In the remainder of this Chapter, I will illustrate how this conclusion obtains independently of Z.13's criticism and marks the dismissal of the most promising solution: the formalist essentialism.

5.4.1 The Rescuers of the Form

To my knowledge, no one has taken into consideration the possibility that Z.13's criticism could undermine Aristotle's essentialism.[43] On the contrary, commentators offer different solutions to demonstrate the immunity of the form. After the discussion of Z.10-11, the principle of metaphysics seems to be firmly identified with the form of a substance. The first challenge for this conclusion is to understand how the form can escape Z.13's criticism. At stake is then a version of the so-called problem of the universals: whether there is some repeatable entity and whether this is a metaphysical principle.[44] Within hylomorphism, the form of substances represents the cause of what an object is in that it determines its material substratum; for example, the human soul is the cause of what a human is in that it determines its flesh&bone.[45] Since form is signified by definition and explains the belonging of an object to a certain kind, it is generally regarded as a repeatable element that is combined with definite portions of matter. This makes the form a universal entity and, thus, potentially subject to Aristotle's criticism. Nevertheless, since form is established to be substance as essence, any difficulty faced by the form would be, at least indirectly, a difficulty for the substance as essence.

In order to rescue the form, commentators take up two distinct strategies. One is to argue in favour of the individual nature of the form. In Z.13-16's criticism, Aristotle simply denies the primacy of universal entities and takes every form to be peculiar to a single object. To illustrate, while the species human is not

[43] Graham (1987) speaks of the general inconsistency between different philosophical models within Aristotle's thought.
[44] The whole section of Z.13-16 could be the treatment of the twelfth aporia: *whether the principles are universal or individual* (B#12, 996a9-10 and 1003a5-17. Cf. B#8, 999a24-b24; B#9, 999b24-1000a4; B#11, 1001a4-b25). For an interpretation along these lines, see Menn (2001).
[45] Cf. Section 2.1.3.

primary, Socrates' human soul is primary and is distinct from Callias' and Coriscus' human souls. Accordingly, Aristotle comes to endorse a nominalist metaphysics, in which every object is the concretization of its individual form.[46] Another strategy is to defend the compatibility between the universality and the substantiality of the form. Basically, the target of Z.13 is not the universal nature of the form, but the universal nature of other objects.[47] Within this framework, Driscoll and Code propose to separate different senses of 'universal'. While genera and species (i.e. the *Categories'* secondary substances) are universals insofar as they characterize individuals, form is universal insofar as it is constitutive of an individual. In attacking universals, Aristotle is then rejecting those entities that are 'shared' by a plurality of individuals.[48] Along the same lines, Loux and Lewis insist on the distinction between senses of 'substance' in order to weaken Z.13's criticism. Rather than arguing that no universal is *substance* absolutely, Aristotle holds that universals cannot be *substance-of* the objects to which they are universals. Consequently, genus and species cannot be substance of individuals, and form cannot be substance of a definite portion of matter; nonetheless, the form can be substance of the individual composite resulting from the realization of its form in some matter.[49] Overall, it is possible to defend the immunity of the form on the basis of its relation with matter. Since form is individualized by the material substratum, it is not classified as universal; for it is a τόδε τι and is not a ποιόν τι, like genus and species.[50]

As shown in my discussion, form risks being subject to the difficulties raised in Z.13 independently of whether it is universal or not. Within metaphysics, the form is the primary object of a demonstrative science and it is the principle grounding the existence of the remaining objects. The point is that *within Z's enquiry the form is established to be the principle of metaphysics only if it is credited with a constitution*; for this makes up the substance as essence that is signified by a definition. Once every type of constitution is dismissed, the final dilemma triggers a structural difficulty: it is impossible to establish the principle of

[46] For this interpretation see Frede (1987), Frede-Patzig (1988: Einleitung, 48ff.), Irwin (1988: 237-274), and Witt (1989). Cf. Sellars (1967).
[47] One more strategy is to identify the target of Aristotle's criticism with the genus. See Section 5.2, note 24.
[48] For this reading see Driscoll (1981) and Code (1984).
[49] For this reading see Loux (1991: Ch. 6), Wedin (2000: 343-403), and Lewis (2013: 191-222).
[50] For this view, see Halper (1989: 240-242) and Galluzzo (2013b: 122-130). Cf. Rapp (1996b: esp. 174-176)

the totality of entities. The threat to Aristotle's solution does not lie in the concrete existence of a repeatable entity; rather, it lies in the existence of a principle to ground a demonstrative science. This difficulty is spelled out in terms of the impossibility of definition: (i) since a definition is the statement of a form, and (ii) since the form cannot be credited with any constitution, (iii) there is no definition of the form; for there is no constitution that makes up a substance as essence and can be signified by the statement.

Undoubtedly, many commentators would reject the idea of crediting the form with some constitution. This is nothing but endorsing (B) the non-composite status of substances. In this way, the form appears to be ensured the unity that pertains to the principles of a science. However, Aristotle warns us against this conclusion and it is not difficult to understand the reason as to why he denies it.

If a form is assumed to be uncompounded, there are no parts into which the form divides. Thus, the constitution of the form is in fact exhausted by one single element. Given the logical strategy of Z's enquiry, we can reformulate this scenario as follows:

$$F =_{def} (x) \textit{ iff } \neg [F =_{def} (x; y; z)]$$

F is the definiendum that signifies the form, while *(x)* is the definiens that signifies the constitution of *F*. The definition of the form is ensured the unity of definition; for there is one single object signified by *F* and *(x)*. Correspondingly, the form is ensured the unity of the principle of metaphysics; for its oneness is neither pluralized nor regressive. In mereological terms, we could say that the form consists of an improper part: there is an absolute overlap between the constitutive part *(x)* and the constituted whole *F*.[51]

Although the non-composition is a promising way to conceive the concrete existence of forms, it can hardly work as a way to reaching the principle of metaphysics. The problems with the form become evident in the light of the problems with its statement. The statement of the improper part accounts for the

[51] Proper and improper parthood are the key notions of standard mereology. Starting from a basic notion of part (i.e. *X* is part of *Y* iff everything separated from *X* is separated from *Y*), it is possible to indicate two senses of part: i) *X* is improper part of *Y* iff *X* is identical with *Y*; ii) *X* is improper part of *Y* iff *X* is identical with *Y*. See Simon (2000: 9ff.) and Koslicki (2008 15-18) for these notions and the theorems grounded in them. For a mereological treatment of Aristotelian issues see Haslanger (1994).

whole insofar as it indicates an essence; thus, the statement of the improper part and the statement of the whole are equivalent descriptions of one and the same object. Since the essence indicated by the improper part overlaps with any other improper part, essence fails to be the principle of metaphysics. Rather than grounding the existence of other entities, the essence turns out to be **an arbitrary way** to refer to the object. Basically, *F* is one and the same as either *(x)*, or *(y)*, etc. From this perspective, formalist essentialism seems to yield a nominalist metaphysics the principle of which is unknowable; for it is the entity signified by arbitrary descriptions.

5.4.2 The Mereological Problems of Constitutions

Z's enquiry into substance attempts to identify the objective cause of why other entities are, and not an arbitrary cause. The core difficulty is that this principle can be established only if we articulate its constitution; for this makes up a substance as essence. Earlier, I argued that if formalist essentialism is incompatible with the non-composition of substance, it must be compatible with some kind of composition. This, however, involves a mereological treatment of the relations between parts and whole, which brings to light the impossibility of ensuring the unity of substance.

Since a definition signifies an essence, the treatment of the parts can only start from the treatment of the defining parts, i.e. the parts of a definition. In Section 5.2.1, I suggested that Aristotle has in mind the genus and differentia of the object. In this regard, we need remind that there are two types of definitions for two types of objects of scientific knowledge. Whereas derivative definitions state the what-it-is (τί ἐστιν) of the secondary objects, immediate definitions state the what-it-is (τί ἐστιν) of primary objects. The same distinction applies to metaphysics; Aristotle separates the essence signified by the definition of substances from the essence signified by the definition of non-substances.[52] What is interesting to see is that Aristotle spells out both these constitutions in terms of genus and differentia. In derivative definitions, genus and differentia are used to indicate the subject-matter of the science and the cause of its characterization; in the definition of eclipse, for example, the loss of light by moon

[52] See Sections 3.2 and 3.3.

is the genus and the screening of sun by earth is the differentia. In immediate definitions, genus and differentia are used to indicate the very cause of the object; in the definition of human, for example, the genus and the differentia indicate the characterization that is one and the same as human, i.e. rational animal.

For the development of his formalist essentialism, Aristotle is concerned with the constitution of the immediate definitions. Thus, the form is the whole consisting of the parts indicated by its genus and differentia. On pain of constituting an arbitrary characterization, these parts must be distinct from one another. In mereological terms, the form must consist of proper parts: there is no absolute overlap between each constitutive part *(x)* and the constituted whole *F*. To illustrate:

$$F =_{def} (x; y; z) \text{ AND } (x \neq y \neq z)$$

Whilst there is no identity between the *F* and each one of *(x)*, *(y)*, and *(z)*, there is identity between *F* and the totality of *(x)*, *(y)*, and *(z)*. This assumption generates the fundamental tension that undermines formalist essentialism: *the unity of the whole has to coexist with the distinctness of its own parts*. Regardless of any understanding of its constitution, the form is one single object and is identical with a plurality of distinct objects. Although Aristotle rejects the composition of substance by dismissing every possible constitution, it is not difficult to outline its intrinsic problems. To this effect, it suffices to consider the relation that unifies the distinct parts into one single whole. For the primary objects of a science, there are at least two possibilities: I) the parts are per se related to one another; II) the parts are accidentally related to one another.

In the case of a per se relation among the parts, one part turns out to hold primacy over the other parts. Consequently, the whole is not ensured unity in spite of composition, but unity of non-composition. That is, the form is not one single object consisting of distinct parts, but one single object consisting of the part that holds primacy over the others. Again, the problem with the form can be more evident in the light of the problems with its statement. If there is a per se relation between the parts, this can be either per se^1 or per se^2. Be that as it may, the statement of a proper part turns out to be constitutive of the statement of another proper part. To use our example, *(x)* is per se^1 related to *(y)* because the

statement of *(x)* is constitutive of the statement of *(y)*.[53] Correspondingly, this proper part holds primacy over the other proper parts because the latter essentially depend upon the former. This means reconsidering the composition of the form; for the constitution indicated by its statement is not identical with a plurality of distinct parts, but with one single part. A host of difficulties derive follows from this conclusion. The formalist essentialism does not commit us to the composition of substance, but to its non-composition; in other words, the essence fails to be the principle of metaphysics, because it turns out to be an arbitrary way to refer to objects. In a nutshell, since the part that exhausts the constitution of the form is not proper, the principle of metaphysics is not articulated into distinct parts. Hence, the principle is one and the same as any improper part of the whole form.

In the case of an accidental relation between the parts, the whole turns out to be the sum of other objects. Consequently, the whole can only be ensured the accidental unity of its composition. That is, the form is not one single object consisting of distinct parts, but a set of essentially independent objects. As with the per se relation, the accidental relation firstly obtains between the statements of the parts that are constitutive of the definition of the whole form. If there is an accidental relation among the parts, then no statement of a proper part is constitutive of the statement of another proper part. To illustrate, *(x)* is accidentally related to *(y)* because neither is *(x)* defined in terms of *(y)* nor is *(y)* defined in terms of *(x)*.[54] Correspondingly, every proper part is essentially independent of the remaining proper parts. The point is that, although the form is identical with the constitution from these parts, nothing prevents the form from being identical with a constitution from the same parts plus one more proper part; for the accidental relation between two proper parts of the form is the same as the accidental relation among a proper part of the form and the proper part of any distinct whole. What matters is that the form is not ensured the unity of substance insofar as its composition is not restricted to any sum of parts. Therefore, the formalist essentialism fails to establish the principle of metaphysics because the

[53] That is, *(y)* is per se^2 related to *(x)*.
[54] That is, there is neither a per se^1 nor a per se^2 relation between *(x)* and *(y)*.

essence turns out to be equivalent to any accidental relation between the proper parts of the form.

5.5 The Failure of Z's Enquiry

Z's enquiry fails to establish the principle of metaphysics because there is no way to ensure the unity of any substance. This conclusion, I have argued, is sentenced by the final dilemma of Z.13. Since substances are compounded neither of universals nor of substances, substances must be uncompounded. Consequently, it is impossible to define any substance. For one thing, this means that there is no statement grounding the demonstrations within metaphysics; for another thing, this means that there is no entity grounding the existence of other entities. The failure of Z appears to be less surprising in the light of the framework of the enquiry. Given the correspondence between composition and definability, Aristotle is bound to identify the principle of metaphysics with the constitution signified by a definition; for this makes up a substance as essence. My analysis shows that if a substance is credited with whatsoever constitution, the substance turns out not to be one. This oneness is not the numerical unity of individual substances; rather, it is the numerical unity of a substance as essence and, thus, can be understood in terms of unity of definition: there is one object that is substance just as there is one object that is signified by a definition. In Z.13-16's criticism, Aristotle dismisses any type of constitution insofar as it undermines this unity. The constitution from universals is rejected because it triggers the pluralization of the substance. Since a universal is common to a plurality of objects, the constituted whole is not one but the many different objects indicated by each constitutive part. The constitution from substances is rejected because it triggers the regressive unity of the substance. Since the constituted substance turns out to be the sum of the constitutive substances, the unity of the former is regressively derived from the unity of the latter. At the end of the day, the enquirer is unable to indicate the constitution of any substance. Therefore, she is unable to establish the principle of metaphysics.

At this point, Aristotle is led to dismiss his formalist essentialism. Whether compounded or uncompounded, the form fails to be the substance defined as essence. This indirect conclusion has nothing to do with the spatio-temporal existence of a repeatable entity. The difficulty with the formalist essentialism lies in the scientific nature of the principle that is supposed to ground metaphysics. If uncompounded, the form is the entity indicated by any arbitrary description and, thus, is unknowable. If compounded, the form is the sum of distinct entities and, thus, is not one. Hence, if substance is defined as essence and identified with form, metaphysics is not grounded in the cause of why entities are. Does the failure of Z's enquiry imply the failure of Aristotle's project to develop the demonstrative science of being? The answer to this question is to be found in Z.17, in which Aristotle attempts to secure the unity and the definability of substances by escaping the dichotomy of composition/non-composition.

Chapter Six

Definition and Unity (II)

Z's enquiry, I contend, contributes to the foundation of the science of being despite failing to establish its principle. After the treatment of the difficulties raised in Z.13-16, Aristotle is able to define only derivative objects of metaphysics: an object is such-and-such a thing in virtue of such-and-such a cause. This definition does not lead to identifying substance; for it ensures neither the primacy nor the unity of the principle of a science. Nevertheless, it leads to identifying the remaining entities studied in metaphysics. The separation between substance and the other entities is indeed the separation between the immediate definition grounding a science and the demonstrative definitions. Accordingly, Z's enquiry fails to ground metaphysics because it does not achieve the knowledge of the principle and its immediate definition; rather, it achieves the knowledge of the other objects and their demonstrative definitions. There is a salient consequence implied by this conclusion: every substance studied in Z is a derivative object of metaphysics. For example, human is a derivative object and thus defined as 'such-and-such a body because of such-and-such a soul'. Since Z's enquiry is focused on sensible substances, and since sensible substances turn out to be derivative objects, we can conjecture that the principle of metaphysics is to be established by positing and defining some suprasensible substance. Basically, the foundation of metaphysics is linked to the existence of the substance which is known by an immediate definition: God.[1]

Chapter Six is concerned with the results achieved by the enquiry and outlined in Z.17. I shall argue that Aristotle sets out demonstrative definitions of the substances studied in Z for two reasons. Firstly, *the demonstrative definition enables him to envision the principle of metaphysics*: substance is the cause of other entities insofar as it explains why something is something else. To envision

[1] This knowledge is not achieved in Z and, perhaps, nowhere in the *Metaphysics*. For this is the knowledge of God as well as the knowledge possessed by God. Cf. A.2, 983a5-7.

some object is to achieve an indirect knowledge of it on the basis of the direct knowledge of a different object. In Z.17's argument, substance is envisioned to be a certain cause explaining why such-and-such body is human. The enquirer does not establish the principle of metaphysis by giving a definition of substance. Nevertheless, she understands its causal role on the basis of her definition of a sensible substance. In particular, the enquirer comes to the conclusion that the principle of metaphysics is signified by the middle-term of a demonstrative definition; for it mediates the belonging of some predicate(s) to a subject. I contend that this renovated view is in line with the failure of Z's enquiry. The principle of metaphysics is not identified with the form of sensible substances (as advocated in Z.4-11), but with some teleological cause. At the end of Z, both sensible substances and non-substances are credited with a derivative characterization that indicates the subject characterized and the purpose for being so-and-so characterized. Therefore, the principle of metaphysics is a purely teleological cause that cannot be established among sensible entities.

