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A pursuit of ontological truth in Aristotle's philosophy

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Chapter Five

Essences in Demonstrations

The starting point of my argument was to analyse ‘being in the strictest sense as truth’ as truth in incomposites and truth in composites. Given the hierarchy of truth and being observed in chapters Three and Four, the aim of this chapter is to show the connection between demonstrations and essences as truth of incomposites in *Metaphysics* Θ.10, which always remains the same and true. Thus being as truth applies to them in such a way that they are always what they are in actuality (1051b30-31); we can only touch, or express them; there is no falsity in them.

Given the character of essences as truth in incomposites, which are always true and in actuality, the definition as an account of the essence can function as the indemonstrable first principle of demonstrations. The connection between truth of essences and truth of demonstrations will be discussed in chapter Five. This feature of essences being truth make them admirably suitable to function as the first principles in demonstrations, as we shall now proceed to explore. We shall see that essences, or their expression in language, i.e., definitions, serve to ground the truth of the premises, and thereby the truth of the conclusions of demonstrations.

In her study of Aristotelian definitions, Deslaurier has distinguished four kinds of definition.²³⁶ The so-called nominal definition (the statement of what a term means) serves as the primary step towards the identification of two further types of definition that exhibit a cause, and thereby offer an explanation, to wit an immediate definition or a syllogistic definition. The syllogistic definitions provide a cause which is different from, or external to, that of which it is the definition. Immediate definitions provide a cause which is itself part of that of which it is the definition, i.e. part of the unity that is the essence.

As we shall see, Aristotle gives priority to immediate definitions. In the *Metaphysics* Aristotle claims that the immediate definitions are causal definitions for the essences of simple things. Thus, immediate definitions can function as the indemonstrable first principles. Because of this essential link, immediate definitions provide the necessity required from the first principles of demonstrations.

Ultimately, the foundation of truth of a demonstration expressed as a truth of a conclusion is based on the immediate definitions, which is what is always true by revealing essences that are always in actuality. What is more, essences have been identified as an example of truth in simple things introduced in *Metaphysics* Θ.10 (see chapter Two). In order to analyse connections between essences and demonstrations, one has to show how the truth of conclusions of demonstrations shall be ultimately guaranteed by the immediate definitions as the first principles – and the immediate definitions are accounts of essences that are simple

²³⁶ Deslauriers, 2007, 44.

things mentioned in *Metaphysics* Θ.10. In the end, the certainty of demonstrations shall also be considered as the basis for achievements of knowledge as the highest actualization of potentiality of human beings.

1. The structure of demonstrations

For Aristotle, a demonstration is a syllogism in which the premises contain the explanation of the fact stated in the conclusion; every syllogism with this feature is a demonstration. In order to answer the question of what guarantees the truth of demonstrations we need to clarify what a demonstration is according to Aristotle.

T64: By demonstration I mean a scientific deduction; and by scientific I mean one in virtue of which, by having it, we understand something. If, then, understanding is as we posited, it is necessary for demonstrative understanding in particular to depend on things which are true and primitive and immediate and more familiar than and prior to and explanatory of the conclusion (for in this way the principles will also be appropriate to what is being proved). For there will be deduction even without these conditions, but there will not be demonstration; for it will not produce understanding. (*A. Pst.* I.2, 70b18-70b24)

Aristotle introduces demonstrations by means of deductions,²³⁷ which is a main topic in the *Prior* and *Posterior Analytics* and the *Topics*.²³⁸ If demonstrations exist, there are things which are premises of demonstrations that are true, primary, and immediate, and also more intelligible than, prior to, and grounds for the conclusions. Without these demonstrations will not exist.

Here, we are getting a list of characteristics of things that can serve as the starting-point of demonstrations: they are true, primary, immediate, better known than, prior to, and grounds of the conclusion. It is clear why the premises of a demonstration must be true – since they must be known, and it is impossible to know something that is not true.²³⁹ More than that, the premises of a demonstration must be primitive and immediate in the sense of being indemonstrable.²⁴⁰

Aristotle explains that things can be said to be more familiar and prior in two senses: 1) that things are more familiar and prior in relation to us when they are closer to perception; and 2) that they are more familiar and prior absolutely or by nature when they are further from perception. In this regard, the premises of demonstrations must by their nature be more familiar than and prior to the conclusion because of these requirements – for example, that the premises of demonstration must be causes of the conclusion.²⁴¹ To know scientifically is to

²³⁷ *Top.* I.1, 100a25-101a4. *A.pr.* I.4, 25b30. *A.Pst.* I.2, 71b18

²³⁸ In point of fact, that definition is more restrictive than Aristotle intends. He will allow that a deduction is a demonstration even in cases in which its premises are not—or not all—principles. The point is made most clearly in: the *Top.* I.1, 100a27-100a9, 100b18-100b21, 100b26-100b27; *A.Pst.* I.10, 76b10; *Rhet.* I, 1357a7

²³⁹ *A.Pst.* I.2, 71b25-71b26.

