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Editor's Statement

This year marks the golden jubilee of Thomas Aquinas College, half a century of offering the foundation for a life of learning by way of a Catholic liberal education devoted to studying the greatest works of the greatest minds of Western Civilization. Twenty-three years after its founding, in 1994, *The Aquinas Review* was created to build upon this education and "to stimulate a continuing conversation," both among our alumni and "an every widening audience,"[1] about perennial truths, and that Truth that matters most.

In this issue are three essays by current and emeritus faculty members of TAC's two campuses: Anthony Andres presents a study of natural contingency according to early twentieth century Thomist, Charles De Koninck; Michael Augros imagines a dialogue between Zeno of Elea and contemporary mathematicians about the claim that the infinite decimal expansion 0.999… is equal to 1; and Ronald J. Richard argues for the demonstrative character of Euclid's *Elements*.

In addition, in order to further one of *The Aquinas Review*'s goals of publishing underappreciated and/or difficult to obtain works of great worth, this issue includes a translation of Maurice Dionne's 1975 series of lectures devoted to clarifying the subject of logic according to the thought of St. Thomas Aquinas.

Christopher A. Decaen
Thomas Aquinas College,
November, 2021

1 "Editor's Statement" of Ronald P. McArthur, *The Aquinas Review*, vol. 1 (1994), iii.

Preface

At Thomas Aquinas College we often say that the education we provide is only a beginning. For the most part, our students are reading the important works in our program for the first time, and the class discussion, while certainly helping them to better understand the principal arguments and themes in the readings and to acquire the intellectual virtues, only introduces them to the profoundest truths and deepest questions that have engaged mankind for centuries.

Accordingly, it is fitting that the College publish *The Aquinas Review* to honor its patron and to provide a forum for deeper consideration of those matters which constitute its curriculum and are central to genuine Catholic liberal education. Consistent with the nature of the College itself, this review is marked by fidelity to the *Magisterium* of the Catholic Church and a respect for the great tradition of liberal learning which is our common heritage.

The essays in *The Aquinas Review* reflect positions taken by their authors and not necessarily by the College itself. The editor – in collaboration with the editorial board – determines the contents of each issue. Any interested person may submit an essay for consideration or letters or comments on articles already published.

It is our hope that *The Aquinas Review* will be a source of wisdom to its readers and contributors.

Michael McLean
President, Thomas Aquinas College

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CHARLES DE KONINCK ON CONTINGENCY IN THE NATURAL WORLD

Anthony Andres

The consensus among the physicists of the 18th and 19th centuries was that the workings of the natural world followed precise and deterministic physical laws. All present events were completely determined by preceding events, and all future events were determined by the present ones. Therefore, everything that happened in the natural world happened by necessity, and everything that did not happen was impossible: a log thrown on a fire under the right conditions had to burn, but one under the wrong conditions could not possibly burn. Pierre Laplace gave the most famous formulation of this opinion in *A Philosophical Essay on Probabilities*:

> We ought then to regard the present state of the universe as the effect of its anterior state and the cause of the one to follow. Given for one instant an intelligence which could comprehend all the forces by which nature is animated and the respective situations of the beings

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> who compose it—an intelligence sufficiently vast to submit these data to analysis—it would embrace in the same formula the movements of the greatest bodies of the universe and those of the lightest atom; for it, nothing would be uncertain, and the future, as the past, would be present to its eyes.[1]

But in the early decades of the 20th century a new theory in physics, quantum mechanics, upset this scientific consensus. Quantum mechanics explains events on the subatomic level using laws that are probabilistic, not deterministic. Thus, given a complete set of prior conditions, the theory does not allow us to predict, for example, the precise location of a particle; it only allows us to determine the probabilities for finding it at various locations. Quantum mechanics implies that the particle occupies its place contingently, and not by necessity.

Some of the scientists who developed quantum mechanics initially thought of it as a stop gap, a stage on the way to a better theory which would show how, given a complete set of conditions, events in the subatomic world occur by necessity. But eventually most came to believe that no such theory could be constructed. Quantum mechanics was probabilistic, they concluded, not because of its own deficiencies, but because nature herself was probabilistic; the events of the natural world simply did not occur by necessity.

This opinion shocked Albert Einstein and led him to say,

> Quantum mechanics is certainly imposing. But an inner voice tells me that it is not yet the real thing. The theory says a lot, but it does not really bring us any closer to the secret of the "Old One." I, at any rate, am convinced that he does not throw dice.[2]

1 Pierre-Simone Laplace, *A Philosophical Essay*, trans. Frederick Truscott and Frederick Emory (New York: John Wiley and Sons, 1902), 4.

2 Albert Einstein, *The Born-Einstein Letters: Correspondence Between Albert*

The most eminent Thomist of that time, Jacques Maritain, agreed. He argued that the principle of causality demands that, in the natural world, the future follows necessarily from the present.[3] And Maritain was not the first scholastic to make this kind of argument.[4]

But Charles de Koninck, a professor of philosophy at Laval University and himself a staunch disciple of St. Thomas, was surprised at resistance of scholastic philosophers to the new theory. In two papers published in the mid-1930s, "The Problem of Indeterminism" and "Reflections on the Problem of Indeterminism," he vigorously argued that Aristotle and St. Thomas upheld the reality of contingency in the events of the natural world.[5] De Koninck also pointed out that St. Thomas had refuted the very arguments used by Maritain and his followers in opposition to this conclusion. In these two papers he tackled both philosophical and scientific objections against contingency in nature. He also explained the nature of the relations between the philosophy of nature, the philosophy of science, and science itself. Finally, he unfolded the true distinction between absolute and hypothetical necessity. The papers displayed both the depth of his grasp of the philosophy of nature and his dialectical

Einstein and Max and Hedwig Born from 1916-1955, trans. Max Born, Irene Born (New York: Macmillan, 1971), 91.

3 Jacques Maritain, *The Degrees of Knowledge*, trans. Gerald B. Phelan (New York: Charles Scribner's Sons, 1959), 191: "But suppose a pure spirit, who knows without material means (and so, no longer by means of empiriological concepts) the behavior of this corpuscle at each instant, it would see that the principle of causality applies strictly and in its full ontological sense."

4 See, for example, Suarez, *Disputationes Metaphysicae*, disp. 19, sect. 10, par. 5.

5 Charles de Koninck, *The Writings of Charles de Koninck*, vol. 1, ed. and trans. Ralph McInerny (Notre Dame: University of Notre Dame Press, 2008), 355-400 and 401-442; "Le problème de l'indéterminisme" was a paper read to the Academie Canadienne Saint-Thomas d'Aquine at its October 9-10, 1935 meeting, and it appeared in the printed proceedings of the session, pp. 65-159; "Réflexions sur le problème de l'indeterminisme," *Revue Thomiste* (1937) in two installments, pp. 227-52 and 393-409.

prowess. But because of the great number of issues that he discussed in these papers, the arguments he put forward for particular conclusions are sometimes hard to understand.

In this paper I intend to leave aside de Koninck's dialectical concerns with science, history, and method, and to discuss only the doctrine he proposed for the philosophy of nature. That is, I intend to present as clearly as I can de Koninck's argument that contingency is a real feature of the natural world. I will divide the argument into three main parts. First, I will explain how the indetermination of matter and form is responsible for the contingent *being* of natural substances. Second, I will show how indetermination brings about contingency in the *coming to be* of natural substances. Third, I will recount how de Koninck answered the rejoinders of those scholastic philosophers who reject the reality of contingency in nature.

But I have two preliminary matters to clear up. First, I need to review Aristotle's basic doctrine on substantial change; second, I want to lay out what the words "necessary" and "contingent" mean and what it means for beings to be either necessary or contingent.

Substantial Change and the Meaning of Contingency

We can investigate the Aristotelian teaching on substantial change by looking at an example, the coming to be of an oak tree from an acorn. We should first note that the acorn, which is undergoing its development on its parent oak tree, and the new oak tree, which comes to be from the acorn which falls to the ground and germinates, are both in some way substances, but are not the same substance: the developing acorn is a part of the substance of the parent oak tree, while the resulting new oak tree is its own, independent substance. Consequently, when the acorn falls and germinates, a part of the substance of the parent

oak tree ceases to be, while a new oak tree comes to be.

But this way of describing how an oak tree comes to be results in a fundamental philosophical problem. On the one hand, it seems necessary that something survive the change from acorn to oak. For if nothing at all from the acorn survived the change to oak tree, then the oak tree might just as well have come from nothing as come from the acorn. But we all know that something cannot come from nothing. On the other hand, it also seems necessary that no actual substance survives the change from acorn to oak tree. For if some actual substance did survive the change, then the oak tree would not be a new substance, but merely the old substance, the acorn, with a new size and shape. This kind of argument led many of the pre-Socratic philosophers, such as Parmenides, Melissus and Empedocles, to assert that no substance comes to be or passes away and that substantial change is an illusion.