Secondly, *the demonstrative definition enables Aristotle to overcome the dilemma of Z.13*: it is possible to ensure the unity of substances and their definability; thus, it is still possible to develop the science of being. The key move is to separate demonstrative definitions from immediate definitions. Since the substances under threat are known by demonstrative definition and thus possess a cause for their existence (i.e. the fact that there is such-and-such a substance), they must possess a cause of their unity (i.e. the fact that there is one substance of such-and-such a kind). Basically, a sensible substance is one object and not a plurality of elements in virtue of its teleological cause. Aristotle holds that since sensible substances and their definitions result from some matter that is in potentiality what a form is in actuality, their composition is only apparent. Namely, every substance is one object identified with either its matter or its form and signified by one unified statement. This solution escapes the dichotomy of composition/non-composition and ensures the unity of some of the primary objects of metaphysics: sensible substances. Indeed, although sensible substances are derivative, they still belong to the first genus of entities.

Chapter Six

6.1 The Demonstrative Definition of Sensible Substances

Unity represents a crux in Aristotelian philosophy. Not only is it a much debated topic by interpreters, but Aristotle himself constantly procrastinates its treatment. Roughly, the problem sounds like this: *why is a thing one whole and not a plurality of parts?*. That amounts to understanding what ensures the unity of anything which is divisible into parts and is still defined as one.[2] In the logical works, Aristotle tends unsurprisingly to shift from the unity of an object to the unity of a definition. The problem amounts to explaining why an object is one and not the plurality of things indicated in its definition; for example, human is one and not the sum of animal, terrestrial, and biped.[3] Correspondingly, a definition must be one statement and not a plurality of terms (i.e. genus and differentiae) insofar as it signifies one object and not many. In the physical works, the problem amounts to explaining why an object is one body and not the plurality of bodily parts into which it can be divided; for example, a chunk of flesh is one body and not the sum of fire and earth.[4]

These versions of the problem are interwoven in the context of metaphysics. In the central books, Aristotle is concerned with the unity of substances, which are the primary objects of the science of being. Since his enquiry is firstly focused on sensible substances, the unity of substance has to match the unity of sensible bodies.[5] Likewise, since his enquiry shifts from examining entities to examining statements, the unity of substance is analysed in terms of unity of definition.[6] In Chapter Five, I argued that the impossibility of ensuring the unity of substance marks the failure of Z's enquiry: if a substance is credited with a constitution from either substances or universals, substance turns out not to be one. Consequently, there is no entity grounding the existence of other entities just as there is no

[2] Importantly, Aristotle is concerned with the form of unity that pertains to the objects of definition. This means discarding other forms of unity, such as the continuity of a sequence of words (e.g. the unity of Iliad). See Z.4, 1030b7-10.

[3] See *De Int*. 11, 20b15-22, *An. Post.* II.6, 92a27-33, and *Top*. VII.3, 154a4-11. Cf. *Metaph*. B.3, 998b11-14.

[4] See *Gen. et Cor.* I.8, 326a29-b1; I.10, 327b19ff. Cf. II.7; II.8, 334-b1.

[5] Again, the difference lies in the fact that unity in metaphysics pertains to substances qua substances, while unity in physics pertains to sensible substances qua sensible substances, i.e. bodies. Cf. Section 2.1.3.

[6] According to some interpreters, unity is the central issue treated in Z, if not in the whole *Metaphysics*. See for example Halper (1989), Gill (1989), and Charles (2000) (cf. Section 2.2.1, note 37). Menn (2001) proposes considering the treatment of unity in Z.17-H.6 as the solution of the sixth aporia tackled in Z.10-16. Quite differently, the centrality of unity in Z.17-H.6 is taken by Morel (2015) to supersede Z's hylomorphism with a conception in terms of potentiality and actuality.

statement grounding the demonstrations conducted in metaphysics. Thus, a key role in the development of metaphysics is likely to be played by the analysis of the problem of unity. For Aristotle must ensure the unity of substance and the unity of definition by explaining why each of these is one whole and not a plurality of elements.

The solution is traditionally reconstructed on the basis of two chapters: Z.12 and H.6.[7] I am inclined to think, however, that Aristotle's argument can be understood only in the light of his renovated treatment of substance.[8] In the first half of Z.17, Aristotle introduces a new definition of the principle of metaphysics which implies two major consequences: i) sensible substances are derivative objects of metaphysics; ii) the principle of metaphysics is to be established by studying some suprasensible substance. Given this conception of sensible substances, Aristotle is in a good position to ensure the unity of these substances and the unity of their definition; for it suffices to show that the two elements into which a sensible substance and a definition divide are one and the same thing: the one is potentially what the other is actually. My first step is then to illustrate the treatment of substance in Z.17. For one thing, this will help us to understand the features of the object and of the statement to which unity pertains. For another thing, it will shed light on the results achieved by Z's enquiry in spite of its failure.

6.1.1 Substance and Cause

At the end of Z.16, Aristotle reminds us that no substance is defined as universal and no substance is compounded of substances.[9] Given my earlier analysis of Z.13-14, the first half of the claim marks the end of the examination of the definition as universal, while the second half marks the end of Z's enquiry. Since no substance can be credited with any constitution, no substance can be defined; therefore, there is no way to establish the principle of metaphysics and to accomplish the enquiry. The aporetic character of these lines contrasts with the incipit of Z.17. At 1041a6-9, Aristotle tells us that the enquiry requires a different

[7] Cf. Ross (1924: 206; 238); Frede-Patzig (1988: 221-222); Burnyeat (2001); Deslauriers (2007: 129-138); Code (2010a); Gill (2010); Galluzzo (2013: 111).
[8] For a similar approach see Charles (2010a).
[9] See Z.16, 1041a3-5.

starting point (ἄλλην οἷον ἀρχήν), which could be illustrative of the suprasensible substance too.

Commentators have paid much attention to this signpost. After having examined the four definitions of substance, Z.17 seems to provide the springboard for a new phase of the enquiry that is completed by book H. On the more radical reading, the signpost witnesses the negative function of the examinations conducted in Z. Basically, Z.3-16 is a dialectical discussion designed to test and reject others' philosophical solutions, especially Plato's and the Pre-Socratics'; Z.17-H, instead, is a presentation of the views advocated by Aristotle.[10] On the less radical reading, the signpost confirms the provisional character of Z's enquiry and the necessity to organize its content into a genuinely scientific knowledge.[11] At the core of this new phase is **the idea that substance is a cause**. This premise is taken to introduce a further definition of substance besides those listed in Z.3; in particular, it is expected to successfully identify the principle of metaphysics. The central point, commentators insist, is that, while the other definitions are tentative answers to Z, the definition as cause is presented as an indisputable truth.[12] Rather than a reputable opinion to be tested, Z.17 presents us with an argument to directly establish the principle of the science of being.

There is a couple of things to consider in this regard. First of all, I showed that, despite its failure, Z's enquiry is not conceived to be a negative and dialectical discussion of others' views. Its task is to establish the principle of metaphysics through the study of the genus of substances (which prima facie is co-extensive with the genus of the entities studied in physics, i.e. sensible bodies). It could be said that Aristotle's primary intent is not to reject others' views–though in fact he does–nor is it to move from a provisional discussion to a scientific argument. Rather, he aims to answer *what substance is* in order to ground a demonstrative science.[13] Also, it must be pointed out that the idea of substance as cause is not a novelty in Z. From the beginning of the enquiry, Aristotle has in mind a univocal

[10] See Rorty (1973: 409), Irwin (1988: 206-207), Lewis (2013: 271-272) for this reading (a similar view is held by Menn who denies any positive contribution in books Z-H). For the passages in which 'the fresh start' seems to separate aporetic phases from genuinely positive discussions see *Phys*. VIII.7, 260a20-21, *Eth. Nic*. VI, 1139b14, VII.1, 1145a15, *Eth. Eud.* II.1, 1218b31, and II.6, 1222b15.
[11] See Bolton (1995: 452ff.), Charles (2000: 283-288), and Burnyeat (2001: 56-57).
[12] See Lewis (2013: 271-272).
[13] Cf. Sections 1.1 and 2.2.2.

concept of substance: substance is a cause insofar as it is the entity grounding the existence and the nature of the other entities (i.e. non-substances). This concept enables Aristotle to elaborate the ontological dependence that drives the enquiry and is at work in metaphysics.[14] In Z.10-11, for example, the parts of an object are regarded as its principles; for they make up the constitution that can be identified with its essence (1035a24-b1). In Z.13, Aristotle motivates the examination of the universal with the general belief in its status of cause and principle (1038b6-8).[15] In a nutshell, that substance is a cause is a premise for the whole enquiry and is not exclusive to Z.17's argument. It is then very plausible that Aristotle is attempting to relaunch the enquiry in order to avoid a new failure. To this effect, he starts with recalling a fundamental premise behind his examinations of the four definitions.[16] Since the concept of cause unifies all the previous definitions of substance, its treatment does preserve the continuity of the enquiry in spite of the contrast between the two phases. From this perspective, it is not unrealistic to understand the incipit of Z.17 as a word game. The ἄλλην ἀρχήν invoked by Aristotle refers both to the *start* of a new phase of the enquiry and to the *principle* that is to be established. Basically, the enquiry can be relaunched only if we restart from the fundamental insight into substance: substance is the cause of why other entities are.

What then does Aristotle argue in Z.17? With few exceptions, it is commonly agreed that the chapter proposes an argument in favour of form.[17] The form of sensible substances is the principle of metaphysics because it is the cause in virtue of which an entity is a certain kind of object. For example, some bricks&stones are a house because of their formal arrangement. After the criticism of Plato's Forms, Aristotle endorses again his formalist essentialism and concludes the enquiry. As argued in Z.4-11, substance is essence and is identified with the form in view of its primacy over other entities; since it determines the organization of a material substratum, the form is responsible for the existence of the matter and, thus, of the whole composite. This ontological

[14] See Z.1, 1028a30-b2.
[15] In addition, Z.9 (esp. 1034a21-32) offers a wide treatment of substance as cause (see also Δ.8, in which 'cause' is one of the senses of 'substance'). For other references see Halper (1989: 145).
[16] Contrary to the Londinenses, there is no reason to doubt about the validity of the introductory reasoning. Aristotle is not arguing that substance is cause from its status of principle (cf. Burnyeat et al., 1979, 150-151); rather, he assumes that substance is some sort of principle and cause in order to relaunch the enquiry.
[17] See Ross (1924: 224), Halper (1989: 144-154), Frede-Patzig (1988: 307-308), Scaltsas (1994a; 1994b: 63ff.), Burnyeat (2001: 59-60), Galluzzo (2013: 134), Lewis (2013: 275-280).

dependence upon the form leads Aristotle to acknowledge its status of primary substance. Within this interpretative line, **the explanatory model elaborated in the *Analytics*** represents the innovative contribution of Z.17. This is the three-term structure to deliver a demonstration; the resulting account explains why a fact necessarily obtains and, thus, provides an explanation. Aristotle seems to apply this model in order to give a formalist solution to Z. Basically, the form represents the middle-term that mediates the belonging of a kind-term to a term indicating some matter. To illustrate,

A) human soul belongs to B) some flesh&bone

C) human belongs to A) human soul

C) human belongs to B) some flesh&bone.

The form of sensible substances is the principle that explains the existence of a certain kind of entity. This makes it the source of the substantiality within sensible reality and thus the source of the nature of any entity. Whether or not the model is applied to deliver a valid demonstration, commentators take Aristotle to offer an alternative way to defend the formalist essentialism of Z.4-11.[18]

I shall try to resist this interpretation for several reasons. It has often been noted that the form is never explicitly mentioned in Z.17.[19] Except for line 1041b8 (which is likely to be a gloss), Aristotle does not identify substance with any hylomorphic principle.[20] He simply maintains that the principle enquired in Z is the cause of some matter being such-and-such an object; thus, we need to spell out the middle-term explaining some facts, such as the existence and the unity of a certain entity. Once we realize this point, it becomes reasonable to understand the views recalled from the *Analytics* in separation from hylomorphism. If Aristotle were applying the explanatory model in order to submit his formalist essentialism, the technical observations about the explanandum and the explanans could hardly be relevant to the overall argument.[21] Likewise, it would be difficult to separate the innovative character of Z.17's solution from the doctrine of Z.4-11.

[18] Lewis (2013: 281-286) denies the scientific character of Aristotle's application in that it is not meant to account for natural bodies but to account for substance as cause. For a different view see Charles (2000: 283-294; 2010).
[19] See Bostock (1994: 236-247). Cf. Menn (2001).
[20] On the gloss, see Burnyeat et al. (1979: 154), Frede-Patzig (1988: 317-318), and Menn (2001).
[21] See Z.17, 1041a10-20; a32-b9. I will analyse these observations in Section 6.1.2.

In the earlier version, the form of a sensible substance holds primacy over its matter in that the definition of the former is constitutive of the definition of the latter; correspondingly, the latter essentially depends upon the former. In so arguing, Aristotle clearly holds that the form is causally responsible for the existence and the nature of the material substratum. If this is so, this very idea is unlikely to be the main contribution of the application of the explanatory model.

Our understanding of the argument of Z.17 is tied to our understanding of the explanatory model. Indeed, there must be a way to make its application in metaphysics functional to the enquiry into substance. In other words, Aristotle is not recalling the views of the *Analytics* to conclude that substance, if defined as cause, turns out to be form. Rather, he is assuming that substance is cause in order to recall the views held in the *Analytics*; for these can help us with the enquiry to establish the principle of metaphysics, which Z wrongly identifies with one among form, matter, and the composite of both.

6.1.2 From the Enquiry into What-it-is to the Enquiry into Why-it-is

The application of the explanatory model covers the first part of Z.17. On the assumption that substance is cause, Aristotle finds it reasonable to discuss the features that pertain to every enquiry (ζήτησις); for a cause can be indicated by an enquiry. In doing so, he clearly draws on the views expounded in *Posterior Analytics* II.

> When one enquires into why, one always enquires into *why a different thing belongs to another*. For to enquire into why musical human is musical human is either to enquire into what we said, i.e. why a human is musical, or something else.[22] But to enquire into why a thing is itself is to enquire into nothing at all (…) and for all cases there is just one statement and one cause of why a thing is itself, e.g. why human is human, or why musical is musical (unless perhaps someone will say that a thing cannot be divided from itself, and this is what it is for it to be one thing; but this explanation applies to everything alike and is too brief). However, one could enquire into why human is such an animal. It is clear that this is not to enquire into why one who is human is human. So what one asks is

[22] I refer εἰρημένον to διὰ τί ἄλλο ἄλλῳ τινὶ ὑπάρχει. See Ross (1924: 223) and Frede-Patzig (1988: 310-311).

> *why something belongs to something else* […]. For example, to enquire into why it thunders is to enquire into why a noise is produced in the clouds. In this way, what is enquired is *why a different thing belongs to another*. (1041a10-26, Bostock's translation slightly modified)

> ζητεῖται δὲ τὸ διὰ τί ἀεὶ οὕτως, διὰ τί ἄλλο ἄλλῳ τινὶ ὑπάρχει. τὸ γὰρ ζητεῖν διὰ τί ὁ μουσικὸς ἄνθρωπος μουσικὸς ἄνθρωπός ἐστιν, ἤτοι ἐστὶ τὸ εἰρημένον ζητεῖν, διὰ τί ὁ ἄνθρωπος μουσικός ἐστιν, ἢ ἄλλο. τὸ μὲν οὖν διὰ τί αὐτό ἐστιν αὐτό, οὐδέν ἐστι ζητεῖν (αὐτὸ δὲ ὅτι αὐτό, εἷς λόγος καὶ μία αἰτία ἐπὶ πάντων, διὰ τί ὁ ἄνθρωπος ἄνθρωπος ἢ ὁ μουσικὸς μουσικός, πλὴν εἴ τις λέγοι ὅτι ἀδιαίρετον πρὸς αὐτὸ ἕκαστον, τοῦτο δ' ἦν τὸ ἑνὶ εἶναι· ἀλλὰ τοῦτο κοινόν γε κατὰ πάντων καὶ σύντομον)· ζητήσειε δ' ἄν τις διὰ τί ἄνθρωπός ἐστι ζῷον τοιονδί. τοῦτο μὲν τοίνυν δῆλον, ὅτι οὐ ζητεῖ διὰ τί ὅς ἐστιν ἄνθρωπος ἄνθρωπός ἐστιν· τὶ ἄρα κατά τινος ζητεῖ διὰ τί, οἷον διὰ τί βροντᾷ; διὰ τί ψόφος γίγνεται ἐν τοῖς νέφεσιν; ἄλλο γὰρ οὕτω κατ' ἄλλου ἐστὶ τὸ ζητούμενον.