²⁴⁰ *A.Pst.* I.2, 71b25-71b29.

²⁴¹ *A.Pst.* I.2, 71b31-71b32

know by means of the cause, and causes are by nature prior to, and more familiar than their effects.²⁴²

The premises and the conclusion of a demonstration must be necessary. With reference to affirmations or negations, this structure can be further expressed as “A belongs (not) to C because of B.” Similarly, a structure of demonstration could be expressed as “A belongs to B, B belongs to C, and therefore, A belongs to C.” After introducing the basic structure of demonstrations in a general sense, the next topic should be to discuss in detail the corresponding parts of the whole structure of demonstrations so that to know their implications on the connection between essences and demonstrations.

2. Immediate definitions as the indemonstrable first principles of demonstrations

Since we learnt from T66 that our demonstrative understanding should depend on things that are true and primitive and immediate and more familiar than and prior to and explanatory of the conclusion, what we need to do is identify these things. Aristotle introduces definitions to account for what a thing is by means of setting up a list of types of definition in the *Posterior Analytics* II 10 so as to pick up one kind of definition that is always true, primitive and immediate to function as the indemonstrable first principles of demonstrations.

T65: Since a definition is said to be an account of what a thing is, it is evident that one type will be an account of what the name, or a different name-like account, signifies—e.g. what triangle signifies. And when we grasp that this is, we seek why it is; but it is difficult to grasp in this way why a thing is if we do not know that it is. The explanation of the difficulty has been stated already—that we do not even know whether it is or not, except accidentally. (An account is a unity in two ways—either by connection, like the Iliad, or by making one thing clear of one thing non-accidentally.) Thus one definition of definition is the one stated. (*A. Pst.* II.10, 93b29-93b38)

T66: Another definition is an account which makes clear why a thing is. Hence the former type of definition signifies but does not prove, whereas the latter evidently will be a sort of demonstration of what a thing is, differing in position from the demonstration. For there is a difference between saying why it thunders and what thunder is; for in the one case you will say: Because the fire is extinguished in the clouds. What is thunder?—A noise of fire being extinguished in the clouds. Hence the same account is put in a different way, and in this way it is a continuous demonstration, in this way a definition. Again, a definition of thunder is noise in the clouds; and this is a conclusion of the demonstration of what it is. The definition of immediates is an indemonstrable positing of what they are. One definition, therefore, is an indemonstrable account of what a thing is; one is a deduction of what it is, differing in aspect from the demonstration. (*A. Pst.* II.10, 93b38-94a12)

T67: A third is a conclusion of the demonstration of what it is. So it is evident from what has been said, both in what way there is a demonstration of what a thing is, and in what way there is not; and in what cases there is and in what cases there is not; and again in how many ways something is called a definition,

²⁴² Bellucci, 2018, 410-428.

and in what way it proves what a thing is and in what way it does not, and in what cases it does and in what cases it does not; and again how it is related to demonstration and in what way it is possible for them to be of the same thing and in what way it is not possible. (*A. Pst.* II.10, 94a12-94a19)

These passages show that the list of types of definition includes 1) an account of what a word or some other account in words signifies (nominal definition), 2) an account in the form of a demonstration, which differs from definition only in “aspect”, i.e. in the arrangement of its parts, and which makes clear why a thing is; Deslauriers calls this ‘syllogistic definition’, 3) the conclusion of such a demonstration, and 4) an indemonstrable account of what a thing is, which has been coined ‘immediate definition’ by Deslauriers.²⁴³ As we can see from this list, only certain items will have definitions that can be displayed in demonstrations, while others will be strictly indemonstrable, and hence suitable for the role of the first premises of demonstrations.