Aristotle uses the nature of the potential to solve this problem. The developing acorn has within itself the potential to be an oak tree. What survives the change from acorn to oak tree is something that is merely potentially a substance. That something is first present in the acorn, and the substantial form of the parent oak tree makes that something to be an actual part of its substance. That same potential something survives the change and then is present in the new oak tree, and the substantial form of the new oak tree makes it be an actual oak tree. Because this potential survives the change of substance, he calls it "matter," likening it to timber, the material of carpentry. And because substance is the most fundamental kind of being, such matter is the first among all matters and is called "prime matter."[6] Prime matter is real but not actual; it underlies every change in substance; it is the potential to be a substance.

6 St. Thomas, *De Principiis Naturae*, c. 1, n. 339.

In fact, it is the potential to be any substance. An acorn is designed to become a full grown oak tree, but most acorns never make it that far. Squirrels and pigs and other animals usually eat them before they germinate. If the pig eats the acorn, the acorn still undergoes a substantial change, but this time a change into being part of a pig: the acorn becomes pig flesh. When I eat bacon, the pig in turn undergoes a substantial change, becoming part of me. But through every change the prime matter survives, first in an acorn, then in a pig, and finally in me. Thus, prime matter is not a determinate potential to be some determinate substance, but rather a potential to be any changeable substance.

Let me sum up. The acorn is a changeable substance, and prime matter, the potential to be a substance, is present in it. At first, that prime matter is an acorn because it is made actual by the substantial form of the parent oak; but when the acorn gains an independent existence, its matter loses that substantial form of the parent oak and gains another, the substantial form of the new oak tree. In general, every changeable substance has two principles, prime matter, the ability to be any substance, and substantial form, what makes it actually be this kind of substance. I hope that this review of the doctrine of Aristotle on substantial change will be helpful for understanding the doctrine of contingency in nature.

But let us now move on to something more obviously relevant, the clarification of the meanings of the words "necessary" and "contingent." As St. Thomas says in many places, the word "necessary" simply names "that which cannot not be," or "that which cannot fail to be." He also says that the word "contingent," in its broader meaning, names "that which might or might not be" or "that which can be but can also fail to be."[7] We see right away that necessity and contingency concern being

7 *In II Phys.*, lect. 8, n. 210.

and existence immediately, and that beings are distinguished as beings by whether they are necessary or contingent.

Let us look at a couple of examples. God, whose very essence is existence, is the perfect example of a necessary being. He cannot not-be simply because of what he is. De Koninck points out that, compared to God, everything else is contingent: "All finite beings are equally contingent insofar as they are finite."[8] But he qualifies this assertion: "Compared to one another, some are less [contingent] than others according to the perfection of the essence which receives more or less intimately the proportioned existence."[9] That is, the more perfect created thing receives existence more intimately than the less perfect. The angels have this property, that their natures receive existence so intimately that their existence always remains secure. Once they have received existence, they cannot cease to exist. They do not have prime matter nor any other principle within their nature by which they might become something else. In this way, angels are also necessary beings.

This is not the case with the substances of the material world, with dogs, pigs, or oak trees. The complexity of their natures entails a complexity of existence and he notes that this "makes a totally assured existence impossible."[10] That is, the existence of the physical substance is not the simple actuality of its nature, as is an angel's. Rather, its existence is the actual inherence of its substantial form in its prime matter, a matter that can have not only its present substantial form, but any other one as well. For this reason, the continued existence of the material substance is not assured, and such a being is essentially contingent. Acorns are contingent beings: pigs eat them. And since we eat the pigs, the pigs are contingent as well.

8 De Koninck, "Reflections on the Problem of Indeterminism," 405.
9 Ibid., 405.
10 Ibid., 407.

De Koninck uses the case of a dog being killed by a falling tree to exemplify the contingency of a natural substance.[11] He notes that the dog's substantial form is too imperfect to receive a simple, assured existence. It can only come to exist by being the determination of matter, which in itself is undetermined potency. But the matter also has an ability to be another substance; and when the dog is struck by the falling tree, his matter does become another substance. Thus, the complexity of the dog's nature, his composition from form and matter, results in the contingency of his existence.

St. Thomas uses the distinction between the contingent and the necessary in his third way of proving the existence of God.[12] There he explains that some beings are contingent, others are necessary through another, and one being necessary through itself. The first are contingent because they have a principle of non-being in their essences. The second, he notes, have no such essential principle, but neither do they have something in their essence by which they exist. Thus, they are necessary beings who must receive their necessary existence from another. Finally, there is God, who not only has an assured existence, but has not received that existence from another. He is the being necessary through himself. We see here, then, how St. Thomas divides beings according to their necessity and contingency.

The Indetermination of Matter and Contingent Being

Now that we have clarified what it means for beings to be necessary or contingent, we are prepared to see how the indetermination of matter is the principle of contingency in the natural world. We should first note that prime matter is a principle of contingency in the physical substance insofar as matter is an

11 Ibid., 414.

12 Cf. *Summa Theologiae Ia*, q. 2, a. 3.

indeterminate potency, that is, a potency to be any material substance. Now, Maritain and his disciples granted that prime matter is a principle of contingency in this sense, that material substances are not necessary beings, but beings that come to be and pass away. What they denied was that the indetermination of matter caused future events to be contingent. They argued that the laws of causality required that, in the natural world at least, the future event followed necessarily from the sum of past events. De Koninck argued, however, that the indetermination of matter not only makes the existence of the material substance contingent, it also makes future events, especially the coming to be and passing away of material substances, contingent. If de Koninck's argument firmly establishes this conclusion, then he will have completed his case for real contingency in the natural world. Before we can understand his argument, however, we need to see a little more clearly what is meant by the word "indetermination."

First, we should note that indetermination is the privation of determination. St. Thomas writes about determination in the seventh *Quodlibetal Question*. An objection in that question argues that, since determination, according to its very etymology, implies boundaries, and God is infinite, that is, without boundaries, then God is indeterminate. This would make God be like prime matter, which is absurd. St. Thomas solves the problem by saying, "determination is twofold, either with respect to limitation or with respect to distinction."[13] As the objection points out, determination is first said with respect to a boundary, a terminus. But determination refers to a boundary, not insofar as the boundary encloses the bounded, but insofar as the boundary excludes anything other than the bounded. That is, determination refers to the boundary insofar as the boundary is a principle of distinguishing one thing from another. And

13 *Quaestiones Quodlibetales* VII, q. 3, a. 1.

so, determination is also said with respect to distinction simply. That is, something is determinate insofar as it is distinct from another. This is what enables us to say that God is determinate. His existence is not determinate like a creature's, bounded or limited by being received into an essence, but this very fact distinguishes Him from all creatures and makes Him most highly determinate. And the Divine Persons are also determinate without being bounded, because they are distinct from each other through distinct relations of origin.[14]

As the angelic natures share in the necessary existence of God, they also share in his determinateness. Nothing can exist without being one individual thing, and so if an essence has the ability to receive determinate existence by itself, it must also have in itself a determination to being one individual. And so, the same determination that makes the angelic natures able to receive necessary existence also makes each nature's existence the determinate existence of one individual.

In contrast, just as the natures of material substances lack necessary existence, so also do they lack determination. Their matter is indeterminate insofar as it is not the distinct potency to be one thing rather than another. In other words, the potency of prime matter is indifferent to the many kinds of substantial forms that it can receive. And since the potency of matter to have another form is the cause of contingency, then the indeterminacy of prime matter is one source of the contingency of existence for the material substance.

But de Koninck argues that the more fundamental reason for the indeterminacy of prime matter is the indeterminacy of the substantial form. He writes:

> Contingency touches even the structure of natural forms, which cannot be entirely determined "ad unum" [to one]

14 Ibid.

> like the angelic form. It is just this lack of determination and incapacity for individuating itself that calls for matter. This need for matter introduces into the form itself an irreducible obscurity.[15]

In other words, the forms of material substances require matter because they are unable to receive existence without matter; that is, in themselves they are too indeterminate to constitute one existing individual. They need the help of matter to determine them to an existing individual. But this need is a need for a matter which itself is indeterminate, able to take on many other possible substantial forms. Thus, the indetermination of prime matter arises from the prior indetermination of the substantial forms of material substances. De Koninck concludes that the deeper reason for the contingency of natural things is the indetermination of their forms.