The central point of the argument is to separate the genuine form of enquiry from invalid forms. In Chapter One, I noticed that an enquiry develops into a scientific knowledge when the definitional knowledge of the genus (i.e. the principle) grounds the demonstrative knowledge of the other objects studied (i.e. the demonstrations). More precisely, Aristotle maintains that an enquiry achieves either knowledge of what an object is (what-it-is, τί ἐστιν) or knowledge of why there is an object (why-it-is, διότι).[23] In *Posterior Analytics* II.8-10, we learn that for the secondary objects of science the enquiry into what-it-is is equivalent to the enquiry into why-it-is; for in either case, the enquiry investigates the cause in virtue of which something exists: the former investigates the cause of the existence of the definiendum (if it exists, εἰ ἔστι), the latter investigates the cause of the existence of an explanandum (that it exists, ὅτι). To illustrate, the enquirer into eclipse must indicate the cause that is stated in the definition of eclipse and works as its explanans, i.e. the screening of sun by earth.[24]

Since substance is a cause, we need to conduct an appropriate enquiry that will simultaneously achieve knowledge of the what-it-is and knowledge of the why-it-is of an object. Aristotle neglects the fact that the definition and the

[23] See *An*. *Post*. II.1-2.

[24] The definition and the explanation of eclipse are the same account: loss of light by moon because of the screening of sun by earth. As a matter of fact, the demonstration that is the explanatory account of the object is obtained by re-arranging the terms of its definitional account. For this equivalence see Section 1.3.2.

explanation produced by the enquiry are the same and focuses on the enquiry into why-it-is.[25] In particular, he separates two ways to conduct the enquiry: (I) to investigate why a different thing belongs to another; (II) to investigate why a thing is itself. To rephrase it in formal terms, the enquiry investigates the cause of:

I) why *x* is *y*;

or

II) why *x* is *x*.

Both these forms of enquiry attempt to establish the cause of a certain fact. The fact is the existence of an object that has to be explained, the explanandum (e.g. eclipse, thunder, etc.); the cause is the principle that explains the fact, the explanans (e.g. screening of sun by earth, quenching of fire, etc.). However, (I) is a genuine form of enquiry, while (II) is not. In (II), the explanandum is indeed the identity of an object with itself; consequently, there is no cause to be established to produce the explanation of the fact. To use Aristotle's example, the existence of musical human cannot be explained by investigating why musical human is musical human. Basically, there is no cause to investigate and, thus, no explanation to produce. In (I), by contrast, the explanandum is the characterization of an object; consequently, there must be a cause that explains why an object is so-and-so characterized. To use Aristotle's example, the existence of musical human must be explained by investigating why human is musical.

Let me reformulate this separation by playing with the correspondence between entities and statements. Whereas the statement of an explanandum always indicates a predicate belonging to a subject, the statement of the explanans indicates the term that mediates this belonging. For example, the statement of thunder indicates the belonging of noise to clouds and the statement of the explanans indicates the quenching of fire, which causes the existence of noise in the clouds, i.e. thunder. If the predicate and the subject stated in the explanandum signify one and the same object, there will be no statement of the explanans; for there is no term that mediates the identity between two terms. For

[25] I use the term 'explanation' to refer to the account that is both a demonstration and, if re-arranged, a definition (i.e. a demonstrative definition).

example, there is no term that mediates the belonging of unmarried man to bachelor; for unmarried man and bachelor signify one and the same object. This separation leaves room for some interesting remarks about the unity of objects. If self-identity were the reason for the unity of an object, every object–either mind-dependent or not–would be credited with unity. This consequence forces us to reject Platonist and Democritean solutions, which are based on the indivisible nature of objects: being indivisible is indeed common to everything that is assumed to be one and not many. Hence, this solution has no scientific value.[26]

How does the application of the explanatory model contribute to establishing the principle of metaphysics? Before answering this question, it is crucial to return to the implicit premise of Z.17's argument: the enquiry into the why-it-is does not concern the primary objects, but only the secondary objects of science. Aristotle introduces this distinction in *Posterior Analytics* II.9.[27] In the case of primary objects, there is identity between the object and its cause; thus, there is no explanation for their existence and, thus, no enquiry into the cause; in the case of secondary objects, there is no identity between the object and its cause; thus, there must be an explanation of their existence and an enquiry into their cause. In astronomy, for example, celestial bodies (e.g. moon) are primary objects and not subjects of explanatory accounts, while their demonstrable attributes (e.g. eclipse) are secondary objects and subjects of explanatory accounts. To put it as Aristotle does, the primary objects are known by immediate definition, while the secondary objects are known by demonstrative definitions. Indeed, the account of a secondary object is the explanation that takes the form either of a demonstration or, if its terms are re-arranged, of a definition. On this basis, the foregoing observations help us to envision an answer to Z. Since the enquiry into what substance is investigates the cause of why other entities are, *substance is the explanans that is indicated to account for the objects of metaphysics*. This conclusion is in line with the failure of Z's enquiry. Although we are unable to establish the principle of metaphysics (for we do not answer what genus is, but we define other objects studied by the relevant science), we can envision this principle by looking at the objects studied by metaphysics. Their existence is an explanandum and their account indicates the cause that must be identified with substance.

[26] See Z.17, 1041a16-20.
[27] See Section 1.3.2.

The key move to come to this conclusion concerns the objects grounded by substance. Having assumed that substance is cause and, thus, having spelled out the enquiry into it, Aristotle is able to envision the principle only if he reconsiders the objects it grounds. First of all, we noticed that the enquiry into the why-it-is presupposes **the difference between the object and its cause**. Given this difference, the object is an explanandum and the cause is the explanans investigated by the enquiry. For example, the enquiry into the why-it-is of eclipse presupposes the difference between eclipse and the screening of sun by earth. This means to rank the object among the secondary objects of science and to account for it by demonstrative definition. Whereas this difference is imported by the observations on the genuine form of enquiry, another difference enables Aristotle to reconsider the objects grounded. It is **the difference between the object and its characterization**. Earlier, I mentioned that the enquiry into the why-it-is investigates the cause of the existence of an object. In metaphysics, this enquiry investigates the cause of the existence of an entity, either substance or non-substance. What Aristotle repeatedly highlights in Z.17 is that the existence of an object is to be reduced to the existence of a different object that is so-and-so characterized; the existence of eclipse, for example, is to be reduced to the existence of moon that is eclipsed, namely losing light. The enquiry into the why-it-is of an object allows to explain the existence of an object (e.g. eclipse) insofar as it indicates the cause of the characterization of a different object (e.g. moon). Arguably, the difference between object and characterization directly follows from the difference between object and cause; if there is a cause for the existence of the object, the existence of the object is not simple, but is the result of the composition of a different object and an attribute. To use our example, eclipse is the result of the composition of moon and loss of light.

These differences apply to the objects of science just as they apply to the statements accounting for them. In order to account for an object, the statement of the explanandum must be first articulated into two distinct terms. Basically, since the statement signifies the characterization of a different object, it states the belonging of a predicate to a subject; the former indicating the characterizing attribute, the latter indicating the object characterized. It is important to see that this process is fully accomplished not simply if the demonstrable attribute is separated from its subject, but also if the statement of the predicate is already part of the whole definition. To illustrate, the statement of eclipse is articulated

not simply into moon and being eclipsed, but into moon and loss of light; for eclipse is partly defined as a certain loss of light. Thus, the definition of an object turns out to be the statement of the belonging of a predicate to a subject plus the statement of the explanans that mediates this belonging.

In metaphysics, the definition of an entity is the statement of the belonging of a predicate to a subject plus the statement of substance, which is the cause mediating the belonging. Consequently, the entity defined must be articulated into distinct objects just as its statement is articulated into distinct terms. This is not a novelty in Z. At the start of the book, Aristotle makes it clear that every entity (quality, quantity, etc.) is a characterization of a substance and, thus, one of its demonstrable attributes. In the science of being, the explanandum is the existence of an entity and, thus, the characterization of a substance; for example, an explanandum is the existence of a quality and, thus, the object resulting from the quality characterizing the substance. The point is that this object is in fact a composite and must be articulated into distinct entities; that is, it must be articulated into entities from different ontological categories (such as substance and quality). Once we acknowledge that every entity is in fact the two entities into which it articulates, we can engage in the enquiry to establish the cause of why there is such a composition.[28] In other words, the composite character of the explanandum is illustrative of the necessity of the explanans. The principle of metaphysics is the cause that brings about the existence of an entity and, thus, the characterization involving two distinct entities.

On the basis of these considerations, Aristotle is able to relaunch his enquiry into substance. Rather than enquiring into what substance is, he has to enquire into why an entity is such-and-such a thing. The answer indicates the principle of metaphysics in both cases. However, whereas the enquiry into what substance is directly attempts to ground metaphysics, the enquiry into the why an entity is such-and-such a thing indirectly envisions the principle. As a matter of fact, the enquiry into the what-it-is, if concerned with a principle, is not a genuine enquiry; the enquiry into the why-it-is, instead, is the most appropriate way to indicate the cause of the objects of science. Basically, the enquiry into the what-it-is is not meant to achieve an immediate definition and to account for the principle of a science, but to achieve demonstrative definitions and to account for secondary

[28] Cf. Halper (1989: 148-149).

objects of science. Therefore, Z's enquiry can be relaunched only as enquiry into the why-it-is of an object. The point is that *this object is not the principle investigated, but a different entity*; in other words, its definition is a demonstrative definition that results from the statement of the belonging of a predicate to a subject plus the statement of the middle-term. It could be said that if no immediate definition of substance can be established, it is still possible to posit a statement of substance working as middle-term for other statements in metaphysics.

6.1.3 Two Consequences

The core of the renovated treatment of substance, I have been arguing, is that the principle of metaphysics can be envisioned by examining the explanatory account of other objects of metaphysics; this means to examine the demonstrative definitions in which substance is the cause signified by the middle-term. Z's enquiry can be relaunched because, despite not answering what substance is and thus establishing an immediate definition grounding metaphysics, it envisions the principle through the demonstrative definitions of which metaphysics consists. I shall conclude this section by showing two consequences that spring from the argument of Z.17.

The first consequence of this argument is that **sensible substances are derivative objects of metaphysics**. More precisely, the substances studied in Z are entities whose characterization is not immediate, but derived from a cause. I have often remarked that for each science there are two types of objects: the primary objects and the secondary objects; the former encompass the genus studied and its sub-kinds, the latter encompass the demonstrable attributes of the genus. In metaphysics, substances are the primary objects and are the entities belonging to the first genus of being (e.g. human, horse, house);[29] non-substances are the secondary objects and are the entities belonging to the remaining genera (i.e. qualities, quantities, etc. that characterize a substance qua substance and not qua moving substance).[30] It is important to note that the substances studied in Z, which are the primary objects of metaphysics, are mainly sensible substances and, thus, the primary objects of physics. The point is that

[29] Prima facie, the genus includes other entities that are taken to be principles of metaphysics, such as Plato's Forms and Pythagoreans' numbers. Cf. Section 2.1.1.
[30] Otherwise, these would be the secondary objects of physics.

physics studies these substances qua sensible entities, while metaphysics is conceived to study substances qua substances (thus, it admits the possibility of non-sensible substances).

According to the guidelines of the *Analytics*, the primary objects of science are known by immediate definition because there is no cause for their existence other than the object itself. The secondary objects, instead, are known by demonstrative definition because there is a distinct cause for their existence. Yet, the argument of Z.17 proposes a demonstrative definition for every object studied by metaphysics. Namely, the statement of the what-it-is of an entity is the statement of its existence plus the statement of its cause. This means to equate substances with non-substances. In particular, although substances belong to the first genus of entities and are primary objects of metaphysics, they are treated as secondary objects and, thus, as non-substances. The definition of house, for example, is the statement indicating the existence of some bricks&stones and the cause of their arrangement (i.e. either the builder or the purpose of being house). What matters to us is that substances and non-substances are equated not simply in their definition, but also in the characterization signified. Basically, since a demonstrative definition signifies the what-it-is of an object, and since there are demonstrative definitions of both substances and non-substances, *substances and non-substances are credited with an analogous characterization*. Rather than the immediate characterization pertaining to the primary objects of science, theirs is the derivative characterization pertaining to the secondary objects; for it is derived from the other entities signified by their definition. The characterization of house, for example, is derived from bricks&stones and their arranging cause.

This consequence becomes even more evident in the light of the separation of these substances from the 'absolute entities' (ἁπλᾶ). As already seen, the absolute entities are the primary subjects within each genus of entities.[31] Thus, the knowledge of absolute entities must be separated from the knowledge of the other subjects and attributes studied by the relevant science; for the former is the knowledge grounding the latter. In other words, the knowledge of absolute entities is totally immediate in that it is not grounded in anything else; the knowledge of the other subjects and attributes is achieved by assuming the knowledge of an

[31] See Section 3.3.2. Cf. E.4, 1027b27-28; Θ.10, 1051b17-1052a4 (in which Aristotle speaks of ἀσύνθετα); *De An.* Γ.6.

absolute entity.[32] The argument of Z.17 leads Aristotle to conclude that, unlike substances and non-substances so far studied, the absolute entities are known by some other form of investigation (1041b9-11). In all likelihood, the immediate knowledge of the absolute entity is the knowledge of the principle of metaphysics; by contrast, the knowledge of the other subjects and attributes is the knowledge of the primary and secondary objects of metaphysics.

Once again, Aristotle levels down substances and non-substances on the basis of their derivative characterization. Contrary to the principle, substances and non-substances can be accounted for as only if their definition states the belonging of a term to another as mediated by a middle-term; that is, if the characterization signified is caused by a distinct entity. To focus on substances, their characterization is indeed derived from some material substratum and the causal principle; what human is, for example, can be derived from different material substrata, such as this body or this animal, and the human soul (1041a20-21; b7). Accordingly, the substances studied in Z are credited with the τόδ' ἐν τῷδε characterization that marks their derivative existence.

The second consequence is that **the principle of metaphysics is established by studying some non-sensible substance**. More precisely, the principle of metaphysics does not match with any principle of physics, form and matter, but with a teleological cause; besides sensible substances, there must be some non-sensible substance that is a purely teleological cause. The first half of this reasoning can be inferred from 1041a27-32. Aristotle argues that the enquiry into the why-it-is of an object takes into consideration two types of causes: the teleological cause and the efficient cause. In other words, the definition of an object consists of the statement of its existence plus the statement of either purpose or the source of some change. To illustrate, the definition of house consists of the statement of such-and-such bricks&stones plus the statement of its function, being a shelter; the definition of thunder consists of the statement of noisy clouds plus the statement of the source, quenching of fire. In so arguing, Aristotle specifies that the efficient cause is enquired to account for the generation and the corruption of the objects; thus, it is stated in the definitions of sensible entities that, as such, undergo change.[33] More interestingly, the teleological

[32] On the notion of ἁπλᾶ see also Frede-Patzig (1988: 318).

[33] For this reading see also Ross (1924: 223), who nonetheless takes every cause to be cause as essence. Frede-Patzig (1988: 313-314) offers a different interpretation: Aristotle is not

cause is enquired to account for the existence of objects; thus, it is stated in the definitions of any entity, regardless of whether it undergoes change or not. Since metaphysics is not concerned with sensible entities and their change but with entities and their existence, we can plausibly say that substance is to be identified with a teleological cause. Namely, it is an entity whose existence and nature are immediately its own purpose.