The first sentence of T65 implies that a nominal definition, simply in virtue of being a kind of definition, will be some account of what a thing is. T65 indicates that the nominal definitions do not assume or state that the object of definition exists, but that nominal definitions do nonetheless give us some knowledge of the existence of that object. As Deslauriers remarks that this view is important because it explains the purpose of nominal definitions relative to the syllogistic definition and immediate definitions. Both syllogistic definition and immediate definition are capable of providing knowledge adequate for identifying instances of the object of definition.²⁴⁴

In a word, we can use a nominal definition to say something of what a thing is, and a nominal definition is somehow involved in establishing that the object of definition exists. Although the nominal definition is not a complete definition, the nominal definitions may mention something of what the thing is, and this will be a non-accidental feature of that thing.

Then, Aristotle goes on to say that once we grasp that, for example, there are triangles, we go on to ask why. One can know what “triangle” means without knowing that it exists, and in using “triangle” as the example of an object of nominal definition in T65, Aristotle suggests precisely that knowing that something exists is not a requirement for having a nominal definition. This shows that having a nominal definition and grasping that the item it defines exists, are somehow connected.²⁴⁵

Considering the basic ability of nominal definitions, that is the first step we have when we begin to know, it is obvious that the nominal definitions is preliminary not only to the syllogistic definitions, but also to the immediate definitions. Since, to grasp that the object of definition exists and to pick out instances of that object is the first step to knowing the reason or cause of what it is. Then, once we can pick out instances of the object in question, we can determine the complete definition of that object, whether syllogistic or immediate.²⁴⁶

²⁴³ Deslauriers, 2007, 44.

²⁴⁴ Deslauriers, 2007, 70.

²⁴⁵ Demoss and Devereux, 1988, 134.

²⁴⁶ Deslauriers, 2007, 75.

T66 shows that the immediate definition is an indemonstrable account of what a thing is. Thus, the immediate definitions constitute the type of definition that we are seeking as the first principles of demonstrations, since there is no middle term that can demonstrate the connection between subject and predicate or substance and attribute.

3. Syllogistic definitions as a conclusion of a demonstration

Besides the nominal definitions and the immediate definitions, T67 introduces the third kind of definition which Deslauriers has coined the syllogistic definition, which serves as a conclusion of a demonstration. The syllogistic definitions are able to account for an item that involves a connection between two things, rather than for simple items, and they include a cause that is distinct in a special sense from that what is defined, as well as they are displayed in demonstrations rather than in propositions or phrases. By contrast, the immediate definitions account for simple items in that they do not have something else as their causes, but causes which are not distinct from themselves. That is the reason why the syllogistic definition as a conclusion of demonstration needs the help of the middle terms.

T68: Since, as we said, to know what something is and to know the explanation of the fact that it is are the same—the argument for this is that there is some explanation, and this is either the same thing or something else, and if it is something else it is either demonstrable or non-demonstrable—if, then, it is something else and it is possible to demonstrate it, it is necessary for the explanation to be a middle term and to be proved in the first figure; for what is being proved is both universal and affirmative. (*A. Pst.* II.8, 93a3-93a9)

In this passage, Aristotle offers an argument for his claim in the first part of the sentence that it is the same to know what something is and to know the explanation or cause of that it is. This argument is that there is some explanation or cause for both, and that it is either the same or other. If it is other, it is either demonstrable or indemonstrable. In some cases the explanation or cause is something other than what the thing itself is, and in other cases it is the same as what the thing itself is.

The distinction of the immediate definitions and the syllogistic definitions has been observed by Harari (2004) who suggests that this cognitive distinction derives from the distinction of ontological modes of being, which is the distinction between subjects and attributes. She concludes that the distinction between the modes of cognition appropriate for the attainment of the first principles and demonstrative knowledge are explained by means of the ontological distinction between entities whose cause is external and entities that include their cause within themselves.²⁴⁷

So, for the syllogistic definition as a conclusion of demonstration, we have to be concerned with the middle terms as the explanation or cause that is something other. Aristotle gives us several examples, including the examples of what is thunder and what is an eclipse, to show

²⁴⁷ Harari, 2004.

his view on the syllogistic definitions that has to be captured with the help of the middle terms in demonstrations.

T69: What is thunder? Extinction of fire in cloud. Why does it thunder? Because the fire in the cloud is extinguished. Cloud C, thunder A, extinction of fire B. Thus B belongs to C, the cloud (for the fire is extinguished in it); and A, noise, to this; and B is indeed an account of A, the first extreme. And if again there is another middle term for this, it will be from among the remaining accounts. (*A. Pst.* II.8, 93b8-93b14)

The example in this passage can be reconstructed as follows: a): A cloud has extinction of fire. b): Extinction of fire is thunder/noise in clouds. c): A cloud has thunder/noise in clouds.