A parallel from the realm of the artificial might make de Koninck's assertion clearer. A general purpose knife, for example, has a use, a form and a matter: its use is to cut, its form is the sharpness of a blade attached to a handle, and its matter is metal. A scalpel also has a use, a form and a matter: its use is to cut flesh, its form is an extreme sharpness of blade attached to a very light, manipulable handle, and its matter is a metal particularly fine-grained and brittle. Note here that the form and matter of the general purpose knife are more indeterminate than those of the scalpel; in fact, we see that the matter of the general purpose knife is more indeterminate because its form is more indeterminate. What de Koninck is telling us is that in natural substances there is a relation of indetermination like the above between substantial form and matter. Because we see, for example, that the acorn can become pig's flesh, or squirrel's flesh, or can simply corrupt into dirt, it is clear that its matter is

15 De Koninck, "Reflections on the Problem of Indeterminism," 408.

indeterminate with respect to the kind of substance it comes to be. Therefore, all the corresponding substantial forms, that of the acorn, the pig, the squirrel, or the dirt, are themselves relatively indeterminate, not as distinct from each other as the different immaterial forms which constitute the different angels. Thus, the reason for the indeterminacy of matter is a prior indeterminacy of the substantial forms of material substances. Let us recall what we have seen so far. Beings are divided into the necessary and contingent, and matter is a principle of contingency in natural substances. But the indeterminacy of matter results from the indeterminacy of form in the material substance. Thus, the forms of those substances are also in some way indeterminate. In sum, de Koninck has argued that both the matter and the form of a natural substance is indeterminate, and that this indeterminateness is the reason why they are contingent beings.

But our account is not yet complete. We now need to see how he argues that, not only is the existence of a material substance contingent, so also is its coming to be. To understand why this is true, we need explain in more detail how coming to be occurs for a material substance. This means that we need to consider its generation, the process of its coming to be.

Contingency in Coming to Be

As we saw before, the generation of a material substance presupposes a matter already existing under the substantial form of a previous substance. The matter of the oak tree first exists in the acorn. But the matter does not acquire its new form by itself. There needs to be an agent involved in the process of generation. A natural agent, having a substantial form as the principle of its action, but using its accidental forms as instruments in that action, works to bring about a new substantial form in the old matter. These accidental forms, active qualities like heat

and moisture, are instruments insofar as they alter the matter so that it is disposed to receive the new substantial form. The substantial change is the terminus of those alterations, a terminus that results in a new substance that resembles in some way the agent of its coming to be. An everyday example is a dog eating his food. The dog that eats his food brings about a substantial change. The food has a matter which the dog, using his digestive powers, alters more and more. The matter of the food becomes more and more disposed to be incorporated under the substantial form of the dog. The term of that alteration is dog-flesh, the food becoming part of the dog. Thus, the dog uses his accidental forms as instruments to dispose the matter of food to receive the substantial form which the dog already possesses.

But according to de Koninck, not only is the dog a contingent being, but the food that the dog eats becomes dog-flesh contingently; that is, because of the indetermination of form and matter, the food might or might not become dog-flesh. De Koninck outlines three modes of indetermination responsible for the contingency of the coming to be of new substances: first the indetermination on the side of the material subject which comes to be; second that on the side of the agent which forms the matter; and third that on the side of an impeding agent cause.

Let us begin our examination of contingency in coming to be by looking at it from the aspect of the material subject. De Koninck writes, "Matter is potency, and it is precisely its indetermination which is the cause of uncertainty."[16] That is, matter is the ability to have substantial form, not a determinate ability to have only some specific kind of substantial form, but an indeterminate ability to receive any substantial form that it does not already have. The dispositions of the matter, the accidental forms which prepare the way for the reception and possession of

16 Ibid., 412.

the new substantial form in that matter, do make the initial ability *more* determinate, but they never make it *completely* determinate. Any indetermination in the ability of a subject to receive a form, however, is an impediment to the reception of that form, and what is impeded might not happen. Thus, the coming to be of a substance, which is the reception of this form in this matter, is uncertain; it might or might not happen. Matter is a principle only of a contingent coming to be.

But de Koninck notes that indetermination also must also exist on the side of the natural agent of substantial change: "But matter can be the cause of contingency only because there is a defect of determination even on the side of the agent cause."[17] The natural agent acts in virtue of its accidental forms, which are ultimately rooted in its substantial form. But, as we saw before, the substantial form itself is not entirely determined to one. Thus, its effects are not entirely determined to one: "The absence of necessity in form entails an absence of necessity in its effects."[18] Thus, the strength of the natural agent is always somewhat imperfect and indeterminate, and so the coming to be of the new substance which the agent attempts to bring about is contingent. That is, the agent might not have the strength to bring about a sufficient disposition in the matter for the new substantial form, or it might have strength to bring a barely sufficient disposition, but not one that guarantees the change.

This statement is clearly true in the case of canine digestion. Sometimes the dog digests his food, sometimes he does not. Since he sometimes does digest his food, his digestion clearly has sufficient strength to bring about the aimed at substantial change; but since he sometimes fails, its strength is not such that it guarantees success. The dog digests his food contingently.

The indeterminacy of matter and form, however, brings

17 Ibid.
18 Ibid.

into play a third factor in the contingent coming to be of natural things, the impeding agent cause. Since the coming to be of the natural substance is contingent, in the cases when it does come to be, the precise moment at which it comes to be is not predetermined in the agent and subject. That is, since there is indetermination on the side of both the agent and the subject, there is no set amount of time which guarantees that the change will take place in the subject. It might happen sooner, it might happen later. The dog might digest his food in thirty minutes or in forty-five minutes. Thus, the precise moment of the coming to be of a new material substance, or of a new state in the material substance, is not predetermined by the prior relation between the agent and the subject.

Thus, the contingency of the coming to be of a new substance, or even the contingency of the moment of its coming to be, inevitably brings about the existence of a third indeterminate factor in natural coming to be, the contrary cause impeding *per accidens*. We should contrast the *per accidens* cause to the *per se* cause. A *per se* cause brings about a particular kind of effect because of the kind of cause that it is. The dog digests food as he does because he is a dog; his distinctively canine nutritive power is the *per se* cause of food becoming dog-flesh. Even the concurrence of two or more *per se* causes can be one *per se* cause if their concurrence is itself predetermined by prior causes; chewing and swallowing are one *per se* cause in digestion. Thus, there can be a *per se* concurrence of *per se* causes which is not a source of contingency.

But since the strength, and even the existence, of natural agents is not entirely predetermined, their concurrence is not always predetermined by the kind of agents that they are. Often the concurrence of natural agents just happens. Such a concurrence brings about accidental agent causality and is therefore *per*

accidens. Therefore, the contingency that comes from the indetermination of natural forms and matter is the source of the *per accidens* concurrence of agent causes in the natural world. And since this *per accidens* concurrence has its source in contingency, it itself is contingent and is even the reason for further contingency.

For even in cases when the agent is strong enough to bring about a more than sufficient disposition in the subject, its action may be frustrated by the concurrent action of a contrary agent. But the concurrence of contrary agents is *per accidens*, and therefore contingent. Consequently, the failure of the agent to bring about the change in the patient is itself contingent.

Let me explain what I mean using an example. A very healthy dog might find easily digestible food, but a lion might arrive there and chase him away from it. Thus, even a very strong agent beginning to act upon properly disposed matter can fail to bring about the intended result. Since the concurrence of the action of the lion and the dog is not predetermined, but *per accidens*, this case in which he fails to digest his food is contingent. And even when the lion does not interfere, and the dog actually succeeds in eating and digesting his food, his causality is still contingent because it *could* have been impeded by another cause. Since the success or failure of the agent also hinges upon the contingent presence or absence of an impeding agent, its success and failure are doubly contingent.

Thus, in this section of the paper we have detailed all the aspects under which the coming to be of a natural, material substance is contingent. Coming to be might fail either because both the potency of matter and the strength of the agent is indeterminate or because of the *per accidens* concurrence of an impeding agent cause, which is itself rooted in some prior indetermination. But the essential indetermination of form and matter, especially the former, is the ultimate root of real contingency with respect both to existence and to coming to be in the natural world.

This conclusion fits with our untutored experience of the world around us. Many events in the natural world, like the generation and movements of storms, are unpredictable. Even those kinds of events which usually happen in the same way, like the development of four legs for a dog, in some cases fail to occur. But as we saw before, Laplace, Einstein, and even the scholastics of the early 20th century rejected the reality of contingency in the natural world. They asserted that contingency was merely the ways things appeared, not how they are. They claimed that it was the result of our ignorance of all the causes. Maritain admitted an exception, the events influenced by the free choices of men, but asserted that natural events uninfluenced by free will, including the comings to be of material substances, happen by necessity.[19]

De Koninck's Response to the Scholastics

What rejoinder might scholastics make to de Koninck's account? They might invoke three principles for maintaining that the events of the natural world happen by necessity: first, the principle of sufficient reason, that everything that happens must have a sufficient cause for its happening; second, the principle that nature is determined to one, which requires that natural agents always act as they are inclined, and to the utmost of their strength; third, the presence of the impeding cause, that every instance in which the natural agent fails to achieve its effect can be attributed to the presence of an impediment.