If this is correct, the argument of Z.17 proves to be in line with the dismissal of the formalist essentialism: the form of sensible substances fails to be the principle of metaphysics. Firstly, in the definition of sensible substances the form is not exclusively indicated by the statement of the explanans. Given its constitution from elements (i.e. genus and differentiae), the form is indicated by the statement of the explanandum; thus, it turns out to be a material substratum, the existence of which has to be explained. For example, the form of human is indicated by the statement of such-and-such an animal and this is an explanandum as well as the statement of such-and-such a body. Aristotle himself often labels the elements of the form as 'matter'.[34] Although this is not a reference to the matter that is formally organized, he separates form and matter from the very principle of metaphysics; for both of them require an explanation of their existence. It must be admitted, however, that the form of sensible substances can also be indicated by the statement of the explanans. Whereas the 'matter' of the form is the explanandum, the form itself is the explanans and is identified with the teleological cause of the sensible substance. For example, the form of human is indicated by the soul in virtue of which there is such-and-such an animal. The reason why the form of sensible substances, despite being conceived as teleological cause, is not the principle of metaphysics is that it cannot play its

distinguishing between the efficient cause and the teleological cause, but between these two and the essential cause mentioned at a28. On this dispute, see Bostock (1994: 239-242).

[34] I did remark on the analogical use of hylomorphism in Section 4.2, note 33. A chief passage is Δ.24, in which Aristotle contrasts sensible matter with the matter of the form; this, I suggested, is the constitution into which the form divides, i.e. genus and differentia. However, the tendency to equate genus and matter has led some commentators to favour a literal interpretation: the matter signifies the genus, while the differentia signifies the form (cf. *De Gen. et. Cor.* I.7, 324b4-9; Δ.6, 1016a25-32; Δ.28, 1024b6-9; I.8, 1057b37-1058a2; a23-25; Z.12, 1038a5-9; H.6, 1045a20-35). The key insight is that the identity genus-matter allows to support an anti-formalist view on definition and to solve the problem of its unity (See Rorty, 1973; Peramatzis, 2011. for less radical interpretations see Deslauriers, 2007: 147-156, and Gill, 2010). The analogical reading, instead, insists on the potential character and the subject-role played by the genus within definition. According to Galluzzo (2017), Aristotle exploits the doctrine of genus as matter to clarify the unity of definition in the light of the unity of matter and form. My treatment of unity in Sections 6.2 and 6.3 will confirm that Aristotle assimilates the elements of form with the material substratum of the teleological cause (cf. H.3, 1043b10-14).

explanatory role in separation from matter. Since sensible substances are accounted fo as by explanation, the purpose of their existence is a cause only if there is some material substratum to be accomplished. In other words, the form of sensible substances is not an entity whose existence and nature are immediately its own purpose. It is the purpose of some material substratum whose existence and nature are to be accomplished.

At this point, we can conjecture that, if the principle of metaphysics cannot be identified with the teleological cause of sensible substances, it must be identified with the teleological cause of some other substance. This is nothing but admitting the existence of some entity besides the sensible substances studied in Z; this entity must be a non-sensible substance and a teleological cause that will ground metaphysics. From this perspective, Z's enquiry helps us to answer the questions posited in Z.2: besides sensible substances, there is a non-sensible substance that is neither a number nor a Form, but a purely teleological cause; for this will be separate, unlike numbers and Forms.[35] My hypothesis is that this is the divine substance treated in book Λ. God is a purely teleological cause in that its existence is immediately its own purpose; that is, nothing is the subject of its causal activity but itself. This is not the case with sensible substances whose existence is the purpose of some subject that has to be accomplished.

6.2 Solutions to the Problem of Unity: Z.12 and H.6

At the beginning of this Chapter, I suggested that since the failure of Z's enquiry is linked to the problem of unity, the relaunch of the enquiry is linked to its solution. Arguably, the development of metaphysics presupposes an explanation of why every substance and every definition is one thing and not a plurality of elements. In view of this, I firstly focused on the argument of Z.17, which leads to envisioning the principle of metaphysics through the demonstrative definition of sensible substances; this helped us to understand the features of the object and of the statement concerned with the problem of unity. Since the principle of metaphysics

[35] See Section 2.1.1.

is not established in Z, the objects and the statements at stake are sensible substances and their demonstrative definitions, respectively.

Traditionally, Z.12 and H.6 are regarded as Aristotle's official treatment of unity.[36] In this section, I shall summarize the solutions expounded in these chapters. To start with, it is worth considering a couple of issues challenging the interpreters. A capital difficulty is to understand what the problem of unity is about. In metaphysics, the unity of an object is the unity of an entity; since the primary entities are substances (prima facie, sensible substances), and since entities are examined by looking at the statements accounting for them, the unity of substance and the unity of definition are in fact entangled. Both in Z.12 and in H.6, Aristotle tends to shift from one version of the problem to the other. Consider their opening lines:

> The problem I mean is why an object whose statement we call a definition is a unity. For instance, let the definition of human be 'two-footed animal'; then why is that this is a unity and not a plurality consisting of two-footed and animal? (1037b10-13, Bostock's translation)

> λέγω δὲ ταύτην τὴν ἀπορίαν, διὰ τί ποτε ἕν ἐστιν οὗ τὸν λόγον ὁρισμὸν εἶναί φαμεν, οἷον τοῦ ἀνθρώπου τὸ ζῷον δίπουν· ἔστω γὰρ οὗτος αὐτοῦ λόγος. διὰ τί δὴ τοῦτο ἕν ἐστιν ἀλλ' οὐ πολλά, ζῷον καὶ δίπουν·

> Let us now consider the problem we have already mentioned concerning both definitions and numbers, namely: what is the cause of their unity? (1045a7-8, Bostock's translation)

> Περὶ δὲ τῆς ἀπορίας τῆς εἰρημένης περί τε τοὺς ὁρισμοὺς καὶ περὶ τοὺς ἀριθμούς, τί αἴτιον τοῦ ἓν εἶναι;

Remarkably, Z.12 is focused on the problem of the unity of the object that is accounted for as by a definition. Aristotle makes explicit reference to the *Analytics*, in which the problem is originally outlined.[37] H.6 is instead concerned

[36] Aristotle seems to consider metaphysics as the appropriate context for the treatment of unity. This, I suspect, can be explained with the epistemic primacy of the science of being. For the principles of the other sciences, unity is always assumed and never proved; for every principle is grounded in a demonstrative knowledge that is more universal and epistemically prior to the demonstrative knowledge it grounds.

[37] See *An. Post.* II.6, 92a29-33.

with the problem of the unity of definition. This is compared to the problem of the unity of numbers that emerges in H.3 in that for every divisible thing there must be a cause that makes a plurality of elements one unified thing. Indeed, Aristotle intends to undertake the enquiry into such a cause.[38]

Let me give some more details. It is important to insist on the fact that Z.12, despite recalling the *Analytics*, tackles the unity of the object. This shift is in line with the logical strategy inaugurated in Z.4. Although the chapter is likely to be a later interpolation, it is conceived to contribute to the enquiry into substance and its contribution is to explain the unity of an object in terms of the unity of the corresponding statement; namely, the unity of substance in terms of the unity of definition.[39] Given this framework, the argument of Z.12 must be understood with reference to the development of the formalist essentialism in Z.4-11. The unity at stake is the unity of the form of sensible substances and the parts into which it divides are the parts signified by the parts of its definition: genus and differentiae. The unity of human, for example, can be ensured by explaining why animal and biped are one thing and not many. Therefore, *the problem of unity is to explain why the parts indicated in a definition make up one unified substance (i.e. form) just as the parts of the definition make up one unified statement*. What matters to us is that in Z.12 the unity of substance is the unity of form and corresponds to the unity of definition; for the form is the object signified by a definition and, thus, identified with a substance as essence.

The converse approach is adopted in H.6. Despite tackling the unity of definition, the chapter constantly refers to the unity of substance. The argument in the chapter is then unlikely to follow the logical strategy dominating Z.[40] Its contribution is indeed to explain the unity of the statement in terms of the unity of the corresponding object; namely, the unity of definition in terms of the unity of substance. Things are more complicated, though. Much of the argument of H.6 seems to present the unity of substance as the central problem. If so, it is also unclear what kind of unity of substance Aristotle has in mind. Since the chapter parallels the parts signified by the definition with the form and the matter from

[38] Loux (1991: 267), for example, thinks that the problem of unity can be addressed from different viewpoints and, thus, equally applies to definition and to an individual. Whilst I agree on the general point, the unity of a particular substance can hardly be equivalent to the unity of a definition.

[39] From this perspective, Z.12 seems to occupy an appropriate position in the book. Cf. Section 2.3.2.

[40] The departure from the logical analysis is perhaps signposted at 1045a21-23.

which a body results, commentators propose different views about the unity of substance. Some hold that the central concern of H.6 is (a) the unity of the form of sensible substances;[41] others take it to be (b) the unity of the composite.[42] Clearly, (a) guarantees a direct correspondence with the unity of definition treated in Z.12; yet, its endorsement clashes with the failure of the formalist essentialism and the relaunch of the enquiry in Z.17. Whilst downgrading the centrality of definition, (b) offers an overarching model to solve the problem of unity, i.e. the translation of hylomorphism into the notions actuality and potentiality.

I am not going to challenge this debate directly. My concern is to give a cursory analysis of the solutions presented in these chapters and to deal with the problem in the light of Z.17. It is then reasonable to preserve the entanglement of the unity of substance and the unity of definition; for the enquiry is expected to ensure the unity of the entity grounding the other entities as much as to ensure the unity of the statement grounding the other statements in metaphysics. In Z.12, this entity is the principle of metaphysics and is identified with the form of sensible substances; in H.6, this entity cannot be the principle, but some other object of metaphysics whose definition must be one.[43]

6.2.1 The Solution of Z.12

It is common to think that Z.12 sets out a Platonist treatment of the problem of unity. At 1037b27, Aristotle tells us that his focus will be the definitions obtained by the method of division, which, we noticed, is a legacy of Plato's late dialectic. Thus, Z.12 is often regarded as an invalid solution to unity or, at best, a preparatory analysis to Aristotle's official answer in H.6. In particular, commentators insist on the contrast between the Platonist model of definition and the hylomorphic conception worked out by Aristotle in Z.17-H.6.[44] As will be clear,

[41] See Ross (1924: 238-239) and Harte (1996).
[42] Bostock (1994: 280-284), Gill (1989: 138-144; 166ff.), Halper (1989: 179-185), Loux (1991), Charles (1994; 2000: 294-308). For a presentation of the debate see Morel (2015: 41-59).
[43] In this regard, my approach is close to Morel's, who considers the unity of hylomorphism to be the focus of H.6. However, Morel (2015: 41-59) argues in favour of two levels of hylomorphism (i.e. the level of the composite and the level of the form) which receive a single treatment. My analysis will suggest that this distinction is to be replaced with a stronger identity, which makes of form and matter different ways to look at one unified entity.
[44] In particular, since the definitions obtained by division are attacked by Aristotle in *On the Parts of Animals* I.1-3, Z.12 might represent an earlier view still close to Platonist approaches. On this point, see Bostock (1994: 183-184) and Code (2010a). In line with his general interpretation of Z,

the argument of Z.12 is unlikely to be effective enough to avoid the failure of the enquiry. Yet, its limits may not lie in the method of definition employed. In the *Analytics*, the method of division is indeed adopted by Aristotle to formulate immediate definitions; namely, the definitions of the primary objects of science.[45] Since substances are the primary objects of metaphysics, and since each of them is identified with the form signified by its definition, Z.12 is not meant to advocate a Platonist solution. More simply, it follows the logical strategy of Z.4-11 and is concerned with the unity of those definitions that are never disputed in science, but always assumed. Correspondingly, it is also concerned with the unity of those objects that are signified by such immediate definitions.

Within this framework, Aristotle tells us that the plurality of the parts that undermines the unity of substance consists of the genus and the differentiae. These are indeed the parts signified by definitions in metaphysics and, thus, making up the form.[46] The solution endorsed can be summarized as follows:

S1: The unity of substance is ensured by eliminating the genus.

Namely, if the genus is eliminated from the constitution of the substance and from the constitution of the definition, then the substance is one unified object and the definition is one unified statement. To illustrate, the unity of human is ensured by removing animal from the constitution 'biped animal'. At 1038a5-9, Aristotle considers two ways to accomplish **the neutralization of the genus as a constitutive part**.[47] One is to remove the genus because its existence is not absolute. In other words, since the genus is not essentially independent of its forms, the constitution of the definition can be reduced to the remaining differentiae. The other is to remove the genus because it is 'like matter'. Arguably, the parallel serves Aristotle to make the same point: the genus is not essentially

Menn (2001) takes Z.12 to be a treatment of the seventh aporia: *whether the principles are the first or the last genera predicated of indivisible objects* (B#7, 998b15-16).

[45] See *An. Post.* II.13.

[46] See Section 4.3, note 49.

[47] From 1037b14 to b27, Aristotle rules out the possibility of ensuring unity by participation of the genus in the differentiae. Remarkably, his arguments play on the dialectical difficulties treated in the *Topics* and anticipate the criticism of Z.13-14: if the genus participates in its own differentiae, then i) the genus would possess contrary characterizations, and ii) the genus would be one and the same with each differentia (1037b21). See Sections 5.2.1 and 5.2.2.

independent of its forms, thus the constitution of the definition can be reduced to the remaining differentiae.[48]

The final section of the chapter expands upon this solution.[49] Once the genus is eliminated, the unity of substance and of its definition is achieved only if the remaining differentiae are somehow unified. To illustrate, once animal is eliminated, the unity of human is achieved only if terrestrial, biped, etc. are proved to be one single thing. To this end, Aristotle proposes to organize each definition into a string of differentiae. Since a definition separates its object by stating the genus and the relevant differentiae, every differentia separates one of the sub-kinds to which the object belongs. To use Z.12's example, the definition of human amounts to the string of the differentiae that separate human from other objects within the genus animal: terrestrial, footed, footed-with-toes, etc. Aristotle argues that the last differentia in the string guarantees the unity of the definition; for whereas the previous differentiae signify other sub-kinds of the genus, the last differentia is the unique term to signify the object defined. To illustrate, while footed indicates the sub-kind encompassing bird, horse, human, etc., rational indicates human exclusively. From this perspective, the plurality of parts that undermines unity is only apparent; for *the last differentia exhausts the constitutions into which definition and substance respectively divide*. To rephrase (S1) above:

> **S1*:** The unity of substance is ensured by eliminating the genus and the differentiae that do not indicate the substance exclusively.

Basically, Z.12's solution to the problem of unity is to reduce the definition to one single predicate and substance to one single entity: the last differentia (1038a19-20).[50]

It is not difficult to see the limits of this argument. First of all, the last differentia is likely to be subject to the criticism levelled against universals; for it is a quality (ποιόν) and not a this-something. In Chapter One, I pointed out that the differentia

[48] The parallel between genus and matter is exemplified by the voice (i.e. sound) which is genus and matter, while its differentiae produce its species, namely letters. Interestingly, Gill (2010: 105-107) connects this example with *Philebus* 17a6-e6.
[49] Gill (2010) argues that Aristotle is refining the first way to remove the genus, while the second way is fully elaborated in H.6.
[50] Cf. Z.12, 1038a25-26; b28-30.

is a predicate that signifies a quality of the relevant genus.[51] This means that the differentia is a demonstrable attribute studied by a science. Despite being stated in definitions and, thus, belonging per se[1] to the object defined, the differentia belongs per se[2] to another subject, i.e. the genus studied by the relevant science. If this is so, the differentia turns out to possess one of the distinctive features of universals: the qualitative character. Although the last differentia does not characterize a plurality, it still lacks the primacy of substance. Therefore, the statement of the differentia is not a definition because it is not an immediate statement, but is derived from the statement of its subject. Correspondingly, the differentia is not a substance because it is not an independent entity, but is essentially dependent on the genus.

In addition, the solution of Z.12 does not enable Aristotle to overcome the final difficulty of Z.13; for it leads to endorsing the non-composition of substances. In Chapter Four, I argued that the non-composition of substances is equivalent to the impossibility of defining them. For one thing, this means that there is no statement grounding the demonstrations within metaphysics; for another thing, this means that there is no entity grounding the existence of the other entities. Basically, if substance is assumed to be one single part (i.e. its last differentia) there are no parts into which substance divides. This makes the substance unknowable and prevents its statement from indicating the entity that is the principle of metaphysics. At best, it indicates an arbitrary way to refer to its object.