Based on the T69, we can be able to read a syllogistic definition off the demonstration as a whole: thunder is a noise in the clouds caused by quenching of fire. This is the example of a syllogistic definition offered by Aristotle in T69. As we can see, the middle term is what brings about the conjunction expressed in the conclusion. The noise in the clouds is thunder only if it is brought about by the extinction of fire in clouds. Then, the middle term as the efficient cause is thus required as a part of the essence. This line of argument is very significant. It is precisely because in some cases we cannot say what the object of definition is without saying how it came to be that Aristotle thinks in some cases, we must state the efficient cause as well as the formal cause.²⁴⁸

Furthermore, a second example of syllogistic definition can be further observed in the following passage:

T70: So in cases in which we grasp something of what the thing is, let it be first like this:—eclipse A, moon C, screening by the earth B. So [to ask] whether it is eclipsed or not is to seek whether B is or not. And this is no different from seeking whether there is an account of it; and if this is, we say that that is too. (*A. Pst.* II.8, 93a29-93a32)

As Aristotle presents it, the demonstration that will display a definition of eclipse would look like this: a): All screening by the earth is eclipse. b): The moon is screened by the earth. c): The moon is eclipsed.

But this does not seem to be a demonstration that displays a definition of eclipse, nor does its conclusion seem to say something of what eclipse is. If, however, we replace “eclipse” with “privation of light”, which we seem to be entitled to do given the example at 93a23, then, we have the following demonstration: a): All that is screened by the earth is deprived of light. b): The moon is screened by the earth. c): The moon is deprived of light.²⁴⁹

The conclusion mentions something of what eclipse is, namely that is a certain deprivation of light, so it is a syllogistic definition. From the conclusion and the middle term we can

²⁴⁸ Deslauriers, 2007, 89-90.

²⁴⁹ *A.Pst.* II.8, 93a22-a24.

construct the syllogistic definition of eclipse, “a deprivation of light caused by screening by the earth.”

We now have sufficient evidence to conclude that the efficient cause acts as middle term in syllogistic definitions. Just as the examples that we have observed in T69 and T70, the examples of syllogistic definition in T70 involve the middle term that is the extinction of fire as the efficient cause. As Max Hocutt (1974) has remarked: “In the *Analytica Posteriora* Aristotle not only says everything he says in the *Physics*, and in greater detail, but he adds further important points. The most important new point in the *Analytica Posteriora* is a new definition of ‘cause’: a cause is the middle term of a syllogism.”²⁵⁰

When searching for a causal explanation in demonstrations, Aryeh Kosman (2014) implies that we also look for a description appropriate to a subject such that the subject under that description is *per se* the predicate in question. Aristotle terms such a description as the middle, which means that it is a description that links subject and predicate, providing the intelligible source of explanation and the real ground of the subject exhibiting the predicate.²⁵¹ In this case, what is revealed in a demonstration in Aristotle’s understanding is this very middle, the cause and nature of the phenomenon in question.

More precisely, Aristotle asserts that the middle term is the cause that relates the major to the minor term in the premises and thereby causally explains the truth of the syllogistic definition that is a conclusion of the syllogism. Aristotle discusses at length how the middle term in a syllogism is the cause of the truth of the conclusion. In order to promise the truth of conclusions, the middle terms serve in this mediating role to state why a conclusion holds from the first principles. The middle terms as causes of conclusions in demonstrations are necessarily true since the middle terms are efficient causes of conclusions. We can conclude that, for syllogistic definitions, the middle term is a necessary intermediate step for a demonstration from an indemonstrable principle to a conclusion. In this case, the process of searching for essences as causes of a certain phenomenon is a process of demonstration in virtue of the first principles, the middle terms, and the conclusions. We can learn that a conclusion is a result of the whole operation of demonstrations through the non-demonstrable principles and the middle terms as efficient causes.

Based on the indications above, it is clear that all four types of definition have some role to play in demonstrations: as premises (type [4] and some of type [1]), as a kind of demonstration (type [2]), and syllogistic definitions as conclusions of that kind of demonstration (type [3], which is identical with some of type [1]). So although no definition, strictly speaking, is demonstration, all the types of definition that Aristotle recognizes as legitimate are connected with demonstration.²⁵²

As the line of argument shows, the discussion of definitions starts with the nominal definitions that are closer to us. With the help of the nominal definitions, we can grasp the immediate definitions and the syllogistic definitions. Aristotle uses the thunder example to get to the real definition that is primary by nature and knowledge. In this process, the thunder

²⁵⁰ Hocutt, 1974, 388, 8.