Putting these principles together, someone could make the following argument. A natural agent always acts with its utmost strength to bring about its effect. And a sufficient cause being posited, the effect necessarily follows, unless there is an impediment. But the impediment itself is the result of a sufficient cause; therefore, the impediment, if present, is present necessarily. Thus, for a natural agent, if its effect comes to be, it does

19 Maritain, *The Degrees of Knowledge*, 151, n. 3.

so necessarily, and if it fails, it was because its coming to be was made impossible by an impediment. Therefore, everything that happens happens by necessity; the contingency in the natural world is not a real contingency, but only our failure to foresee the absence or presence of the impediment.

The argument can be applied differently to each of the ways in which an effect can be contingent. We noted before that the coming to be of the effect is contingent because of the weakness of the agent. But those who might argue for necessity insist that the agent which is so weak that it does not bring about its effect is not a sufficient agent, and so it is impossible for it to achieve its effect. If there is an impediment on the side of the disposition of matter, they might reply that the disposition is of a certain degree, and that, taking into account the exact degree of the disposition and indisposition, we can determine the exact degree of strength necessary in the agent to bring about the effect. If the agent has that degree of strength, it will bring about the effect necessarily; but if not, it is again not a sufficient agent. Finally, if the agent is impeded by a concurrent agent cause, that cause comes to be in that place at that time by necessity, and so it makes the action of the agent impossible. In every case, necessity is preserved amid apparent contingency.

The 16th Century Thomist, Cardinal Cajetan, took up the question of contingency in his commentary on St. Thomas's *Summa Theologiae*. There he notes that the above use of the principle of sufficient reason commits the fallacy of the consequent.[20] It is true that if an effect comes to be, there must be a sufficient cause, but it does not follow that, if there is a sufficient cause, then the effect must come to be. In fact, Cajetan argues that the effect might not come to be even if the cause is sufficient. In sum, the main argument commits the fallacy of the consequent in its use of the principle of sufficient reason.

20 Thomas de Vio, Cardinal Cajetan, *In Iam Summa Theologiae*, q. 115, art. 6.

St. Thomas himself disputes the notion of necessity that is implicit in the main argument. The argument asserts that the effect is necessary because of the absence of an impediment. But just as the concurrence of the *per se* agent and the contrary agent is accidental, so the absence of an impediment is accidental to the coming to be of the effect. The fact that the lion fails to impede the feasting dog is accidental to the dog digesting his food. Thus, the objector has defined the necessary, not in relation to *per se* being, but in relation to *per accidens* being. This is an erroneous understanding of necessity because it undermines the principle that the necessary and the contingent are essentially different kinds of beings. St. Thomas argues that we should define necessity and contingency just in terms of being: the necessary is what cannot not-be and the contingent is what can be, but can also fail to be. The lack of an impediment is not the cause of necessity, as the opponents of contingency think; rather, necessity is the reason why some agents cannot be impeded.

And de Koninck replies decisively to the subsequent application of this argument. The application assigns a precise degree of strength to the agent and a precise degree of disposition to the matter. For example, the argument assumes that some dog's digestive powers have a precise degree of strength, and that the food has a precise degree of disposition to be digested. But to talk about a precise degree of strength or a precise degree of disposition is in fact to deny the indetermination of form and matter:

> The margin of indetermination [of matter] which exceeds the form, and this form itself, are incommensurable, since matter is indetermination . . . The margin of indetermination always remains indefinite, even if its range diminishes according to the perfection of the form. To say that "there is only a certain quantity of indetermination" is to suppress indetermination.[21]

21 De Koninck, "Reflections on the Problem of Indeterminism", p. 420.

De Koninck is here appealing to the indetermination of the matter in the patient. It is true that the more that the matter is altered, the more it is disposed to become this or that determinate kind of substance. And the more the matter is disposed, the more determinate it is. But disposed matter is still matter, and as matter it is still indeterminate. Making the matter more disposed can never completely eliminate matter's indetermination. The phrase "only a certain quantity of indetermination" is a contradiction in terms; it signifies a completely determinate indetermination.

Conclusion

Charles de Koninck, following the doctrine of St. Thomas, argues that in the natural world neither being nor coming to be are always necessary, but both are subject to contingency. Contingency in coming to be, which is caused by the weakness of the natural agent, the indisposition of matter, and the *per accidens* impediment of a contrary agent, is rooted in the indetermination both of natural form and of prime matter. If all of this is correct, no disciple of St. Thomas should be alarmed by the probabilistic conclusions of quantum mechanics.

But de Koninck did not argue for contingency in nature to update an obsolete natural philosophy; his respect for both St. Thomas and the physicists was far too great. He wanted to show Thomists that contingency had always been part of the tradition, a part abandoned for insufficient reasons. And perhaps the recovery of a truly philosophical understanding of the natural world depends a great deal upon the wisdom of men like Charles de Koninck.

ZENO AND THE MATHEMATICIANS
ON WHETHER 9.999... = 10

Michael Augros

The question in the title of this essay remains a matter of current and lively discussion, if not among mathematicians themselves, then between some mathematicians and some non-mathematicians.[1] Mathematicians are satisfied that 9.999… is indeed equal to 10, but a significant number of intelligent non-mathematicians balk at the statement, thinking it involves some sort of cheat, or else believing that it is only ever approximately true. In order to convince the doubters, mathematicians sometimes propose the following argument. Without any assumption or prejudice regarding its value, let 9.999 ... be given a name, *M*:

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1 The question was, for example, the topic of a 2015 YouTube post (called "9.999… really is equal to 10") by the mathematician Burkard Polster (known online as the Mathologer), who presents in that post the type of argument outlined above. As I sit down to compose this essay (in March, 2021), that post has gotten 1,187,827 views and has generated over 19,721 comments. These numbers will surely have grown by the time this essay sees print. Having seen how many comments his post is generating, Professor Polster has promised to revisit the question in a future post.

$M = 9.999\ldots$

Now multiply both sides by 10:

$10M = 99.999\ldots$

Now subtract M from both sides:

$10M - M = 99.999\ldots - 9.999\ldots$

So $9M = 90.000\ldots$

or $9M = 90$

which of course implies that

$M = 10$

There we are. To some, however, it might seem a sneaky move to write "9.999…" or "$9.\overline{9}$" in the first place. Does "9.999…" mean that the infinitely many possible digits are somehow all present, and that the infinitely many fractions they signify have all been somehow produced and added together into a total? Is it really possible for such a sum to exist or to be brought into existence? If so, how or where does such a sum exist, and how did it come into existence? And if not, then don't we have only a finite number of digits in fact, so that their total cannot equal 10, but can only approximate it? Thanks to such misgivings as these, the statement that 9.999… = 10 can seem doubtful, if not to mathematicians, then at least to those whom we might call (purely for convenience, and meaning no disrespect) "the many."

This essay is an exploration of the meaning and truth of the claim that 9.999… is equal to 10. It is an attempt to do justice both to what mathematicians have to say on the subject, and to the deepest and worthiest doubts about it that lie implicit in the thoughts of the many. In order to make the implicit explicit, I will voice the doubts of the many in a fictional version of the Presocratic philosopher Zeno. It is a bit unorthodox to associate Zeno with the many, since Zeno of Elea was a famous proposer

of paradoxes which, by definition, run against the opinions of the many. But in this matter, he is their ally. At least, he would think it impossible for 9.999… to be equal to 10 in the most obvious way in which that statement could be meant.

Before hearing what he has to say, however, let us listen in as an equally fictitious gathering of mathematicians takes Zeno to school in order to show him what I take to be a perfectly true and incontrovertible sense in which 9.999… = 10.

The Mathematicians Teach Zeno

There is a sense in which 9.999… = 10 is a perfectly true, certain, verifiable, unobjectionable, and exact statement of mathematics. This truth, moreover, is accessible to non-mathematicians, even to high school students, although it is not often presented to them in a fully explicit way. Let us imagine that when Zeno first hears the assertion made that 9.999… = 10, he is already in the company of our imaginary mathematicians. Let us further imagine that he is in a disadvantaged state, being as yet unacquainted with some basics of calculus, and being also somewhat foggy of mind, not yet having had his morning coffee. In this condition, thinking perhaps a little too much like the many, Zeno objects that 9.999… can never equal 10 because no matter how many decimal places we fill in with nines we only ever have an approximation of 10 as our sum.