6.2.2 The Solution of H.6

Let us turn to the argument of H.6. The problem of unity concerns both substance and definition. In particular, the unity of substance is understood either as unity of form or unity of composite. For the present time, we can leave aside the unity of absolute entities, which is quickly treated at 1045a36-7, and focus on the general problem tackled by Aristotle: why is a plurality of parts one unified thing? Namely, there must be a cause of why the parts of a definition make up one unified statement and, correspondingly, the parts of a substance make up one unified object.

[51] This is the categorial distinction introduced to avoid the difficulties about the unity of the genus. See Section 1.2.2.

Roughly, the solution is to translate the notions of matter and form into the notions of potentiality and actuality. Thanks to this move, says Aristotle, the problem simply disappears (1045a24-25). It could be said that there is no plurality of parts that undermines unity and, thus, no problem to raise. How can this be the case? The idea is that every item results from some matter and a definite form; thus, *since the matter is in potentiality what the form is in actuality, both substance and definition are in fact one unified thing*. The problem disappears in the case of substances because the matter and the form are one and the same entity, the former potentially and the latter actually; for example, the bronze sphere is not compounded of a lump of bronze and the shape of sphere, but it is its bronze actualized by the appropriate form, sphere. Likewise, the problem disappears in the case of definitions. Aristotle seems to suggest that every definition consists of some material or potential substratum that is accomplished in terms of the formal or actual characterization; for example, the definition of circle is one statement because there is some term, such as plane figure, that indicates potentially what the other term indicates actually.[52] This solution can be summarized as follows:

> **S2:** The unity of definition is ensured by understanding one term as matter and the other term as form.

That is, one term indicates the potentiality of what the other term indicates the actuality.

Clearly, the solution of H.6 is to illustrate the plurality of parts into which substance and definition divide is only apparent. For this attempt, some commentators take Aristotle to introduce the analogy between hylomorphism and the content of definition. More precisely, he seems to strengthen his parallel between the genus and the matter of an object by implying the further parallel between the differentia and the form.[53] In this regard, it is important to note that the parallel does not apply so rigidly. Rather, it shows that every plurality of parts can be regarded as a material substratum that is one in virtue of some cause. Cases of such a matter are both bodily parts and the parts indicated by a definition, i.e. genus and differentiae. To illustrate, the matter of human could be

[52] Cf. H.6, 1045a30-35.
[53] See, for example, Deslauriers (2007) and Gill (2010).

either flesh&bone or such-and-such an animal. With his parallel, Aristotle is indeed focusing on the cause that makes a plurality of parts one unified thing.

Commentators propose a wide range of readings of the solution of H.6. The first point of disagreement is whether Aristotle endorses a non-realist view on form and matter. Form and matter appear to be nothing but ways to refer to an object, by pointing to either its potential or its actual existence.[54] Alternatively, form and matter are real elements constituting an object. This introduces a second point of disagreement: whether the cause of unity is the form or the very hylomorphic constitution.[55] In the final section of this chapter, I will defend the absolute oneness of form and matter in Aristotle's metaphysics. Although I do not wish to deny the scientific realism behind his conclusions, form and matter turn out to be, in my view, one and the same object considered from different viewpoints. For they indicate one sensible substance, which is credited with the derivative characterization signified by its demonstrative definition.

6.3 Beyond the Dilemma

My analysis of the renovated treatment of substance showed that, despite the failure of the enquiry, the results of Z contribute to the project of the science of being. Aristotle is able to envision–though not to establish–the principle of metaphysics. On the assumption that substance is the cause of other entities, Z's enquiry turns from investigating what substance is to investigating why something is something else. This means setting out demonstrative definitions of the objects of metaphysics, in which substance comes across as the teleological cause signified by the middle-term. Two consequences are extremely significant. First, sensible substances–the entities mainly studied in Z–turn out to be derivative objects of metaphysics; for they are credited with the derivative characterization signified by their demonstrative definition. Second, the principle of metaphysics

[54] Put it in the terminology from Charles (1994), this is a non-explanatory account of unity. For this view, see Sellars (1967), Rorty (1973), Gill (1989: 166ff.). Cf. Scaltsas (1994a; 1994b: Ch. 5)
[55] Some commentators hold that the unity of substance is explained through the form, which is the cause of unity (cf. Halper, 1989; Loux, 1991; Galluzzo, 2013; Lewis, 2013). Some others hold that this is explained in terms of both form and matter (cf. Bostock, 1994: 287-290; Charles, 1994; Morel, 2015: 185-205).

must be investigated by studying suprasensible substances; for it must be credited with the immediate characterization signified by the immediate definition grounding the science.

In the remainder of this Chapter, I will show that this relaunch of the enquiry means overcoming the dilemma of Z.13 and its final difficulty; that is, to ensure the definability of substance beyond the dichotomy of composition/non-composition. Earlier, we noted that Z's enquiry ends with the dilemma because of the impossibility of ensuring the unity of substance. On the one hand, the composition of a substance guarantees its definability but undermines its unity; on the other, the non-composition of a substance guarantees its unity but undermines its definability.[56] To overcome the dilemma means giving a solution to the problem of unity. The answer lies in the separation of the immediate definition of the principle of metaphysics from the demonstrative definition of sensible substances. Accordingly, the unity of sensible substances is explained through the teleological cause indicated in their definition. This does not mean that sensible substances are one in virtue of something different, as apparently suggested in Z.17. With the translation of hylomorphism in terms of actuality and potentiality, sensible substances are one in virtue of themselves, just as every primary object of science.

6.3.1 The Argument about Composite Objects

The second half of Z.17 is taken by both commentators and philosophers to endorse a holistic metaphysics. In particular, Aristotle seems to reject the idea that an object is just a sum of its parts and to argue in favour of a new notion of whole: an object is one unified whole that is something over and above the totality of its constitutive parts.[57] Within the context of Z, a sensible substance is then regarded as a unified whole and not as the sum of material parts; for its form is the principle in virtue of which every part of the substance surrenders its identity

[56] See Sections 5.1.2 and 5.4.

[57] See Scaltsas (1994a; 1994b: Ch. 4), who argues that Z.17 is meant to solve the difficulty raised in the *Theaetetus* (201e-206d): form is a unificatory principle that makes substance a whole over and above its constitutive parts. On the new notion of whole inspiring Neo-Aristotelian mereology see Fine (1999) and Koslicki (2008: Ch. 4). In particular, Koslicki proposes a hylomorphic mereology according to which form and matter are two proper parts representing the structure and the content of the whole. For some criticism of this view see Oderberg (2014).

to the whole. For example, a human is the whole to which every bodily part surrenders its identity in virtue of a human soul. Basically, Z.17 proposes a further formalist solution that leads to a fresh understanding of genuine substances in reality and of their unity.

If my interpretation of the relaunch of the enquiry is correct, Aristotle is not outlining a holistic metaphysics. His concern is the idea of substance as cause in order to develop the demonstrative science of being. Namely, he attempts to envision the principle of metaphysics by looking at the cause that makes a plurality of parts one unified whole. From this perspective, his argument about composite objects is an argument to overcome the dilemma of Z.13.

> However, things that are composite in such a way that the whole is a unity, are not like a heap but like a syllable–BA is not the same as B and A–nor is flesh just fire and earth (for on dissolution the flesh and the syllable no longer exist, but the letters exist and so do the fire and the earth). So the syllable then is not only its elements (vowel and consonant) but something else besides (ἕτερόν τι). And flesh is not only fire and earth, or the hot and the cold, but something else besides (ἕτερόν τι). And this something else cannot itself be an element or composed of elements. For if (i) it is an element, the same argument will apply again […]; and if (ii) it is composed of elements, then it must be composed of more than one element (otherwise it would be that one element) and so we shall apply to it the same argument as to the flesh and the syllable. It would seem, then, that there is this something else and that it is not an element, and that it is the cause of this thing being flesh and that thing being a syllable; and similarly in other cases. And this is the substance of each thing, because it is the primary cause of being. (1041b11-28, Bostock's translation slightly modified)

> ἐπεὶ δὲ τὸ ἔκ τινος σύνθετον οὕτως ὥστε ἓν εἶναι τὸ πᾶν, [ἀν] μὴ ὡς σωρὸς ἀλλ' ὡς ἡ συλλαβή—ἡ δὲ συλλαβὴ οὐκ ἔστι τὰ στοιχεῖα, οὐδὲ βα ταὐτὸ τὸ β καὶ α, οὐδ' ἡ σὰρξ πῦρ καὶ γῆ (διαλυθέντων γὰρ τὰ μὲν οὐκέτι ἔστιν, οἷον ἡ σὰρξ καὶ ἡ συλλαβή, τὰ δὲ στοιχεῖα ἔστι, καὶ τὸ πῦρ καὶ ἡ γῆ)· ἔστιν ἄρα τι ἡ συλλαβή, οὐ μόνον τὰ στοιχεῖα τὸ φωνῆεν καὶ ἄφωνον ἀλλὰ καὶ ἕτερόν τι, καὶ ἡ σὰρξ οὐ μόνον πῦρ καὶ γῆ ἢ τὸ θερμὸν καὶ ψυχρὸν ἀλλὰ καὶ ἕτερόν τι—εἰ τοίνυν ἀνάγκη κἀκεῖνο ἢ στοιχεῖονἢ ἐκ στοιχείων εἶναι, εἰ μὲν στοιχεῖον, πάλιν ὁ αὐτὸς ἔσται λόγος (…)· εἰ δὲ ἐκ στοιχείου, δῆλον ὅτι οὐχ ἑνὸς ἀλλὰ πλειόνων, ἢ ἐκεῖνο αὐτὸ ἔσται, ὥστε πάλιν ἐπὶ τούτου τὸν αὐτὸν ἐροῦμεν λόγον καὶ ἐπὶ τῆς σαρκὸς ἢ συλλαβῆς. δόξειε δ' ἂν εἶναι τὶ τοῦτο καὶ οὐ στοιχεῖον, καὶ αἴτιόν γε τοῦ εἶναι τοδὶ μὲν σάρκα τοδὶ δὲ συλλαβήν· ὁμοίως δὲ καὶ ἐπὶ τῶν ἄλλων. οὐσία δὲ ἑκάστου μὲν τοῦτο (τοῦτο γὰρ αἴτιον πρῶτον τοῦ εἶναι)

Aristotle considers two cases of composite objects: the syllable BA and flesh. The syllable BA is the whole dividing into its letters, B and A; flesh is the whole dividing into physical elements, fire and earth. The argument defends the existence of something different from the sum of these parts. This, we infer, is the cause of the unity of such objects.

First of all, it is worth noting that Aristotle is not attempting to prove the unity of some objects. The argument rests on **a distinction between wholes and heaps**: whereas the former are credited with unity, the latter are identified with the sum of their constitutive parts. To illustrate, a ship is a whole insofar as it is one object dividing into some planks; the mere sum of the planks, instead, is a heap insofar as it lacks unity. The idea is that if a whole divides into its parts, the whole does not exist anymore, while the parts do. If dismantled, a ship does not exist, while the planks do. On the contrary, a sum does exist as long as the parts do; the sum of the planks exists as long as every plank does. Consequently, there must be a further item in virtue of which a whole, such as syllable and flesh, is one object. To put it in mereological terms, there must be a principle to restrict the composition of a whole to one unified object.[58]

At this point, the argument takes the form of a reductio. The item at stake can be either (i) an element (στοιχεῖον), or (ii) a composite of elements (ἐκ στοιχείων). If (i), it will be a further part to be added to the composition; consequently, there will be a new whole consisting of the original parts plus the new item. To illustrate, if the syllable BA were a whole because of the addition of X to the original parts B and A, there would be a new whole consisting of B, A, and X. Plainly, (i) yields a regressive explanation. If (ii), the item will be a composition of parts; consequently, the item itself will be a new whole, the unity of which must be explained. To illustrate, if the syllable BA were a whole because of the composite of elements XYZ, XYZ itself would be a whole and its unity should be explained. Hence, (ii) steps back to the initial question: whether the item explaining unity is an element or a composite of elements.

Aristotle concludes that *if the item is neither an element nor a composite of elements, it must be the cause of why the elements are something different*. To use the previous examples, it is the cause of why B and A are the syllable BA and the cause of why fire and earth are flesh. Despite speaking of ‘the cause of

[58] The unrestricted composition is a consequence of the classical extensional mereology. For some criticism, see Koslicki (2008: esp. Ch. 1 and 4).

being' (αἴτιον τοῦ εἶναι), Aristotle has clearly in mind the cause of unity; for it explains why a plurality of parts is one object. This is not surprising if we think that the multiplicity of being is mirrored by the multiplicity of unity. To say that there is an entity (being/existence) is indeed to say that there is one whole (unity).[59] But what unity is the argument concerned with? There is a salient detail that could help us to answer these questions. Given Z.10-11's examination, Aristotle takes the cause to explain the unity of two types of parts: the formal parts and the material parts.[60] The formal parts are the parts into which the form divides and are exemplified by the letters of a syllable; the material parts, instead, are the parts into which the composite divides and are exemplified by the physical elements of flesh.[61] Remarkably, these are the parts that make up the constitution of a substance: the formal parts make up the constitution that is stated by its definition, and the material parts make up the constitution that is subject of change.[62] Whether directly or not, the argument of Z.17 outlines a solution to ensure the unity of substance:

> **S3:** The unity of substance is ensured by enquiring into the cause of why its elements are one unified whole.

To illustrate, the unity of human is ensured by enquiring into the cause of why either some bodily parts or biped animal are one unified whole. In one word, **the cause of unity is substance**. As learned earlier, this is the principle of metaphysics that is investigated by an enquiry into the why-it-is of an object. The argument about composites shows that substance explains why some elements are one unified object just as it explains why some matter is such-and-such an object.

Let me compare the two sections of Z.17. In both of them, Aristotle attempts to indicate the principle of metaphysics. The fundamental idea is that substance is the cause of other entities. In the first half, substance is assumed to be the cause of the existence of other entities insofar as it explains why some matter is

[59] Cf. Γ.2, 1003b22ff; Z.4, 1030b7-12.
[60] My reading concurs with the general plan of Z.10-16 outlined by Menn (2001). Namely, Aristotle is discarding both material and formal parts in order to reject both the Pre-Socratic and the Platonist metaphysics. Contrary to Menn, I acknowledge the positive contribution of Z to the project of the *Metaphysics*.
[61] See Z.10, 1034b24-28 and 1035a25-b2. See also Section 4.1 and Frede-Patzig (1988: 320).
[62] The translation of hylomorphism into the notions of potentiality and actuality will enable Aristotle to admit a notion of definite matter (unlike the matter of Z.3). In H.4 and 5, Aristotle identifies this matter with the substratum for the immediate realization of the form.

such-and-such an object. In the second half, substance is inferred to be the cause of the unity of other entities insofar as it explains why some parts are one unified whole.[63] In so arguing, Aristotle commits himself to the difference between object and cause: substance must be something different from the subject existing or unified. The cause of existence must be something different from the material substratum (e.g. eclipse/loss of light), and the cause of unity must be something different from the plurality of elements (e.g. letters).

To specify what substance is, we can then play on the correspondence between the explanandum and the explanations; that is, between the existence/unity of an object and its statement. The key point is that the statements of existence and unity of an object follow the same structure: the statement of a term belonging to another plus the statement of the middle-term; the former stating the explanandum and the latter stating the explanans. The entire statement (i.e. explanation) is the demonstration of the existence/unity of an object. Thus, the statement of the unity of BA consists of the statement of the oneness of BA belonging to B and A plus the statement of the cause. Aristotle is then arguing that substance is the principle signified by the middle-term mediating a certain fact, such as the existence and the unity of an entity.

If this is correct, we can infer two of the results established in Section 6.1 above. Since substance is the cause explaining the existence/unity of other entities, and since the existence/unity of sensible substances must be explained by a cause, sensible substances turn out to be derivative objects of metaphysics. For they are credited with the derivative characterization signified by the statement of their existence/unity. In other words, Aristotle seems to separate the principle of metaphysics from the substances mainly studied in Z: whereas the principle is signified by an immediate statement, sensible substances are signified by a derivative statement. Therefore, they are treated as secondary objects of metaphysics. Moreover, since substance is the cause explaining why a plurality of elements is one whole, and since every sensible substance (either as form or as composite) divide into a plurality of elements, the cause of the unity of sensible substances is neither a formal nor a material part. Rather, it is the same teleological cause that explains the existence of such-and-such an object. Therefore, the derivative characterization of sensible substances consists of the

[63] This might suggest that the second half of Z.17 introduces the premises for the first half.

subject characterized (i.e. the subject ‘that exists’ or ‘that is one’) plus the purpose for being so characterized (i.e. ‘that is such-and-such a substance’ or ‘that is one substance of such-and-such a kind’).