²⁵¹ Kosman, 2014.

²⁵² Deslauriers, 2007, 80.

example also shows how a definition is used in the premises in which it is not simply a premise itself, but parts are used as terms in the syllogisms so that the premises become immediate, i.e. without need of a further middle to explain them. To grasp true definitions is the kind of contact mentioned in $\Theta.10$. Here we can see how the truth of a demonstration depends on the ontological truth of essences, thus confirming the hierarchy of being true on which chapter Four ended.

4. Objects of definitions

We now need to ask why these different definitions can perform their roles, and what is the ground of these various definitions. For Aristotle claims that the distinctions among definitions rest on his conviction that there are different kinds of causes or principles.

Reflecting on these four types of definition, the objects of definition can be divided into two types in term of explanations or causes that can be seen in T69 and T72.

T71: Of some things there is something else that is their explanation, of others there is not. Hence it is clear that in some cases what a thing is is immediate and a principle; and here one must suppose, or make apparent in some other way, both that they are and what they are (which the arithmetician does; for he supposes both what the unit is and that it is); but in those cases which have a middle term and for which something else is explanatory of their substance, one can, as we said, make them clear through a demonstration, but not by demonstrating what they are. (*A. Pst.* II.9, 93b22-93b28)

There are some points that we can learn from these passages. Firstly, as we said before, there is more than one kind of principle or cause, including a principle or cause which is something other than what the thing itself is, and in other cases a principle or cause which is the same as what the thing itself is. Secondly, in line with his view that the structure of a definition reflect the structure of the objects of the definition, Aristotle identifies the object of the immediate definitions as something simple that does not have an explanation or cause other than itself, and identifies the object of the syllogistic definitions as something complex which does have an explanation or cause other than itself. The object of the syllogistic definitions is something complex that has principles or causes in other things than itself; examples of this have been observed in T70 as what is thunder and what is eclipse in T71.

By contrast with the object of the syllogistic definitions, the object of the immediate definitions are simple things that are immediate, indemonstrable and always true. Since the immediate definitions account for simple things, they have causes not distinct from themselves, so they cannot be displayed in demonstrations.

In this sense, the distinction between the immediate definitions and the syllogistic definitions is a distinction between demonstrable and non-demonstrable terms.²⁵³ In order to make clear the particular function of the immediate definitions as the first principles that are indemonstrable, the term necessity has been introduced to specify the immediate definitions

²⁵³ Deslauriers, 2007, 64.

as the indemonstrable first principles of demonstrations. Firstly, what Aristotle means by “necessary” is to be found in the *Metaphysics*:

T72: That which cannot be otherwise is said to be necessary [...] Again, a demonstration is necessary in view of the fact that, if something has been demonstrated without qualification, it cannot be otherwise; and the causes of this are the first premises, if these, from which a syllogism proceeds, cannot be otherwise. Accordingly, of some things which are necessary, the cause is something distinct from them, but of other things there is no cause distinct from them, but because of them other things are necessary. Hence, the necessary in the primary and main sense is the simple, for this cannot be in many ways so as to be now in one way and now in another, but if the latter were the case it would have been in many ways. (*Met.* Δ.5, 1015a32; 1015b6-1015b14)

T73: Since it is impossible for that of which there is understanding simpliciter to be otherwise, what is understandable in virtue of demonstrative understanding will be necessary (it is demonstrative if we have it by having a demonstration). Demonstration, therefore, is deduction from what is necessary. We must therefore grasp on what things and what sort of things demonstrations depend. And first let us define what we mean ‘by holding of every case’ and what by ‘in itself’ and what by ‘universally’. (*A. Pst.* I.4, 73a21-73a27)

According to these passages, we can see that there is a question as to what demonstrations depend on, and the answer would be what is necessary that which cannot be otherwise. So, it is clear that something that cannot be otherwise should be necessary. And then Aristotle here explicitly connects the two senses of the necessary with two kinds of items: those that have a cause not distinct from themselves, and those that do. The first kind of necessary is the necessity of the first principles that have causes identified with themselves, for what belong to objects in themselves is necessary, while the second necessity is the necessary conclusion of a demonstration with causes distinct from itself. More importantly, as T73 shows, Aristotle’s claim is that the premises and the conclusion of demonstration are necessary, and the necessity of the conclusion is established by the necessity of the premises. In a word, the necessity of the first principles of demonstrations is the ultimate ground of the necessity of the conclusion of demonstrations. In this case, the necessity of the immediate definitions that are first principles is non-derived, while the necessity of conclusions is derived from the necessity of the first principles.