The mathematicians, on the other hand, not only know their mathematics, but have also had their morning cups, and, moreover, have been warned about what Zeno can be like once he has had his. With their guard up, they approach him not with the argument given above—which, after all, might be apt to convince only those not suspicious of infinity, hence already inclined to agree with the conclusion—but with the following slower, more cautious, and more explicit line of thinking.

The process of summing consecutive terms of the form

$$\frac{9}{10^i}$$

with i running from 0 up through the positive integers as far as one likes, has no last possible term. So the mathematicians say, and (for once) Zeno agrees. The mathematicians continue: since there is no last term to such a series, it is not possible to sum the infinite series by carrying out all the additions one at a time. (Zeno nods to this as well.) Nonetheless there is a sense in which the infinite series can be assigned a value. To see this, let any sum of a finite number of terms in an ordered infinite series, taken consecutively from the beginning, be called a partial sum of the series. So the numbers 9, 9.9, 9.99, are the first three partial sums of our series. Such partial sums bear a relation to the number 10 analogous to that which the parts of an ordinary quantity bear to another which is its equal. Suppose, for example, that

$$q = S$$

This equality implies two things: (1) that S is greater than every part of q, and (2) that anything less than S is not greater than every part of q; in other words, S is the smallest quantity or number to which property (1) belongs.

Analogously, (1) the number 10 is greater than every partial sum of our series, and (2) anything less than 10 is not greater than every partial sum of our series. In order to indicate this double truth unique to the number 10, and in acknowledgment of the analogy to equality in the primary and ordinary sense, we write

$$9.999\ldots = 10$$

Zeno is intrigued. This is new thinking for him. But he will remain skeptical until he has seen proof of this two-part

assertion about the number 10. The mathematicians point out that Zeno himself has already admitted that the partial sums of 9.999… are only ever approximations of 10, so presumably he grants that they are always less than 10. But Zeno now wants to see this proved anyway, and then also the further statement that 10 is the least number to exceed all those partial sums.

The mathematicians are happy to oblige. They prove first the assertion that no partial sum equals or exceeds 10. To do so, they proceed by assuming the contrary and deriving a contradiction. Their argument is along the following lines. Assume that some partial sum in our series is greater than or equal to 10. For example, suppose that

$$\frac{9}{10^0} + \frac{9}{10^1} + \frac{9}{10^2} + \frac{9}{10^3} + \frac{9}{10^4} \geq 10$$

The greatest denominator on the left in this case is 10^4. We can raise each of the previous denominators to that same power of 10 by multiplying each by a suitable power of 10, and we can leave each term in the sum unchanged in value if we also multiply each numerator by the same power of 10 by which we multiplied the corresponding denominator. So doing, we have

$$\frac{9}{10^0}\left(\frac{10^4}{10^4}\right) + \frac{9}{10^1}\left(\frac{10^3}{10^3}\right) + \frac{9}{10^2}\left(\frac{10^2}{10^2}\right) + \frac{9}{10^3}\left(\frac{10^1}{10^1}\right) + \frac{9}{10^4} \geq 10$$

$$\frac{9}{10^0}\frac{10^4}{10^4} + \frac{9}{10^1}\frac{10^3}{10^3} + \frac{9}{10^2}\frac{10^2}{10^2} + \frac{9}{10^3}\frac{10^1}{10^1} + \frac{9}{10^4} \geq 10$$

$$\frac{9 \cdot 10^4}{10^4} + \frac{9 \cdot 10^3}{10^4} + \frac{9 \cdot 10^2}{10^4} + \frac{9 \cdot 10^1}{10^4} + \frac{9}{10^4} \geq 10$$

$$\frac{9 \cdot 10^4 + 9 \cdot 10^3 + 9 \cdot 10^2 + 9 \cdot 10^1 + 9}{10^4} \geq 10$$

$$\frac{90{,}0000 + 9{,}000 + 900 + 90 + 9}{10{,}000} \geq 10$$

$$\frac{99{,}999}{10{,}000} \geq 10$$

so $\frac{99{,}999}{10{,}000} \geq \frac{100{,}000}{10{,}000}$

or $99{,}999 \geq 100{,}000$

which is absurd. Therefore, our initial assumption was impossible, and so every partial sum of such a series must be less than 10. Although in this case we arbitrarily chose to stop our partial sum at $\frac{9}{10^4}$, it is easy to see that the patterns in the argument do not depend on that particular choice. Anywhere we stop the partial sum, this sort of argument will prove that the partial sum is less than 10.

Zeno is satisfied on this point. He is eager now to hear the proof of the second assertion, that 10 is the least number that exceeds all possible partial sums. This is equivalent to saying that any number less than 10, no matter by how little, will be equal to or less than some partial sum, hence less than the next partial sum. Expressed in notation, this second assertion says that for some sufficiently large number of decimals,

$$10 - \varepsilon < 9.999\ldots9$$

That is, anything less than 10 by some given quantity ε (however tiny this might be) will be less than one of the partial sums (and so will also be less than all subsequent partial sums). Put otherwise,

$$10 - 9.999\ldots9 < \varepsilon$$

for some sufficiently large number of decimals in the partial sum 9.999…9. Spelling this out in fractional notation, the mathematicians are saying that

$$10 - \left(\frac{9}{10^0} + \frac{9}{10^1} + \frac{9}{10^2} + \frac{9}{10^3} + \ldots + \frac{9}{10^n}\right) < \varepsilon$$

for some positive integer *n*. Looking at the left side, we see that we can distribute the negative sign, giving us

$$10 - \frac{9}{10^0} - \frac{9}{10^1} - \frac{9}{10^2} - \frac{9}{10^3} - \ldots - \frac{9}{10^n} < \varepsilon$$

Performing the first subtraction on the left, we have

$$1 - \frac{9}{10^1} - \frac{9}{10^2} - \frac{9}{10^3} - \frac{9}{10^4} \ldots - \frac{9}{10^n} < \varepsilon$$

Performing the new first subtraction (which was originally the second subtraction in the previous line) on the left, we have

$$\frac{1}{10^1} - \frac{9}{10^2} - \frac{9}{10^3} - \frac{9}{10^4} - \frac{9}{10^5} \ldots - \frac{9}{10^n} < \varepsilon$$

Performing the new first subtraction (originally the third subtraction) on the left, we have

$$\frac{1}{10^2} - \frac{9}{10^3} - \frac{9}{10^4} - \frac{9}{10^5} - \frac{9}{10^6} \ldots - \frac{9}{10^n} < \varepsilon$$

Doing the same a third time, we have

$$\frac{1}{10^3} - \frac{9}{10^4} - \frac{9}{10^5} - \frac{9}{10^6} - \frac{9}{10^7} \ldots - \frac{9}{10^n} < \varepsilon$$

The pattern is clear. Each time we subtract the second term in the partial sum from the new lead term on the left, we have a

new lead term which is simply 1 over 10 raised to a number equal to the number of such subtractions we have performed. Hence, after performing all n subtractions on the left side, we will be left with

$$\frac{1}{10^n} < \varepsilon$$

or $1 < 10^n \varepsilon$

for some positive integer *n*. The second assertion of the mathematicians, then, amounts to saying that the above inequality holds for some positive integer *n* sufficiently large. And that is obviously true.[2]

What Zeno has required the mathematicians to prove, they have proved: 10 exceeds every partial sum of the infinite series 9.999…, and it is also the smallest number to do so. Hence, as promised, 9.999… = 10, in the sense of "equal" earlier explained, which is analogous to the ordinary equality of one fixed and finite quantity to another.

Will Zeno agree?

Zeno Teaches the Mathematicians

By this time in his conversation with the mathematicians, Zeno has had his coffee. "I am ready now," he says, "to tell you what I think of your statement that 9.999… = 10." The mathematicians lean forward a bit in their seats as Zeno goes on.

"I begin with a confession and a corresponding concession.

2 Whatever ε might be, it can be multiplied by some positive integral power of 10 so as to exceed 1. To see this, let $\varepsilon = \frac{1}{k}$, and take 10^n as the first power of 10 (with *n* a positive integer) to exceed k. Then $10^n > k$, so $\varepsilon > \frac{1}{10^n}$, so $1 < 10^n \varepsilon$.