6.3.2 Ways of Defining

When the dilemma of Z.13 triggers the impossibility of defining any substances, Aristotle appears to weaken this claim in the very next lines. In some way, he says, there can be definitions, whilst in some other way there cannot be.[64] No interpretation of this remark, I argued in Chapter Five, prevents the enquiry from failing. Arguably, Z.17 provides Aristotle with the right tools to overcome the dilemma and avoid its difficulty. That is, to put into effect the weakened version of the claim.

Given our analysis above, it is clear that Z.17 establishes the distinction between ways of defining prompted in Z.13. The first way of defining is by demonstrative definition: the statement indicates the object existing and the cause of the existence. This is the way to define the secondary objects of science, namely, the demonstrative attributes of the genus studied (e.g. eclipse); for they are credited with a derivative characterization. The second way of defining is by immediate definition: the statement indicates an object that is cause of its own existence. This is the way to define the primary objects of science, namely, the genus and the sub-genera studied (e.g. celestial bodies). The crucial point is that in metaphysics sensible substances are encompassed by the genus studied, and yet are credited with a derivative characterization. Consequently, they are assumed to be primary objects of metaphysics and to be known by immediate definitions. Nonetheless, they are treated as secondary objects and known by demonstrative definitions.

In science, every way of defining applies to an object, either primary or secondary, and produces a definition, either immediate or demonstrative. Aristotle endorses this distinction for the development of his essentialism in Z.4: substances possess definition and essence absolutely, while non-substances possess definition and essence derivatively. Thus, the former are primary

[64] See Z.13, 1039a21-23. Cf. Section 5.1.1.

objects, while the latter are secondary objects of science.[65] In Z.10-16, he moves to examine the immediate definition in metaphysics. In order to secure the possibility of metaphysics threatened in Z.13, Aristotle reintroduces the distinction. *The peculiarity of metaphysics is that some objects, despite being primary, are definable only if treated as secondary*. These are sensible substances, which are the primary objects on which Z is focused. By relaunching the enquiry into the principle, we have to accept both the derivative nature of sensible substances and the necessity to study suprasensible substances. For one thing, this means that sensible substances are definable by a demonstrative definition; for this signifies their τόδ' ἐν τῷδε characterization: a sensible substance is such-and-such matter in virtue of such-and-such a cause. For another thing, this means that a suprasensible substance is definable by a purely immediate definition; for this signifies an absolute entity that cannot be known through Z's enquiry.[66]

To avoid the final difficulty means carrying on with the project of grounding the demonstrative science of being. For this is to secure the possibility of defining the primary objects and, thus, to establish the principle of metaphysics. This possibility imports a solution to the problem of unity treated in Z: why is every substance and every definition one whole and not a plurality of parts? If my hypothesis is correct, the solutions of Z.12 and H.6 can be understood with reference to the solutions outlined in Z.17. Whereas in Z.12 the unity of substance corresponds to the unity of the immediate definition grounding demonstrations in science, in H.6 it corresponds to the unity of a demonstrative definition. Therefore, Z.12 is concerned with the unity that pertains to the principle of metaphysics, and H.6 is concerned with the unity that pertains to the objects grounded in the principle. Once Z.17 makes it clear that sensible substances are known by demonstrative definition, Aristotle is able to separate the unity that Z.12 fails to ensure from the unity that H.6 successfully guarantees. In order to ensure the unity of sensible substances, it suffices to show that the explanans is one and the same as the explanandum; for a sensible substance is one in virtue of the cause

[65] See Z.4, 1030a17-7 and Section 3.3.2.

[66] In general, I agree with Charles (1994; 2000) that Aristotle ends up with defining sensible substances in terms of matter and form. However, this conclusion marks the failure of Z in that it does not achieve the immediate definition to ground metaphysics. Moreover, Charles holds a univocal view on hylomorphism, while I separate the concept of form as material substratum from the concept of teleological form.

signified by the explanans. To illustrate, in order to ensure the unity of human, it suffices to show that human soul and the parts into which human divides are one and the same thing.

I am inclined to think that the argument of H.6 is designed for this purpose. The unity of substance is ensured for both sensible substances and for the principle of metaphysics. For sensible substances, unity is ensured by translating the notions of matter and form into the notions of potentiality and actuality. Since a sensible substance results from a portion of matter in potentiality and a form in actuality, the sensible substance is one; for the matter is potentially what the form is actually. For example, human is such-and-such a body in potentiality and the human soul in actuality; thus, human is one because such-and-such a body is potentially what the soul is actually. Correspondingly, we are also able to ensure the unity of definition. Since the demonstrative definition of sensible substances results from some matter (i.e. the explanandum) and a form (i.e. the explanans), the demonstrative definition is one; for the explanandum states potentially what the explanans states actually. For example, the definition of human states biped animal in potentiality and the human soul in actuality; thus, the definition is one because biped animal states potentially what human soul states actually. Remarkably, the matter and the form treated in H.6 are not fully equivalent with the matter and the form treated in Z. The point is that the notion of matter encompasses every material substratum into which substance divides; that is, both the constitution of the form and the constitution of a composite.[67] Likewise, the notion of form is to be understood as the teleological cause of an entity; for it indicates the purpose of its existence.

On the contrary, for the principle of metaphysics there is no cause of unity at all. The reason is simple: in the absence of every type of material substratum, the principle lacks every potentiality. Namely, it must be a pure actuality. This is the unity that pertains to the ἁπλᾶ. It is impossible to establish the cause of the unity of absolute entities just as it is impossible to establish the cause of their existence. Therefore, the principle of metaphysics, which is one of the absolute entities,

[67] It could be said that Aristotle is concerned with disentangling the notion of element and the notion of cause. This separation is outlined at A.2, 1013b16-30: besides material (e.g. fire) and formal parts (e.g. letters) that are the causes from which an object (e.g. flesh, syllable) is constituted (i.e. elements), there are the efficient and the teleological causes. In this way, Aristotle seems to move toward the concepts of matter and form treated in Z to the concepts of potentiality and actuality treated in H and Θ.

exists and is immediately one. Correspondingly, we are able to understand the unity of its definition. Since the definition of such a substance is the purely immediate statement of the object, the definition is one. In all likelihood, this is the definition of the suprasensible substance that must be studied to complete the foundation of metaphysics: the definition of God.

Aristotle comes to overcome the dilemma of Z.13 and to relaunch the enquiry insofar as he ensures the unity of substances and their definability. Basically, he escapes the dichotomy of composition/non-composition for sensible substances. Strictly speaking, a sensible substance is not compounded; for its constitution is potentially what the whole object is actually. To use Aristotle's words, it is wrong to enquire into the difference between the potentiality and the actuality of a substance (H.6, 1045b16-23). These are nothing but two ways to take one and the same object. Likewise, a sensible substance is not uncompounded; for its characterization does consist of distinct entities. The point is that these entities are not added to one another and, thus, do not yield any composition. Again, these entities are one and the same object taken in different ways.

It is not difficult to see that this conception of sensible substances requires a non-realist view on form and matter. Since there is no real composite substance to make up, form and matter are not special constituents of each natural body. Rather, they are alternative notions to refer to one and the same object.[68] The notion of matter refers to the potentiality of a sensible substance and, thus, grounds the demonstrations about its powers; for example, the notion of iron refers to the potentiality of axe and, thus, grounds the demonstrations about the power of cutting. The notion of form refers to the actuality of a sensible substance and, thus, grounds the demonstrations about its activities; for example, the notion of rationality refers to the actuality of human and, thus, grounds the demonstrations about the activity of thinking. Although neither of them is the proper principle of metaphysics, form and matter are still the principles of sensible substances. This enables Aristotle to perfectly match the results of Z's enquiry

[68] This conceptualist reading is perhaps close to the application of hylomorphism in Λ.1-5. As highlighted by Rapp (2016), form and matter are the principles of sensible substances because they are analogically the same causes in each substance within one genus. Rapp, however, does not look at Z-H as an enquiry toward a higher kind of principle.

with the principles of physics. Within the context of sensible substances, **substance is identified with nature**, **which is both form and matter**.[69]

6.4 The Unity of Substance

The enquiry into substance overcomes the dilemma of Z.13 and guarantees the possibility of the demonstrative science of being. This means ensuring the unity of substance that is undermined by the constitutions stated in definitions: metaphysics is possible because every substance is one unified object signified by one unified definition; it is then possible to relaunch the enquiry into the principle of a science. Aristotle outlines a solution to the problem of unity in the second half of Z.17. The unity of an object is ensured by enquiring into the cause of why a plurality of elements is one unified whole. The unity of the syllable BA, for example, is ensured by enquiring into the cause of why the letters A and B are one syllable. In so arguing, Aristotle considers the types of parts distinguished in Z.10-11. The formal parts are the parts into which the whole taken as form divides; the material parts are the parts into which the whole taken as composite divides. Since sensible substances divide into such parts, we can infer that there is a cause of their unity; that is the cause of why either the formal (e.g. biped animal) or the material parts (e.g. bodily parts) are one substance (e.g. human).

This treatment of unity, I suggested, is tied to the relaunch of the enquiry in the first half of Z.17. The key point is that the cause of the unity of an object is also the cause of its existence. Thus, the account of both unity and existence is an explanation indicating a subject characterized (i.e. explanandum) plus the cause for being so characterized (i.e. explanans). In the case of unity, the subject characterized is a plurality of parts being one whole; in the case of existence, it is a material substratum being such-and-such an entity. Consequently, the enquiry into the principle grounding the existence of other entities is the enquiry into this very cause: substance. The idea of substance as cause is pivotal in the relaunch of the enquiry. Rather than investigating what substance is, the enquiry

[69] See Z.17, 1041b28-33 and H.2, 1043a26-28, which are likely to provide the best possible answer to the question ‘What is substance?’ and confirms the agreement of the results achieved in Z with the discussion undertaken in H.

has to investigate why something is something else. This shift prevents Aristotle from establishing the principle of metaphysics; for the enquiry accounts for other objects that are known by demonstrative definition. Yet, the demonstrative definition of these objects enables Aristotle to envision the principle; for this is indicated by the middle-term. This conclusion is in line with the failure of Z. Although the enquiry neither identifies the principle nor achieves its immediate definition grounding metaphysics, it envisions the principle through the demonstrative definitions of which metaphysics consists. There are two salient consequences. First, since sensible substances possess a cause of unity and existence, they are known by demonstrative definition; namely, sensible substances are credited with a derivative characterization consisting of the material substratum plus the appropriate cause. Thus, sensible substances turn out to be derivative objects of metaphysics. Second, since Z's enquiry is primarily focused on sensible substances, and since sensible substances are derivative objects of metaphysics, the principle of metaphysics can be established by studying some suprasensible substance, perhaps God.

It is important to remark that although sensible substances are somehow derivative, they still belong to the first genus of being. Thus, they are primary objects of science, while non-substances are secondary objects of science. For this reason, Aristotle attempts to spell out the unity of sensible substances and of their definition. The solution of H.6 is to translate the notions of matter and form into the notions of potentiality and actuality: both a sensible substance and its definition result from some material substratum and a causal form. Since the former is in potentiality what the latter is in actuality, matter and form indicate one and the same thing. This is not the unity of the principle of metaphysics because it is derived from a cause. On the contrary, the unity of the principle is derived from no cause at all; for it possesses no material substratum and, thus, no potentiality. On this basis, Aristotle is able to ensure the unity of sensible substances and their definability.

Conclusion

The cover of a famous monograph on Z made it popular to compare Aristotle's enquiry to the Mount Everest: every path to the summit is a philosophical way to substance. This work has taken a different viewpoint to observe the mountain in its entirety; namely, I have engaged with the problems and the arguments about substance in the light of the problems and the arguments about definition. The fundamental idea is that since substance is the entity grounding the existence of other entities, and since a definition is the statement grounding the demonstrations within a science, the enquiry into substance corresponds to the enquiry into a definition.

Therefore, the standpoint of my observation of Z is the theory of definition I have outlined on the basis of Aristotle's logical works. In particular, my analysis has focused on two issues concerning definitions: primacy and unity. Primacy is the immediate character of the statement that grounds the demonstrations within a science and, thus, is not subject of demonstration itself; unity is the predicative oneness of the statement that signifies one object. In Z's enquiry, Aristotle is bound to deal with the primacy and the unity of the entity that is signified by a definition: substance. Substance must hold primacy over the other entities insofar as it grounds their existence. To illustrate, a quality ontologically depends upon the substance qualified. Besides, substance must be credited with unity insofar as it is one object and not a plurality of elements. A substance is one entity and not the sum of the genus and the differentia indicated by its definition.

Given this framework, I have argued that every solution to the enquiry undertaken by Aristotle can be analysed with reference to the primacy and the unity of definition. The treatment of primacy is central in the endorsement of the formalist essentialism: substance is defined as essence and identified with the form of substances. If every substance is an essence and thus the entity signified by its definition, every substance turns out to hold primacy over other entities; for the latter essentially depend upon the former. Accordingly, Aristotle identifies

every substance with the form that is indicated by its definition. The form of substances is the principle enquired in Z. The treatment of unity is central in the failure of Z's enquiry: it is impossible to define what substance is and to establish the principle of metaphysics. If every substance is credited with the constitution indicated by its definition, no substance can be one unified object; for it is pluralized by its composite character. Accordingly, Aristotle is compelled to dismiss his formalist essentialism. The form of substances is not the principle of metaphysics because it fails to be one object and not many. Both primacy and unity are at the core of the relaunch of the enquiry that follows the failure: what substance is can be envisioned–though not established–by looking at the substances studied in Z. Since the substances studied in Z are firstly sensible substances, and since sensible substances are derivative objects of metaphysics, we are able to make two salient points. For one thing, the enquiry has to focus on some suprasensible substance that is credited with the primacy and unity of the principle of a science; for another thing, Z's enquiry successfully defines sensible substances in terms of form and matter. I shall close this work with some concluding remarks about three aspects of Z: the argument advanced, the method adopted, and the metaphysics endorsed by Aristotle.

The Argument of Z

The argument of Z is designed to establish the principle of metaphysics by answering the question 'What is substance?'. The solution will enable the enquirer to develop the demonstrative science of being. Substance is the first genus of being and encompasses the entities that are primary objects of science; non-substances are the remaining genera of being, each of which encompasses the entities that are secondary objects of science. Every substance is the subject of some non-substances, which are the demonstrable attributes studied by metaphysics. Accordingly, the demonstrative science of being consists of the definitional knowledge of substances and the demonstrative knowledge of non-substances; for the former is assumed to ground the latter. Since the genus of substances, suggests Aristotle, is prima facie co-extensive with the genus of sensible substances, metaphysics studies the same primary objects as physics (e.g. human, horse, etc.). However, since substances are not studied qua

sensible entities but simply qua entities, metaphysics does not study the secondary objects of physics (e.g. alteration, locomotion, etc.); for it is not concerned with motion, but simply with existence. The goal of Z is to specify the entity whose linguistic counterpart is the definition of the genus studied by metaphysics.

Does the enquiry reach this principle? Does it lead to the foundation of the demonstrative science of being? The value of the argument of Z is one of the most debated issues concerning Aristotle's metaphysics. Its difficulty, I have already noted, lies in the presence of both positive and negative phases of discussion. The aporematic approach seems to dominate the criticism of the invalid solutions, such as Z.3's definition as subject and Z.13's definition as universal. While Z's enquiry is concerned with testing and discarding the positions held by other philosophers (i.e. Pre-Socratics and Platonists), Aristotle's own views might be found somewhere else, perhaps in the analysis in terms of actuality and potentiality conducted in H and Θ or in the theology of Λ. On the other hand, Z seems to favour the endorsement of a 'theory of essences': every object is ultimately the essence indicated by its own definition, which is the cause of its being what it is. Z.4-11 and Z.17 appear, more or less explicitly, to define substance as essence and to identify the principle with the form of sensible substances.