Moreover, both of these passages clearly specify that the necessary is the simple in the primary and main sense, and it is impossible to understand the simple things to be otherwise. As we discussed above in chapters Two and Four, the simple things are the object of the immediate definitions which are true, immediate, primitive and indemonstrable, so the simple things should be true, immediate, primitive and indemonstrable too.

Since simple things as the object of the immediate definitions are responsible for being indemonstrable, and being indemonstrable is part of the internal structure of immediate definitions, they are capable of serving as the first principles of demonstrations. Thus, the

necessity of the first principles should be identified with the necessity of the immediate definitions, and the necessity of the immediate definitions should be ultimately attributed to the necessity of simple things.

Given that immediate definitions are of what is simple, and are not concerned with a cause other than themselves,²⁵⁴ the object of the immediate definitions are the objects that do not have a cause other than themselves, which could be serve as evidence for the immediate definitions' being necessary in the primary sense, as simple. The immediate definitions as causal definitions for simple things in *Metaphysics* are the accounts of essences. So this necessity too is a function of causality, in that such definitions, for example, the first principles, are necessary because of the necessary relation between the attributes that is the cause of its object. What is more, the necessity in the primary sense as the simple corresponds to the simple things that Aristotle has classified and clarified as essences in *Metaphysics* Θ.10.

The necessity of the immediate definitions as first principle can only be the necessity that makes something what it is, since one cannot demonstrate what something is. In this case, this necessity is indemonstrable and non-derived. But, the absolute necessity of immediate definitions in one feature that allows such definitions to have the certainty required by the first principles, and the certainty that they are indemonstrable. Therefore, the necessity of the first principle is the necessity of the immediate definition, and the necessity of the object of immediate definition is the necessity of the simple things, which is essences of simple things. Our next task is to explain this necessity.

T74: Whatever, therefore, in the case of what is understandable simpliciter, is said to belong to things in themselves in the sense of inhering in the predicates or of being inhered in, holds both because of themselves and from necessity. (*A.Pst* .I.4,73b16-73b18)

T75: Now if demonstrative understanding depends on necessary principles (for what one understands cannot be otherwise), and what belongs to the objects in themselves is necessary (for in the one case it belongs in what they are; and in the other they belong in what they are to what is predicated of them, one of which opposites necessarily belongs), it is evident that demonstrative deduction will depend on things of this sort; for everything belongs either in this way or accidentally, and what is accidental is not necessary. (*A. Pst*. I.6,74b5-74b12)

The necessity of both immediate and syllogistic definitions is a function of essential predication. Whatever belongs to things in themselves is necessary as mentioned in T75. Aristotle argues that necessary first principle will be predications of essential attributes to some objects, and the syllogistic definitions will also be predications of essential attributes of their subjects.

Based on T74, Aristotle distinguishes two kinds of essential attributes, the predication of which of some subject constitutes necessary propositions, in the former case, this amounts to saying that these attributes are or are parts of the essence; in the latter, that that to which they

²⁵⁴ Deslauriers, 2007, 104.

belong is or is part of the essence of the attribute. In either case, the necessary predication is necessary because it is a predication of an essential attribute, and such an attribute stands in a particular causal relation to that of which it is predicated. Therefore, the particular causal relation will be either (i) the attribute is or is some part of the essence of the subject or (ii) the subject is or is some part of the essence of the attribute.²⁵⁵

Both sorts of attribute can be attributed to all members of the species to which they belong as such, and both sorts belong to their subjects “because of themselves”, because they follow immediately on the nature of the thing in question. As Deslauriers remarks that: “because these attributes belong ‘because of themselves’ to their subjects they are also necessary, since either a) they must belong to their subjects or their subjects would not be what they are (in the case of parts of the essence) or b) they occur whenever the essence occurs, and as a consequence of the essence.”²⁵⁶