My confession is that I am not one who believes in continuous entities. In this I am practically alone, siding neither with the many, nor with you, the few who are mathematicians. Infinitely divisible things such as motion, time, and even magnitudes themselves (including lengths, areas, volumes and angles), thought to exist by both you and the many, I regard as absolute impossibilities and illusions. Though I seem to have convinced almost no one with my famous arguments for these startling conclusions of mine, neither has anyone been able to convince me that these, my paradoxes, fail to prove their point. In the interests of avoiding deadlock, however, I will set aside these convictions and, for the purposes of this discussion, admit, together with you and the many, that there are continuous motions, magnitudes, and other things infinitely divisible. And that is my concession.

"In the spirit of this concession, I make no bones about the infinite divisibility of a magnitude of 10 units. Nor do I object to adding together magnitudes with values of 1, $\frac{9}{10}$, $\frac{9}{10^2}$, and so on, as far as we please. In fact, I agree with everything you have said, and gratefully acknowledge that I have found it very instructive. And so I agree with you that 9.999… = 10 in the precise sense in which you have explained it. I take it you mean that the infinite series indicated by the notation 9.999… is of such a sort that its partial sums cannot be made to exceed all bounds, that 10 is one boundary that none of them can reach or exceed, and, finally, that 10 is the least quantity of which all the possible partial sums fall short. If all of this is what you mean by declaring the infinite series equal to 10, then I must agree that you are right. Indeed, if that is all you mean, then you are thinkers after my own heart—I love nothing better than to show that things cannot be reached. That 10 cannot be reached by the infinite series, however far it is pursued, does not displease me, and certainly does not surprise me. That it can be proved to be the *first*

thing that cannot be reached, I must admit, is real news to me. For that illumination I am in your debt. If we are to broaden our use of the word *equal* to extend to this particular relationship of a series to its limit, so be it. The extension of the word to this sense is natural enough; you have made a compelling case for the similarity of (i) the relationship between an infinite series and its first, unattainable limit, to (ii) the relationship between a finite series and its perfectly performable summation. Bravo!

"But now I ask you: is that the only sense in which you intend the statement that 9.999… =10 ? Permit me to say, ladies and gentlemen of the mathematical community, what I suspect about some of you. I suspect that secretly, or in some instances perhaps not so secretly, by saying that 9.999… =10 you mean rather more than you have so far openly declared.

"I suspect that some of you, possibly all of you, beyond taking 9.999… to mean a limit approached by such a series, take it to mean a completed sum.[3] In other words, you take it to

3 If we go back far enough in the history of mathematics, Zeno's suspicions are not easily verified. Karl Friedrich Gauss, for example, famously wrote in a letter to his friend H. Schumacher, who had invited him to review a certain attempt to prove Euclid's fifth postulate, "I protest first of all against the use of an infinite quantity as a completed one, which is never permissible in mathematics. The infinite is only a *façon de parler,* where one is really speaking of limits to which certain ratios come as close as one likes while others are allowed to grow without restriction ..." On the other hand, although many historians of mathematics have taken those words as proof that Gauss would have rejected the idea of an infinite set, others have said that that is an unwarranted inference, given the special context and sense of what Gauss said in his letter (see, e.g., William C. Waterhouse, "Gauss on Infinity," *Historia Mathematica* 6 (1979): 430–436, from whose article I have quoted the translation of Gauss's words). Still, Georg Cantor, who first proposed transfinite arithmetic, and first dealt in a serious way with infinite sets as actual infinities, met with a great deal of skepticism and even hostility in the mathematical world. Leopold Kronecker was not impressed with Cantor's ideas regarding transfinite numbers, and Henri Poincaré said that "There is no actual (given complete) infinity. The Cantorians have forgotten this, and they have fallen into contradiction" (*Science and Method,* Book 2: *Mathematical Reasoning,* Ch. V: *The Latest Efforts*

mean the total one gets when all the decimal nines are present and accounted for, when none is omitted, when all consecutive terms of the form $\frac{9}{10^n}$ (beginning with $n = 0$ and letting its value

of the Logisticians, Section XI: *Conclusions,* authorized translation by George Bruce Halsted, first published by The Science Press, NY: 1913, then in a Project Gutenberg edition, eBook #39713, 2012, p.484). David Hilbert, however, subsequently helped bring Cantor's ideas into general favor among mathematicians; when certain antinomies first began to be discovered in the classical, or "naive," set theory of Cantor, Hilbert promoted the program of resolving them by means of a formal axiomatization of set theory. Today, set theorists and other mathematicians seem to be quite at home with actual and complete infinities—with regarding a line, for instance, as an infinite set of ordered points. According to the late John D. Barrow, an English cosmologist, theoretical physicist, and mathematician, over the course of many centuries after Aristotle had distinguished between actual and potential infinites

> people thought that there couldn't be actual infinities. In fact, the only [actual] infinity was supposed to be the divine, [i.e.,] God. ... Things changed in the world of mathematics at the end of the nineteenth century, when Cantor (Georg Cantor) in particular developed a more subtle way of looking at mathematical infinities and distinguishing one type of infinity from another. ... This led people to think again about the status of infinities. Cantor was treating infinities not just as potential infinities, but as actual infinities. ... And there was a great fuss in the world of mathematics [over] whether this should be allowed. So some mathematicians thought that by allowing Cantor's transfinite quantities (as they were called) into mathematics, you were introducing some type of subtle contradiction somewhere. ... This development in pure mathematics, which was eventually accepted and forms its own subbranch of mathematics today, led some theologians even, and philosophers, to rethink their ancient attitude about infinities. ...

(This is my transcription of part of an interview with Barrow, available as a podcast to which a link can be found in the 2012 article *Does Infinity Exist?* by Marianne Freiberger, based on the interview with Barrow, and posted in *Plus,* an online magazine which is part of the Millennium Mathematics Project at the University of Cambridge.)

ascend through all the positive integers) have been added up. If that is what any of you have in mind, then I have to tell you the thing is impossible. More, I believe I can prove it, maybe even convince you of it, as long as I do not reach into my customary quiver of impossibility proofs.

"As a warm-up to my proof that there is something amiss in saying that the sum, when all the terms of the infinite series are present, is 10, I ask you to consider a particular way of adding up the terms, namely by taking steps. Suppose I am standing at point *A* on a straight line *L*, and my intention is to walk to some further point *Z*, ten meters away. The method I will adopt, however, will be to let my first stride be 9 meters (more like a great leap, I agree), and my second stride will be $\frac{9}{10}$ of a meter, my third will be $\frac{9}{100}$, and so on.

"Going forward in this manner, I will never in fact arrive at point *Z*. I see you are all nodding. Excellent. Adding to my distance from point *A* in this manner, or, as is equivalent, taking partial sums of our series one at time, in sequence, I will never cover a total distance of 10 meters, as we agreed at the outset of our conversation.

"But I imagine that you can hardly restrain yourselves from asking: what if we let all the steps be made at once? What if,instead of taking each step one at a time, I take them all together? Your gratified expressions tell me that this is indeed what at least some of you would have me answer. And you can rest easy—I will not offer the facile reply that it is impossible for a mere mortal to take an infinity of discrete steps at once. After all, I see that we sometimes spell a word one letter at time, and other times stamp it out from pre-set type, producing all its letters at once. You mathematicians, besides, do not make motion and time your special subject, preferring to consider things in abstraction from all sorts of physical conditions, so that many physical

impossibilities present no special obstacle to your mathematical consideration. I will respect this as well.

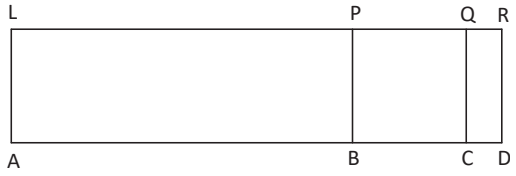
"What, then, is to prevent us from letting all the terms of our infinite series be present together, all at once, 'at one fell swoop' (as I'm told a certain Galileo once put it),[4] rather than producing them one at a time in order? Might that method not absolve us of having supposed something impossible?

"Alas, learned friends, I think it would not. Even this bold new supposition would not leave us entirely in the clear. And here is why. We are now supposing that the length *AZ*, which is 10 meters in length, is the sum of an infinite multitude of strides (albeit ones accomplished all at once) whose several lengths fit into our pattern. But consider the strides near point *A*. We can speak of the "first" of these in a non-temporal sense, meaning only the stride nearest to point *A*, which is the stride from *A* to *B*. The "next" in this order is that from *B* to *C*, and the next after that is that from *C* to *D*. What defines point ? It is the point reached by the first stride of 9 meters. Likewise the point *C* is the point reached by the second stride, that of $\frac{9}{10}$ of a meter. What, then, I ask you, is the point *Z*? Is it the point reached by a certain stride, or not? If not, then what right have we to say that the sum of strides has reached it? But if so, then are we not admitting that the sum is capped by a final stride? Whichever answer we give to this question about the nature and origin of the final point *Z*, we find ourselves saying something self-defeating or impossible. We say something self-defeating if we say that *Z* is not reached by a stride, since in that case neither is it reached

4 Galileo Galilei, *Discourses & Mathematical Demonstrations Concerning Two New Sciences Pertaining to Mechanics & Local Motions (With an Appendix On Centers of Gravity of Solids),* First Day. See p.54 of the translation of *Two New Sciences* by Stillman Drake, 1989, Wall & Thompson, Toronto, Ontario, Canada.