I have shown that the argument of Z directly endorses the formalist essentialism in order to ground metaphysics and indirectly dismisses it in view of its limits. Nevertheless, the failure of Z does not automatically mark the enquiry as aporematic; for its genuine contribution emerges when we take Z to account not for the principle of metaphysics, but for one of its derivative objects. First of all, I have argued that Z.4-6's essentialism is conceived to ground the demonstrative science of being. The idea is that substance, if defined as essence, is ensured the primacy of the principle of a science. That is, every non-substance ontologically depends upon some substance because the essence of the former is caused by the essence of the latter. Secondly, I have proposed a formalist conception of substance on the basis of Z.10-11's hylomorphic analysis. Every substance is one and the same as its form and is the subject of its matter; namely, the form of substances is the principle of metaphysics, while their matter is a demonstrable attribute. In so arguing, I have remarked that this formalist solution is not Aristotle's final word in Z. Whereas most commentators refer to other texts

to advocate the essentiality of matter, my analysis insists on the provisional character of the argument of Z.4-11. Once Z.13-14 show that every substance, if credited with any constitution, fails to be one object, the formalist essentialism is indirectly abandoned; for there is no way to ensure the unity of the form of substances and thus its role as the principle of metaphysics. From this perspective, the argument of Z does not simply lead to questioning Plato's theory of Forms and Aristotle's own views, but also the possibility of grounding metaphysics. The point is that among the substances studied in Z, there is no entity that can be ensured the primacy and the unity of the principle of a science. I have argued that Z.17 is designed to relaunch the enquiry: what substance is can be envisioned–though not established–through the definition of the derivative objects of metaphysics, such as sensible substances. For one thing, Z's enquiry reaches a definition of those substances resulting from both matter and form; for another thing, it suggests the study of some suprasensible substance for the foundation of metaphysics, i.e. God.

Within the *Metaphysics*, the argument of Z is then an active phase of the project to ground the demonstrative science of being. Its results are tied to and fully developed in other books, such as H, Θ and Λ. This conclusion has no chronological implication. Although Z is likely to be the product of an extensive revision and, perhaps, one of the latest versions of Aristotle's positions, its enquiry is designed to harmonize with the analyses conducted in the other books. In this regard, the relationship between Z and H can be very illustrative. In H, Aristotle is concerned with three main issues: the account of sensible substances in terms of actuality and potentiality (H.2); a fresh understanding of the notion of matter (H.4-5); the unity of definition and substance (H.3, H.6). The outcome is the definition of the substance which is found to be a derivative object in Z: the sensible substance. In other words, whereas Z fails to state what substance is (i.e. to establish the principle of metaphysics) and ends up with defining sensible substances (i.e. some primary objects), H explores the characterization of the latter and comes to the following conclusion: 'From what has been said, it is clear what sensible substance is and how it is; in one way it is as matter, in another way it is as form and actuality, in a third way it is as the composite of both' (H.2, 1043a26-28). Remarkably, this three-fold definition of substance perfectly matches the definition of nature given in *Physics* B.1. In physics this definition picks the principles, while in metaphysics it concerns only some primary objects.

If this is correct, the goal of H is to show that the derivative characterization ascribed to sensible substances does not prevent them from being primary objects of metaphysics. To this effect, Aristotle resorts to the notions of potentiality and actuality. His first step is to ensure the unity of sensible substances (H.6); subsequently, his concern is to prove the priority of the actuality (Θ.8). For this will get us closer to the principle of metaphysics: the substance that is pure actuality.

The Method of Z

The method of Z is the method to establish the principle of a demonstrative science. In particular, it must be functional to identifying the entity that grounds the existence of the other entities and the definition that grounds the demonstrations within metaphysics. Plainly, the debate concerning the method of Z is a cast of the debate concerning its argument. Does the enquiry follow a scientific method to achieve positive results? Or does it set out dialectical procedures to reject invalid solutions? At the beginning of this work, I noticed the limits of this dichotomy. On the one hand, Z's enquiry is conceived to develop a fully-fledged science and, thus, cannot represent a scientific argument itself. On the other, Z's enquiry consists in investigating the principle of metaphysics and, thus, cannot represent a mere dialectical examination.

I have argued that the method of Z exemplifies the procedure followed by every pre-scientific enquiry. Namely, the procedure to achieve the knowledge grounding the whole science. This is the definitional knowledge of the genus studied; for instance, the definitional knowledge of 'celestial body' grounds astronomy and its demonstrations. The method of Z is to consider different ways to define for 'substance' in order to ground metaphysics and its demonstrations. From this perspective, Z can be compared to other pre-scientific discussions, such as *Physics* B.1 and *On the Soul* A.1-2 and B.1-2. The science of nature and the science of the soul must be grounded in the definitions of 'nature' and 'soul', respectively; for these will be the principles of the relevant demonstrations. What is then the method adopted in such contexts? The difficulty lies in the fact that scientific principles seem to be always assumed on the basis a superordinate science; for example, the principles of geometry (e.g. point) are assumed on the

basis of mathematics. Since metaphysics is the most universal and eminent science, its principles must be established on the basis of a direct enquiry. I am inclined to think that this procedure is outlined at the end of the *Posterior Analytics*. After having presented the procedures of learning by demonstration (A.1-33) and by enquiry (B.1-18), Aristotle sketches the procedure of learning by induction (B.19). Its product is the preliminary knowledge to conduct demonstrations (i.e. learning by enquiry) and to organize these results into a fully-fledged science (i.e. learning by demonstration). My hypothesis is that this could be the method adopted for the project of the *Metaphysics* and, thus, for Z's enquiry.

Importantly, nothing prevents the enquirer into substance from recalling dialectical schemes. The key point is that no scheme is employed for purely negative purposes. My interpretation of the notion of λογικῶς can help us to understand this fact. This term, I have argued, marks the shift from the analysis of entities to the analysis of the statements accounting for them. Basically, in order to establish the principle of metaphysics, Aristotle examines the predicative relations involved in accounting for entities and, in particular, for substances. In a word, definitions are the focus of Z's enquiry. The application of dialectical schemes is then in line with this logical strategy. Our understanding of the principle of metaphysics relies on the technical analysis of definition expounded in the *Topics*. This means both to present and to discard the material that can be organized into the demonstrative science of being: the knowledge of entities.

The Metaphysics of Z

The metaphysics of Z is not a fully developed theory about entities. The enquirer does not achieve any definitive conclusion about the principle of metaphysics; nor do the results obtained appear to be exhaustive. This is totally unsurprising; for the value of Z does not lie in its answers but in its problems. The metaphysics of Z is a philosophical exercise in which the enquirer is presented with the most significant accounts of being: the theory of the common material substratum (Z.3), essentialism (Z.4-6) and its hylomorphic version (Z.10-11), Platonist realism (Z.13-14), nominalism (Z.15). To engage with this exercise means engaging with some challenging problems in metaphysics: the multiplicity of being, the relations

of ontological dependence, the treatment of properties and attributes, the mereology and the unity of entities. On the whole, these features witness the comprehensiveness of the enquiry into substance, which is in line with the comprehensiveness of the first philosophy.

Undoubtedly, hylomorphic essentialism represents the most interesting phase of this exercise. In modern philosophy, there have been a few attempts to set out metaphysical doctrines inspired to Aristotle's views: the fundamental insight is to credit material objects with a core identity, which is the source of every other characterization. This principle of identity, which is generally characterized as essence, is then the principle to understand the ontological relations among objects (e.g. the capability of learning of humans) and their holistic unity (e.g. the oneness of a house). I have argued that Aristotle's essentialism is certainly the most promising solution in metaphysics; however, it shows some limits once filled with the content of hylomorphism. In particular, I have shown that Aristotelian essentialism leads to a formalist understanding of objects: the source of what an object is is confined to its form and does not include its matter. For the matter of the object essentially depends upon its form. This conclusion raises some problems concerning the unity of objects. Basically, it is impossible to ensure that an object is one thing and not the plurality of formal elements.

The suggestion of Z is that such problems can be avoided with two steps. First, we need to acknowledge the derivative character of material objects. Thus, our essentialist metaphysics does not provide us with a definitive explanation of ontological facts, but needs to be grounded in some other principles. Second, we need to translate the notions of form and matter into the notions of actuality and potentiality. In other words, the possibility of an essentialist metaphysics for material objects is tied to our understanding of the powers and the activities that characterize an entity.

Bibliography

Primary Sources

ARISTOTLE

Categories and On Interpretation = Categoriae et Liber De Interpretatione, Recognovit brevique adnotatione critica instruxit L. Minio-Paluello, Oxford: 1949.

Prior and Posterior Analytics = Prior and Posterior Analytics, a Revised Text with Introduction and Commentary by W.D. Ross, Oxford: 1949.

Topics = Topiques, 2 tom., texte établi et traduit par J. Brunschwig, Paris: 2003-2007.

Sophistical Refutations = Topica et Sophistici Elenchi, Recognovit brevique adnotatione critica instruxit W.D. Ross, Oxford: 1958.

Physics = Physics, a Revised Text with Introduction and Commentary by W.D. Ross, Oxford: 1939.

On the Heavens = Du Ciel, texte établi et traduit par P. Moraux, Paris: 1965.

On Generation and Corruption = De la Géneration et la Corruption, texte établi et traduit par M. Rashed, Paris: 2005.

Metereologica = Météorologiques, 2 tom., texte établi et traduit par P. Louis, Paris: 1982.

On the Soul = De Anima, Recognovit brevique adnotatione critica instruxit W.D. Ross, Oxford: 1963.

On Sense = De Sensu, in *Parva Naturalia*, a Revised Text with Introduction and Commentary by W.D. Ross, Oxford: 1955.

On the Parts of Animals = Les Parties des Animaux, texte établi et traduit par P. Louis, Paris: 1957.

On the Generation of Animals = De la Génération des Animaux, texte établi et traduit par P. Louis, Paris: 1961.

Metaphysics = Metaphysics, 2 vols., a Revised Text with Introduction and Commentary by W.D. Ross, Oxford: 1924.

Nicomachean Ethics = Ethica Nicomachea, Recognovit brevique adnotatione critica instruxit I. Bywater, Oxford: 1963.

Eudemian Ethics = Ethica Eudemia, Recognoverunt brevique adnotatione critica instruxerunt R.R. Walzer et J.M. Mingay, Oxford: 1991.

Rhetoric = Ars Rhetorica, Recognovit brevique adnotatione critica instruxit W.D. Ross, Oxford: 1963.

PLATO

Opera I: Euthyphro, Apologia Socratis, Crito, Phaedo, Cratylus, Theaetetus, Sophista, Politicus, recogniverunt brevique adnotatione critica instruxerunt E.A. Duke, W.F. Hicken, W.S.M. Nicoll, D.B. Robinson, et J.C.G. Strachan, Oxford: 1995 (1st ed. 1900-1907).

Opera II: Parmenides, Philebus, Symposium, Phaedrus, Alcibiades I and II, Hipparchus, Amatores, recognivit brevique adnotatione critica instruxit J. Burnet, Oxford: 1900-1907.

Opera III: Theages, Charmis, Laches, Lysis, Euthydemus, Protagoras, Gorgias, Hippia Maior et Minor, Ionis, Minoxenus, recognivit brevique adnotatione critica instruxit J. Burnet, Oxford: 1900-1907.

Opera IV: Clitopho, Respublica, Timaeus, Critias, recognivit brevique adnotatione critica instruxit J. Burnet, Oxford: 1900-1907.

Opera V: Minos, Leges, Epinomis, Epistulae, Definitiones, recognivit brevique adnotatione critica instruxit J. Burnet, Oxford: 1900-1907.

Secondary Sources

2.1 Translations and Commentaries

Ackrill J. (1963), *Aristotle's* Categories *and* De Interpretatione. *Translations and Commentary*, Oxford: Clarendon Press.

Alexander of Aphrodisias (*In Top.*), *In Aristotelis Topicorum Libros Octo Commentaria*, M. Wallies (ed.), *CAG* II.2, Berlin: Reimer, 1891.

Aquinas (*Expositio*), *In Duodecim Libros Metaphysicorum Expositio*, Cathala M.R. e Spiazzi R. (eds.), Roma: Marietti, 1954.

Averroes (*In Metaph.*), *In Aristotelis Metaphysicorum Libros Commentarium*, in *Aristotelis Opera cum Averrois Commentariis*, M.A. Zimara (ed.), Vol. VIII, Venetiis, 1562-1574 (reprinted in Frankfurt, 1962).

Barnes J. (1984) (ed.), *The Complete Works of Aristotle: The Revised Oxford Translation*, 2 Voll., Princeton: Princeton University Press.

— (1994), *Aristotle*: Posterior Analytics. *Translation and Commentary*, Oxford: Clarendon Press (1st edition 1975).

Bostock D. (1994), *Aristotle*: Metaphysics *Books* Z *and* H. *Translation and Commentary*, Oxford: Clarendon Press.

Brunschwig J. (2003), *Topiques*, Livres I-IV, Paris: Les Belles Lettres.

— (2007), *Topiques*, Livres V-VI, Paris: Les Belles Lettres.

Burnyeat et al. (1979), *Notes on Zeta*, Oxford: Sub-faculty of Philosophy.

Cooper J. (1997) (ed.), *Plato: Complete works*, Indianapolis: Hackett.

Frede M. und Patzig G. (1988), *Aristoteles* Metaphysik Z, *Text*, *Übersetzung und Kommentar*, 2 Bd., München: Beck.

Kirwan C. (1993), *Aristotle:* Metaphysics *Books* Γ, Δ *and* E. *Translations and Commentaries*, Oxford: Clarendon Press.

Makin S. (2006), *Aristotle:* Metaphysics *Book Θ*. *Translations and Commentaries*, Oxford: Oxford University Press.

Mignucci M. (1975), *L'Argomentazione Dimostrativa in Aristotele. Commento agli* Analitici Secondi, Padova: Antenore.

— (2007), *Aristotele*: Analitici Secondi. *Traduzione e Commento*, Roma: Laterza.

Morel . (2015), *Aristote:* Métaphysique *Èta*, Paris: Vrin.

Rashed M. (2005), *Aristote*. De la Géneration et la Corruption, Paris: Les Belles Lettres.

Ross W.D. (1924), *Aristotle.* Metaphysics, 2 vols., Oxford: Clarendon Press.

— (1949), *Aristotle.* Prior *and* Posterior Analytics, Oxford: Clarendon Press.

Simplicius (*In Cat.*), *In Aristotelis Categoria Commentarium*, C. Kalbfleisch (ed.), *CAG* VIII, Berlin: Reimer, 1907.

— (*In Phys.*), *In Aristotelis Physicorum Libros Quattruor Priores Commentaria*, H. Diels (ed.), *CAG* IX, Berlin: Reimer, 1882.

Smith R. (1997), *Aristotle:* Topics *I and VIII*, Oxford: Clarendon Press.

2.2 Monographs and Articles

Ackrill J. (1981), 'Aristotle's Theory of Definition. Some Questions about *Posterior Analytics* II.8-10', in Berti E. (1981), 339-358.

Barnes J. (1969), 'Aristotle's Theory of Demonstration', *Phronesis*, 14.2, 123-152.

— (1981), 'Proof and Syllogism', in Berti E. (1981), 17-59.

Berti E. (1981) (ed.), *Aristotle on Science*. *Proceedings of the 8th Symposium Aristotelicum*, Padova: Antenore.

Bolton R. (1976), ‘Essentialism and Semantic Theory in Aristotle: *Posterior Analytics* II.7-10’, *Philosophical Review*, 85: 515-544.

— (1987), ‘Definition and scientific method in Aristotle's *Posterior Analytics* and *Generation of Animals*’, in Gotthelf A. and J. Lennox (eds.) *Philosophical issues in Aristotle's Biology*, Cambridge: Cambridge University Press, 120–166.

— (1990), ‘The Epistemological Basis of Aristotelian Dialectic’, in Devereux D. et Pellegrin P. (1990), 185-236.

— (1994), ‘Aristotle's Conception of Metaphysics as a Science’ in Scaltsas T., Charles D., and Gill M.L. (1994), 321-354.

— (1995), ‘Science and the Science of Substance in Aristotle’s *Metaphysics* Z’, *Pacific Philosophical Quarterly*, 76, 419-469.

— (2010), ‘Biology and metaphysics in Aristotle’, in Lennox J. and Bolton R. (2010), 30-55.

Bolton R. and Lennox J. (2010) (eds.), *Being, Nature, and Life in Aristotle*, Cambridge: Cambridge University Press.