In conclusion, causality and necessity in demonstrations are thus internally connected. There are reasons for this argument. Firstly, the first principles are necessary propositions because they predicate the essence of the subject. And secondly, the conclusions of demonstrations are necessary propositions because their predicates express an essential attribute of the subject that is not part of the essence of the subject but follows from that essence, and the subject, because it belongs to the definition of the predicate, is the cause or part of the cause of the predicate.²⁵⁷

5. Two kinds of knowledge²⁵⁸

Based on what we have acquired from the research above, the knowledge can be divided into the demonstrative knowledge based on demonstrations as well as the indemonstrable knowledge. Demonstrative knowledge is possible with regard to attributes since their dependent mode of existence entails their dependence on middle terms. Similarly, non-demonstrative knowledge is applicable to substances due to their ontological primacy, which manifests itself in the absence of external causes and hence of middle terms.

Orna Harari (2004) sets forth her own understanding of the relationship between knowledge and demonstrations. According to her interpretation, knowledge of the fact is attained by a verbal account that defines an attribute according to its perceptual characteristics, whereas knowledge of the reason why is attained by a definition that specifies conceptual characteristics. This latter type of definition is revealed indirectly through demonstrations: in demonstrations the attribute of the conclusion is subsumed under the middle term, which specifies its essence. Hence demonstrations are processes that mediate between two types of understanding, the perceptual and conceptual. In her view, a demonstration, like induction, involves a modification of content which results in a conceptualization. This is because an

²⁵⁵ Deslauriers, 2007, 105.

²⁵⁶ Deslauriers, 2007, 105.

²⁵⁷ Deslauriers, 2007, 108-109.

²⁵⁸ In *NE*. VI.3, 1139b15–1139b17, Aristotle lists philosophical wisdom among the five ways the psyche possesses truth by means of affirmation and denial: technical knowledge, demonstrative knowledge, practical wisdom, philosophical wisdom, and noetic comprehension. Each of these modes of cognition, according to Aristotle, essentially involves the psyche possessing truth by means of acts of assertion.

induction leads from sensation to an apprehension of the essence, while a demonstration leads from perceptual understanding to conceptual understanding.²⁵⁹

In this case, Aristotle's general attitude to knowledge is determined by his attempt to apply the same notion of knowledge to both substances and attributes. As he considers the knowledge of substances as an acquaintance with these essences that is attained by means of definitions, he conceives of demonstrative knowledge as an inquiry into the essence of a certain attribute. Such an inquiry is made through syllogistic inferences that explicate the content of attributes.²⁶⁰ Consequently, the theoretical foundation that links the various facets of Aristotle's theory of demonstrations is to be found in this notion of substances where he characterizes substance as an essence that can be defined.²⁶¹ This ontological theory implies a notion of knowledge that identifies it with a definition that specifies an essence. Aristotle's theory of demonstrations is thus motivated by the attempt to apply this notion of knowledge, which is appropriate to substances, to the objects of demonstrations, which are attributes.²⁶²

Besides demonstrable knowledge, the indemonstrable knowledge of immediate truth has been discussed by Breno Zuppolin (2020), who claims that a demonstration is an inference that allows us to determine the truth-value of problematic propositions from premises previously known to be truths. Ultimately, demonstrable propositions are deductively derived from immediate truths that have been grasped in advance and in some independent way.²⁶³ These demonstrable knowledge is an inference-based knowledge of evident truths.²⁶⁴ In other words, knowledge of the first principles of demonstrations is intuitive and non-inferential recognition of self-evident propositions, which is obtained independently of their explanatory connection to other propositions in the domain. In this case, it is clear that what determines the role of a given truth in a demonstrative science is not how accessible the evidence for it is to us, but how fundamental it is in the causal order of reality.²⁶⁵

Except for the first principles of demonstrations that are indemonstrable, axioms are indemonstrable too, such as the principle of non-contradiction. Referring to what Aristotle has claimed about the role of principles, demonstrations and axioms in *Metaphysics* Γ.3, we can learn some points about the role of them in the process of performing the task of philosophers, and the relations between principles, demonstrations and axioms.

T76: We must state whether it belongs to one or to different sciences to inquire into the truths which are in mathematics called axioms, and into substance. Evidently the inquiry into these also belongs to one science, and that the science of the philosopher; for these truths hold good for everything that is, and not for some special genus apart from others. And all men use them, for they are true of being qua being, and each genus has being. [...] —Evidently then the philosopher, who is studying the nature of all substance, must inquire also into the principles of deduction. But he who knows best about each genus must be able to state the

²⁵⁹ Harari, 2004, 120,145.