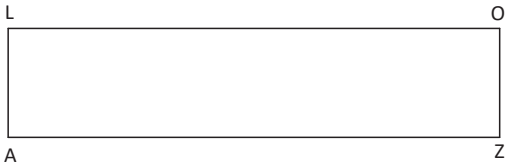
by the infinite series of simultaneous strides, and so their infinite sum cannot be *AZ*. But we say something impossible if we say that *Z* is reached by a stride, since that is tantamount to saying that there is an ending term in our unending series.

"At this point, I worry that this talk of strides is becoming a distraction. Perhaps you think that any difficulty I am causing you with my questioning really has to do with strides, and all will be well again if only we set aside all talk of movement and progress, and instead confine our considerations to purely abstract mathematical magnitudes existing simultaneously and taken together in a sum. Let us put this hopeful idea to the test.



"Suppose that instead of strides we are adding abstract rectangles. I will draw them for you somewhat out of proportion solely in order to make them easier to see and conceive. We begin with a rectangle having height 1 and base 9, so that its area is 9 square units. Call this rectangle *LABP*, with *LA* being its left side of length 1, and *BP* its right side, and *AB* its base of length 9. To this initial rectangle we add another, *PBCQ*, with *BP* as its left side, its base being a segment *BC* (in line with *AB*) of length $\frac{9}{10}$. Next, we tack on another rectangle, *QCDR*, with the same height again, this time standing on a base *CD* (an extension of BC) having length $\frac{9}{100}$. And so on. Adding the areas of these rectangle *LADR*, with its area equalling $9 + \frac{9}{10} + \frac{9}{100}$, whose base is the sum of the three bases, and whose right side, *DR*, is of course the right side of the last rectangle in the sum.

"This process of adding rectangles can of course continue forever, so that each new rectangle introduces an additional tenth of the one before it. For this reason, we might call these added rectangles decimating rectangles; each adds a tenth of the preceding rectangle to the previous total. Just as when we considered my taking strides from *A* to *Z*, we cannot produce all such rectangles so long as we insist on producing them one at a time in order. Can we, then, let them all be made present at once 'at one fell swoop,' thereby producing a total, a sum, equal to 10 units of area?



"We cannot. To see why, suppose instead that we have succeeded. What would this total be? It could be nothing but a rectangle, specifically one with a height of 1 and a base of 10. Let this rectangle be *LAZO*. But there is a problem. The rectangle *LAZO* cannot exist without its right side, *ZO*. And yet it cannot have such a side, since it is nothing but the sum of our infinitely many rectangles in series. In the case of any partial sum, the result is a composite rectangle whose right side is, of course, the right side of the final rectangle in the sum. But in the case of our hypothetical *LAZO*, there is no final rectangle for *ZO* to be the side of. There is in fact no rectangle in the whole infinite sum able to offer its right side to serve as the side of the total rectangle.

"Summing up the argument:

(1) If it were possible for all the rectangles of areas $\frac{9}{10^0}$, $\frac{9}{10^1}$, $\frac{9}{10^2}$, etc. to exist together as a completed sum, then

they must, by being taken together, compose a finite rectangle (a 1×10 rectangle in particular, but no matter).

(2) But they cannot, by being taken together, compose a finite rectangle.

Therefore, it is not possible for all the rectangles of areas $\frac{9}{100}$ $\frac{9}{101}$, $\frac{9}{102}$, etc. to exist together as a completed sum.

"Premise (2) is perhaps the more subtle premise in this argument, so permit me to elaborate on it a little. Everything in a mere sum of things is either one of the things added or else belongs to one of the things added. Every part of *LADR*, for example, which was a partial sum in our series, is either one of the rectangles constituting it, or part of one or more of them. And every side of *LADR* is a side of one or more of the rectangles constituting it, or is a sum of the sides of one or more of the rectangles constituting it. But no finite rectangle presumed to be the mere sum of our infinitely many rectangles can derive its final side from anything in the sum. Hence there is no way for the sum of them to finish off an area, and no way, therefore, for them to constitute a finite area.

"Of course, nothing prevents us from drawing line *ZO* ourselves. But in so doing, we only draw attention to the fact that *ZO* must be extrinsically supplied, that it cannot result from our supposed sum of infinitely many rectangles—which is to say that no such sum can by itself be or produce the rectangle *LAZO*. This in turn implies that no such infinite sum can exist at all, since if it did, it would have to be a finite rectangle, which it is

incapable of being.

"Mind you, I am not saying that the sum of all fractions of the form $\frac{9}{10^n}$ (with n climbing from 0 up through all the positive integers) is something other than 10. I am saying there is no such sum. Were it a sum, it would have to be finite; were it finite, it would have to come to an end; were to come to an end, there would have to be a last term. But there is no last term, and can be none. Therefore, no such sum exists.

"The upshot is that a convergent infinite series such as we have been contemplating exists only in two ways. In one way, it exists incompletely in its partial sums. In another way, it exists potentially in an actual finite whole that is approached as a limit by such partial sums, which whole is divisible into parts corresponding to the terms in any one of the partial sums (leaving always some remainder). In the first of these ways, the infinite series is incompletely instantiated in some actual sum of things. In the second, it is in a sense 'all there,' entirely, for example, contained in a 1×10 rectangle that we construct independently of the series. But even in this latter case the series is 'there' only as an infinity of different statues are 'there' in an uncarved block of marble. The marble contains all of these in its potential, but is not actually any of them until certain divisions are introduced. It is not a sum of all such statues, not even of ones whose volumes converge on the finite volume of the uncarved block.[5]

"Or will someone suggest that 'the sum of all the rectangles in such a series' need not be a rectangle at all? Very well, let us ignore our preconceptions about a 1×10 rectangle, and ask instead what our infinite sum will be on its own. It must contain the partial sums, of course, and these are all rectangles.

5 Here I must admit that my Zeno sounds more like Aristotle than one might expect, but he might well be forced to speak in this way so long as he keeps his promise not to deny the existence of magnitudes altogether.

The infinite sum is, then, just a sum of all these rectangles, all of which share the common height of 1, each one of which has its own right-hand side. What sort of object will the sum of them all be? Either it has a right-hand side to it, or it hasn't. If it has, then this must be the right-hand side of the right-most rectangle in the sum; hence there will be a last rectangle in the sum, which is impossible. If the sum hasn't any right-hand side, then there is nowhere that its area stops in the rightward direction, and so its area is limited even though it has no limit—which is again impossible.

"Will someone say that these impossibilities result not from supposing we have a sum of an infinity of things, but only from the attempt to produce such a sum in rectangles? Can we sidestep the problem by refraining from making statements about rectangles and the like, and instead assert, more abstractly, that [here Zeno scribbles on a nearby whiteboard]

without committing ourselves to saying 10 *of what?* I don't see how this second retreat into the abstract will help us any more than the first. Three reasons move me to say so.

"First, because then the equality I have written would turn out to be a rather disappointing and altogether inapplicable abstraction even in pure mathematics, since it would not permit us to say that we can sum infinitely many rectangles, or infinitely many straight lines, or what have you. It would be an isolated truth by itself, untrue about any *things* one might care to count and sum.

"Second, because what is true in the abstract, after all, must be true in the concrete. This is not to say that what works in theory must always work in practice; theory often overlooks many relevant things one cannot afford to ignore in practice. Nor is it to deny that a concrete material approximation of something will often behave in ways contrary to the exact and perfect thing abstractly considered. A straight line drawn on the surface of

the earth, for example, continued far enough, will rejoin itself, quite unlike Euclid's straight lines. But that only proves that the terrestrial 'straight line' was never truly *straight* in Euclid's sense at all, but was only as good an approximation of a straight line as is possible on a spherical surface. Again, I do not mean to deny that things added together in physical reality might form no mere sum, but might also physically interact, so that the result is in some fashion something more or less than the parts; this shows only that physical combination is not mere addition. I do not mean to contradict any of these things. But it remains that if $2 + 3 = 5$ is true in the abstract, then it will also be true in the concrete, whether one is counting cows or cabbages, so long as 2, 3, 5, and + all mean the same thing in the abstract and in the concrete. Hence, if the summation formula is true in the abstract, it must also be true in concrete cases, as in the case of summing infinitely many rectangles or strides in a journey. And yet it is not true in those cases, as we have seen. So either the abstract summation formula I have just written is false, or else it must be shorthand for saying that the limit of the partial sums, carried out as far as one likes, is 10, to which statement I do not object.