Bonitz H. (1870), *Index Aristotelicus*, Berlin: Graz.

Bronstein D. (2016), *Aristotle on Knowledge and Learning*, Oxford: Oxford University Press.

Brunschwig (1990), ‘Remarques sur la communication de Robert Bolton’, in Devereux D. et Pellegrin P. (1990), 237-262.

Burnyeat M. (1981), ‘Aristotle on Understanding Knowledge’, in Berti E. (1981), 97-139.

— (2001), *A Map of* Metaphysics *Zeta*, Pittsburgh: Mathesis Publications.

Castagnoli L. (2013), ‘Aristotle on Begging the Question’, *Logical Analysis & History of Philosophy*, 15, 90-121.

Cavini W. (1995), ‘Naming and Argument: Diairetic Logic in Plato’s *Statesman’*, in Rowe C. (ed.), *Reading the* Statesman, Sankt Augustin: Academia Verlag, 123-138.

Chantraine P. (1968), *Dictonnaire Étymologique de la Langue Grecque*, 2 voll., Paris: Klincksieck.

Charles D. (1994), ‘Matter and Form: Unity, Persistence, and Identity’, in Scaltsas T., Gill M.L., and Charles D. (1994), 75-105.

— (2000), *Aristotle on Meaning and Essence*, New-York: Oxford University Press.

— (2010) (ed.), *Definition in Greek Philosophy*, Oxford: Oxford University Press.

— (2010a), ‘Definition and Explanation in Aristotle’s *Posterior Analytics* and *Metaphysics*’, in Charles D. (2010a), 286-328.

Cherniss H. (1944), *Aristotle's criticism of Plato and the Academy*, Baltimore: John Hopkins Press.

Chiaradonna R. (2014), 'La chair et le bronze. Remarques sur *Métaphysique* Z, 11 et l'interprétation de M. Frede et G. Patzig', L*es études philosophiques*, 110, 375-388.

Code A. (1984), 'The Aporematic Approach to Primary Being in *Metaphysics* Z', *Canadian Journal of Philosophy*, suppl. vol. 10, 1-20.

— (1997), 'Aristotle's Metaphysics as a Science of Principles', *Revue Internationale de Philosophie*, 201, 345-366.

— (2010), 'An Aristotelian puzzle about definition: *Metaphysics* Z.12', in Lennox J. and Bolton R. (2010), 78-96.

— (2011), 'Commentary on Devereux', *Proceedings of the Boston Area Colloquium in Ancient Philosophy*, XXVI, 197-210.

Crivelli P. (2013), *Plato on Falsehood*, Oxford: Oxford University Press.

Dahl N. (2003), 'On substance being the same as its essence in *Metaphysics* VII', *Ancient Philosophy*, 23.1, 153-179.

Deslauriers M. (2007), *Aristotle on Definition*, Leiden-Boston: Brill.

Devereux D. (1990), 'Comments on Robert Bolton's *The Epistemological Basis of Aristotelian Dialectic*', in Devereux D. et Pellegrin P. (1990), 263-286.

— (2003), ‘The Relation between Books *Zeta* and *Eta* of Aristotle’s *Metaphysics*’, *Oxford Studies in Ancient Philosophy*, XXV, 159-212.

— (2011), ‘Aristotle on the Form and Definition of Human Being’, in *Proceedings of the Boston Area Colloquium in Ancient Philosophy*, XXVI, 167-196.

Devereux D. et Pellegrin P. (1990) (eds.), *Biologie, Logique et Métaphysique chez Aristote*, C.N.R.S.-N.S.F., Paris: Les Belles Lettres.

DeMoss D.J. and Devereux D. (1988), ‘Essence, Existence, and Nominal Definition in Aristotle’s *Posterior Analytics* II.8-10’, *Phronesis*, 33, 133-154.

Driscoll J. (1981), ‘EIDĒ in Aristotle’s Earlier and Later Theories of Substance’, in O’Meara D. (1981), 129-159.

Evans J. (1977), *Aristotle’s Concept of Dialectic*, Cambridge: Cambridge University Press.

Ellis B. (2001), *Scientific Essentialism*, Cambridge: Cambridge University Press.

Fine K. (1994), ‘Essence and Modality’, *Philosophical Perspectives*, 8, 1-16.

— (1995a), ‘Senses of Essence’, in Sinnott-Armstrong W. (ed.), *Modality, Morality, and Belief: Essays in Honor of Ruth Barcan Marcus*, Cambridge: Cambridge University Press, 53-74.

— (1995b), ‘Ontological Dependence’, *Proceedings of the Aristotelian Society*, 95, 269-290.

— (1999), ‘Things and Their Parts’, *Midwest Studies in Philosophy*, 23, 61-74.

Fraser K. (2002), ‘Demonstrative Science and the Science of Being qua Being’, *Oxford Studies in Ancient Philosophy*, XXII, 43-82.

Frede M. (1981), ‘Categories in Aristotle’, in O’Meara D. (1981), 1-25.

— (1985), ‘Substance in Aristotle’s *Metaphysics*’, in Gotthelf A. (ed.), *Aristotle on Nature and Living Things*, Pittsburgh: Mathesis, 17-26.

— (1987), (ed.), *Essays in Ancient Philosophy*, Minneapolis: Minnesota University Press.

— (1987a), ‘The Unity of General and Special Metaphysics: Aristotle’s Conception of Metaphysics’, in Frede M. (1987), 81-95.

— (1987b), ‘Individuals in Aristotle’, in Frede M. (1987), 49-71.

— (1990), ‘The Definition of Sensible Substances in *Metaphysics* Z’, in Devereux D. et Pellegrin P. (1990), 113-129.

Frey C. (2007), ‘Organic Unity and the Matter of Man’, *Oxford Studies in Ancient Philosophy*, XXXII, 167-204.

Galluzzo G. (2013a), *The Medieval Reception of Book Zeta of Aristotle’s* Metaphysics, Leiden: Brill.

— (2013b), ‘Universals in Aristotle’s *Metaphysics’*, in Galluzzo G. and Chiaradonna R. (2013), 209-253.

— (2017), ‘Genus as Matter in Aristotle’s *Metaphysics*. A Reconsideration’, in Bertolacci A. and Paravicini Bagliani A. (eds.), *La filosofia medievale fra antichità ed età moderna. Saggi in onore di Francesco Del Punta*, Firenze: Edizioni del Galluzzo, 37-71.

Galluzzo G. and Mariani M. (2006), *Aristotle’s* Metaphysics *Book Z. The Contemporary Debate*, Pisa: Edizioni della Normale.

Galluzzo G. and Chiaradonna C. (2013), *Universals in Ancient Philosophy*, Pisa: Edizioni della Normale.

Gill M.L., (1989), *Aristotle on Substance. The Paradox of Unity*, Princeton: Princeton University Press.

— (2010), ‘Unity of definition in *Metaphysics* H.6 and Z.12’, in Lennox J. and Bolton R. (2010), 97-121.

— (2016), ‘Method and Metaphysics in Plato's *Sophist* and *Statesman’*, in Zalta E.N. (ed.), *The Stanford Encyclopaedia of Philosophy*, Stanford: Stanford University Online.

Goldin O. (1996), *Explaining an Eclipse: Aristotle’s* Posterior Analytics *2.1-10*, Ann Arbor: Michigan University Press.

Gotthelf A. and Lennox J. (1987) (eds.), *Philosophical Issues in Aristotle’s Biology*, Cambridge: Cambridge University Press.

Graham D.W. (1987), *Aristotle's Two Systems*, Oxford: Oxford University Press.

Granger H. (1981), 'Aristotle on Genus and Differentia', *Journal of the History of Philosophy*, 22, 1-23.

— (1984), 'The Differentia and the *Per Se* Accident in Aristotle', *Archiv für Geschichte der Philosophie*, 62.2, 118-129.

Halper E.C. (1989), *One and Many in Aristotle's* Metaphysics, Columbus: Parmenides Publishing (reprinted in 2005).

Harte V. (1996), '*Metaphysics* H6: A Dialectic with Platonism', *Phronesis*, 41, 276-304.

Haslanger S. (1994), 'Parts, Compounds, and Substantial Unity', in Scaltsas T., Gill M.L., and Charles D. (1994), 129-170.

Irwin T. (1988), *Aristotle's First Principles*, Oxford: Oxford University Press.

Jaeger W. (1917), 'Emendationum Aristotelearum Specimen', reprinted in Jaeger W. (1960) (ed.), *Scripta Minora*, Roma: Edizioni di Storia e Letteratura, 1-38.

Koslicki K. (2008), *The Structure of Objects*, Oxford: Oxford University Press.

Kripke S. (1980), *Naming and Necessity*, Oxford: Blackwell.

Lennox J. (1987), ‘Divide and Explain. The Posterior Analytics in Practice’, in Gotthelf A. and Lennox J. (eds), *Philosophical Issues in Aristotle’s Biology*, Cambridge: Cambridge University Press, 90-119.

Lennox J. and Bolton R. (2010) (eds.), *Being, Nature, and Life in Aristotle*, Cambridge.

Lewis F. (2013), *How Aristotle gets by in* Metaphysics *Zeta*, Oxford: Oxford University press.

Locke J. (*Essay*), *Essay on Human Understanding*, edited by Nidditch P.H., Oxford: Oxford University Press, 1975.

Loux M. (1991), *Primary Ousia: an essay on Aristotle’s* Metaphysics Z-H, Ithaca-London: Cornell University Press.

— (2006), ‘Aristotle’s Constituent Ontology’, *Oxford Studies in Metaphysics*, 2, 207-250.

Lowe J. (1998), *The Possibility of Metaphysics*, Oxford: Oxford University Press.

Malink M. (2007), ‘Categories in *Topics* I.9’, *Rhizai*, IV.2, 271-294.

Mansion S. (1948), *Le jugement d’existence chez Aristote*, Louvain: Éditions de l’institut supérieur de philosophie.

Mariani M. (1997), ‘Aristotele e la differenza’, in Fabris A., Fioravanti G., e Moriconi E. (eds.), *Logica e Teologia. Studi in onore di Vittorio Sainati*, Pisa: ETS, 3-21.

McKirahan R. (1992), *Principles and Proofs*, Princeton: Princeton University Press.

Menn S. (2001), ‘*Metaphysics* Z.10-16 and the Argument-Structure of *Metaphysics* Z’, *Oxford Studies in Ancient Philosophy*, XXI, 83-134.

Mensch W. (1996), ‘Die Teile Der Definition’, in Rapp C. (1996), 135-156.

Morrison D. (1990), ‘Some Remarks on Definition in *Metaphysics* Z’, in Devereux D. et Pellegrin P. (1990), 113-129.

— (1993), ‘Le statut catégoriel des differences dans *l’Organon*’, *Revue philosophique*, 2, 147-178.

Moraux P. (1968), ‘La joute dialectique d’après le huitième livre des *Topiques’* in Owen (1968), 277-311.

Oderberg D. (2007), *Real Essentialism*, London: Routledge.

— (2014), ‘Is Form Structure?’ in Novotný D.D. and Novák L. (eds), *Neo-Aristotelian Perspectives in Metaphysics*, London: Routledge, 164-80.

O’Meara D. (1981) (ed.), *Studies in Aristotle*, Washington D.C.: The Catholic University of. America Press.

Owen G.E.L. (1960), ‘Logic and Metaphysics in Some Earlier Works of Aristotle’, in Düring I. and Owen G.E.L. (eds.), *Aristotle and Plato in the mid-Fourth Century*, Götenborg: Studia Graeca et Latina, 160-190.

— (1961), ‘*Tithenai ta phainomena*’, in Mansion S. (ed.), *Aristote et les problème de méthode*, *Proceedings of the 2nd Symposium Aristotelicum*, Louvain: Publications Universitaires de Louvain, 83-103.

— (1965), ‘*Aristotle on the Snares of Ontology*’, in Bambrough R. (ed.), *New Essays on Plato and Aristotle*, London: Routledge and Kegan Paul, 69-75.

— (1966), ‘*The Platonism of Aristotle*’, *Proceedings of the British Academy*, 51, 125-150.

— (1968), *Aristotle on Dialectic: The* Topics. *Proceedings of the 3rd Symposium Aristotelicum*, Oxford: Clarendon Press.

— (1968a), ‘Dialectic and Eristic in the Treatment of the Forms’, in Owen G.E.L. (1968), 103-125.

— (1978-9), ‘Particular and General’, *Proceedings of the Aristotelian Society*, 79, 1-21.

Patzig G. (1960), ‘Theologie und Ontologie in der *Metaphysik* des Aristoteles’, *Kant-Studien*, 52, 185-205.

Peramatzis M. (2010), ‘Essence and *per se* Predication in Aristotle’s *Metaphysics* Z 4’, *Oxford Studies in Ancient Philosophy*, XXXIX, 121-182.

— (2011), *Priority in Aristotle's* Metaphysics, Oxford: Oxford University Press.

Primavesi O. (2012), 'The Transmission of the Text and the Riddle of the Two Versions', in Steel C. and Primavesi O. (eds.), *Aristotle's* Metaphysics *Alpha*: *Proceedings of the 18th Symposium Aristotelicum*, Oxford: Oxford University Press: 387-457.

Putnam H. (1973), 'Meaning and Reference', *The Journal of Philosophy*, LXX, 699-711.

— (1983), 'Possibility and Necessity', in Putnam H., *Philosophical Papers* III, Cambridge: Cambridge University Press, 46-68.

Quine W.V.O. (1953), 'Reference and Modality', in Quine W.V.O., *From a Logical Point of View*, Cambridge: Harvard University Press, 139-159.

Rapp C. (1996) (ed.), Metaphysik: *Die Substanzbücher*, Berlin: Akademie Verlag.

— (1996a), 'Substanz als vorrangig Seiendes. Z.1', in Rapp C. (1996), 27-40.

— (1996b), 'Kein Allgemeines ist Substanz. Z.13, 14-16', in Rapp C. (1996), 157-191.

— (2016), 'The Principles of Sensible Substances in *Metaphysics* Λ.1-5', in Horn C. (ed.), *Aristotle's* Metaphysics Λ. *New Essays*, Boston-Berlin: De Gruyter, 87-118.

Rorty R. (1973), ‘Genus as Matter: a reading of *Metaphysics* Z-H’, in Lee E.N., Mourelatos A.P.D., and Rorty R. (eds.), *Exegesis and Argument*, Assen, 393-420.

Scaltsas T. (1994a), ‘Substantial Holism’ in Scaltsas T, Gill M.L., and Charles D. (1994), 107-128.

— (1994b), *Substances and Universals in Aristotle’s* Metaphysics, Ithaca: Cornell University Press.

Scaltsas T., Gill M.L., and Charles D. (1994) (eds.), *Unity, Identity and Explanation in Aristotle’s* Metaphysics, Oxford: Oxford University Press.

Sellars W. (1967), ‘Aristotle’s *Metaphysics*: An Introduction’, *Philosophical Perspectives*, III, 73-124.

Sholz H. (1975), ‘The Ancient Axiomatic Theory’, in Barnes J., Schofield M., and Sorabji R. (eds.), *Articles on Aristotle. Science*, London: Duckworth, 1975, 50-64.

Simons P. (2000), *Parts: A Study in Ontology*, Oxford: Oxford University Press.

Solmsen F. (1968), ‘Dialectic without Forms’, in Owen G.E.L. (1968), 49-68.

Wedin V. (2000), *Aristotle’s Theory of Substance: The* Categories *and* Metaphysics *Zeta*, Oxford: Oxford University Press.

Whiting J. (1991), ‘Metasubstance: A Critical Notice of Frede-Patzig and Furth’, *The Philosophical Review*, 100, 607-639.

Witt C. (1989), *Substance and Essence in Aristotle: An Interpretation of* Metaphysics VII-IX, Ithaca: Cornell University Press.

Woods M. (1967), ‘Problems in *Metaphysics* VII 13’, in Moravcsik J. (ed.), *Aristotle*: *A Collection of Critical Essays*, New York: Anchor, 215–238.

— (1974-75), ‘Substance and Essence in Aristotle’, *Proceedings of the Aristotelian Society*, 75, 167-180.

— (1991), ‘Universals and Particular Forms in Aristotle’s *Metaphysics’*, *Oxford Studies in Ancient Philosophy*, suppl. vol.: *Aristotle and the Later Tradition*, 41–56.