²⁶⁰ Harari, 2004, 145.

²⁶¹ Wheeler, 2019a, 21-22.

²⁶² Harari, 2004, 147.

²⁶³ Zuppolin, 2020, 30

²⁶⁴ Zuppolin, 2020, 31.

²⁶⁵ Zuppolin, 2020, 35.

most certain principles of his subject, so that he whose subject is being qua being must be able to state the most certain principles of all things. This is the philosopher, and the most certain principle of all is that regarding which it is impossible to be mistaken; for such a principle must be both the best known (for all men may be mistaken about things which they do not know), and non-hypothetical. For a principle which everyone must have who knows anything about being, is not a hypothesis; and that which everyone must know who knows anything, he must already have when he comes to a special study. Evidently then such a principle is the most certain of all; which principle this is, we proceed to say. It is, that the same attribute cannot at the same time belong and not belong to the same subject in the same respect; we must presuppose, in face of dialectical objections, any other qualifications which might be added. This, then, is the most certain of all principles, since it answers to the definition given above. (*Met.* Γ.3, 1005a19-1005a24; 1005b6-1005b22)

In order to finish the task of philosophers, which is to pursue truth, philosophers should be educated by sciences. The science of the philosophers includes the inquiry into the truths that are called axioms, principles and demonstrations. Specifically speaking, axioms are self-evident and non-hypothetical, and serve as the starting point of all principles. While, principles, including the principles of deduction, are defined as things that are primary, so a principle is a principle of something. In a demonstrative science, the first indemonstrable principles are the principles on which the demonstrations and demonstrated conclusions depend. What is more, philosophers should be able to state the most certain principle of all things that also must be indemonstrable. Aristotle suggests that what is most certain of all, best known and non-hypothetical is the principle of non-contradiction, which is the starting point of other axioms.

Scientific knowledge is the product of scientific demonstrations that start with the indemonstrable first principles. It is clear that, except for the demonstrative knowledge examined in this chapter, there is some other indemonstrable knowledge, including indemonstrable principles that we need to explore. More importantly, Aristotle clearly points out that there is an axiom that is indemonstrable and that is the most certain and absolute starting-point of other axioms. This indemonstrable axiom, i.e. the principle of non-contradiction, will be further investigated in the following chapter so as to show how these inquiries help philosophers to perform their task of the pursuit of truth.

6. Conclusion

As we can observe from the investigation above, the fundamental structure of demonstrations is able to contribute to the truth of demonstrations. In the first place, the structure of demonstrations entails the indemonstrable first principles that should be always true, intermediate middle terms, and necessary conclusions. And the indemonstrable first principles are fundamental starting-points for the process of demonstrations. Secondly, there are various kinds of definition related to demonstrations among which the immediate definitions are as the account of essences. Thus, immediate definitions are immediate, true and primitive, so they function as the indemonstrable first principles, which guarantee the necessity and the

certainty of demonstrations. What is more, the necessity of the conclusion of demonstration as the syllogistic definitions has been grounded on the necessity of the first principles.

Nevertheless, there are some differences between definitions and demonstrations. Aristotle introduces an important similarity that both of them have to include causes. The requirement that a definition should state the cause of the objects of definitions, is best fulfilled by immediate definitions. They can play a role as the first principles of demonstrations. A demonstration, then, is a deduction that entails the necessary truth of its conclusion and that makes known the grounds for its conclusion. In sum, the truth of demonstrations is completely grounded in essences.

Immediate definitions as accounts of essences function as the first indemonstrable principles of demonstrations. Moreover, the object of immediate definitions are the simple things that have causes in themselves, and have ontological priority over other sorts of objects. The absolute necessity of the first principles is accounted for by the fact that they cannot be otherwise. Thus, the essences that constituted truth in simple things come to be the ultimate ground of the necessity and the certainty of demonstrations. This reveals the connection between essences as an example of the truth in the incomposites mentioned in *Metaphysics* Θ.10 and demonstrations regarding essences that serve as the indemonstrable first principles of demonstrations.

The distinction between first principles that are indemonstrable and demonstrable reveals that there are two kinds of knowledge, called indemonstrable knowledge and demonstrable knowledge. How demonstrations produce the demonstrable knowledge has been examined in this chapter, so, the aim of the next chapter will focus on indemonstrable knowledge, especially on the knowledge of the principle of non-contradiction as the axiom that is the starting-point of all other principles.