"Third, a retreat into the abstract will not protect the abstract formula (if it is not understood as a statement about a limit) from the sort of argument I made earlier against the notion that infinitely many rectangles could, all by themselves, constitute a finite whole. Recall the argument showing that an infinity of steps has no last step, hence no way of producing a point of arrival, hence no way to span the distance from *A* to *Z*. To escape this argument, we retreated from talk of steps into the abstract world of rectangles. We then discovered that essentially the same argument followed us into that abstract world: an infinity of rectangles has no last rectangle, hence no way of producing a final side, hence no way of constituting a total

rectangle, hence no way of constituting an actual total. In just the same way, the argument continues to hound us in the world of more general and abstract notation. Each term in the abstract summation, after all, must be something infinitely divisible and finite. Hence each has its indivisible beginning and end, whether these be points, lines, surfaces, ticks in time, or what have you. The whole they are supposed to constitute, then, since it is also infinitely divisible, and supposedly finite, also begins and ends with some such indivisible. But its ending indivisible cannot be the end of any of its infinitely many components, since if it were, it would have to be the indivisible ending of the last of the components, whereas there is no last component (as you mathematicians yourselves are always, and rightly, the first to insist).

$$\sum_{n=0}^{\infty} \frac{9}{10^n} = 10$$

"I see no escape from this reasoning. If you wish to say, as your earlier lesson implied, that

$$9.999\ldots = 10$$

means that the first and smallest number which the partial sums in such a series cannot reach and surpass is 10, and that this relationship of 10 to 9.999… bears many, strong, and useful analogies to the relationship of a finite sum to the finite number of things added together in it, then I agree wholeheartedly, and I myself will defend you against the many who assail you on that score.

"But if by this equation you wish also to insinuate that all the terms in such a process of addition can by themselves constitute a completed and finite total, I fear I cannot agree, even if it

means I must side with the many."

With those words, Zeno concluded his speech. Of the mathematicians who heard him, some could not see his point and merely shrugged. Others smiled, or raised their eyebrows, but made no verbal reply. But a few took serious interest in what he had said and promised, after taking consultation with one another, to make a reply some time in the future.

Some Philosophical Reflections on the Place of this Question

For dramatic effect, and for brevity and clarity, I have so far employed a fictional version of one philosopher and a group of imaginary mathematicians in place of quoting actual philosophers and mathematicians. The arguments put forward by means of those devices, however, are not fictions. They are, I believe, sound arguments, and real mathematicians and philosophers have proposed them in various forms and contexts. But next I will say some things about the question that I have never heard or read anyone else saying, so I will speak in my own voice.

How ought one to judge between the mathematicians, the philosophers, and the many, regarding what they have to say about whether 9.999… = 10? To the extent that "9.999…" means a limit approached by the partial sums of the series in question, mathematicians are of course perfectly right to say that this is certainly and exactly 10, and their reasons for saying so are both conclusive and properly mathematical. So far as that goes, any members of "the many" who deny that 9.999… = 10, making no distinctions or allowances, are simply uninformed.

On the other hand, it is absolutely impossible for all magnitudes of the form $\frac{9}{10^n}$ (with n running from zero up through all the positive integers) taken together to constitute a finite sum, a finished total, a complete whole. As far as I can see, the reasons for saying this is impossible, which I have put into the

mouth of Zeno, are decisive. So far as that goes, certain members of "the many" who, in their gut, sense that there is something fishy when the mathematicians say that 9.999… = 10 without explaining that they are talking about a limit approached by partial sums, have indeed sensed something fishy, or sensed that something needs to be distinguished from what the mathematicians really mean.

But what is it that the mathematicians really mean? Some seem to speak as if 10 is not only the limit approached by the partial sums of the series, but is in fact the sum of all the terms in the infinite series, as though the sum of an infinity of terms could be regarded as a *fait accompli*.[6] To regard a finished quantity as a sum of an infinity of things, however, if the foregoing reasoning is to be trusted, is an error.

The question I would like to explore in the remainder of this essay is whether this error is a mathematical one, or is instead a philosophical one. Is the question "whether an infinity of actual and distinct things can constitute a finite and actual sum" a philosophical question, or a mathematical one? And if it is a philosophical one, is it a question for first philosophy, or for natural philosophy? As I explore the matter below I will endeavor to maintain a tentative tone, in keeping with my own uncertainty about the matter.

The history of mathematics provides one indication, albeit a fallible one, that the question does not belong properly to mathematics but rather to some other branch of philosophy. True, some mathematicians barked at Cantor when he first began to talk of infinite sets and transfinite numbers, but since that time mathematical controversy over these things appears to

6 At least, anyone saying that a line ten units long is nothing more than an infinite set of points must also regard it as an actual and completed sum of all the terms in the series, since those terms are all "there" in precisely the same way as the ten-unit long line itself.

have died down. Moreover, those who have gone beyond raising an eyebrow at the idea of an infinite sum, or rejecting actually infinite sets and the like, and have tried to articulate in a clear and convincing way what is impossible in such a notion, have rarely been mathematicians. Even more rarely have they been non-philosopher mathematicians. And they have frequently been philosophers.

On the other hand, there is some reason to think the opposite, that the question is properly mathematical. After all, the mathematicians appear to have reached a kind of consensus about the acceptability of actually infinite multitudes, whereas the philosophers have not done so. St. Thomas Aquinas himself, one of the greatest thinkers to grapple with the possibility of actually infinite multitudes, appears to have been ambivalent about them, sometimes saying they involve no contradiction, other times saying that they do, and still other times refusing to say which is the case or else saying the question remains unresolved.[7]

7 In *Quodlibet* XII, q. 2, a. 2, co., the question is "utrum (Deus) possit facere infinita in actu," and in the course of the article St. Thomas distinguishes two ways in which doing or making something can be impossible for a certain productive power to produce: (1) the thing to be made is simply an impossible thing in itself, implying a contradiction, or (2) the thing to be made is in conflict with the *modus agendi* of the agent in question, e.g., God. He says that making something infinite in actuality would not be in conflict with the power of God in the first way, that is, absolutely, since something actually infinite does not imply a contradiction. In *ST,* q. 1, a. 4, co., however, St. Thomas speaks rather decisively against the possibility of an actually infinite multitude of things, as though there were something inherently contradictory about such a notion. In *Quodlibet* IX, q. 1, co., though he uses less decisive language, he likewise says that Averroes's view that an actually infinite multitude involves something self-contradictory seems to be a truer view than that of Avicenna who permits such multitudes as long as they are not infinite *per se* (i.e., as long as no effect depends on the very infinity of those things). In *De veritate,* q. 2, a. 10, co., St. Thomas mentions the question whether an actually infinite multitude of things is possible or is instead self-contradictory, and chooses not to answer it there. In *De aeternitate mundi,* he says that the question is as yet

If mathematicians have come to an agreement on the question, and philosophers have not, then perhaps that is a sign that it belongs to mathematical competence to consider the question.

Moreover, the question is obviously about a properly mathematical thing. Whose job is it, if not the mathematician's, to talk about the properties of the series 9.999… ? If it belongs to mathematics to prove that the partial sums of this series can neither exceed nor reach 10, and that they can exceed anything less than 10, should it not also belong to mathematics to say whether the series can be taken as a whole so as to equal 10? Who is better suited than a mathematician to say what essentially belongs to a subject that is properly considered by mathematicians?

And yet perhaps that is not decisive, either. It happens sometimes that certain questions about the subjects of a particular science do not belong to that particular science. What makes this possible is that each science not only considers a certain subject, but considers it in a certain way. Consequently, nothing prevents distinct sciences from considering the same particular subject, since they can consider it in different ways, or for different reasons—as logic and grammar both consider sentences and parts of speech, but for different reasons. Distinct sciences can even establish the same conclusion about the same subject, though they must arrive at that conclusion by means of different middle terms.

But what science other than mathematics could possibly

unresolved: "Et praeterea non est adhuc demonstratum, quod Deus non possit facere ut sint infinita actu." In *Summa contra Gentiles,* lib. 2, c. 81, St. Thomas says that Aristotle proved there can be no actually infinite thing in natural bodies, but not that there cannot be an actually infinite multitude of immaterial substances. He observes, moreover, that Aristotle's own view that a new human soul comes into existence with each new human body and does not cease to exist after death, together with his view that human generation never began, led others (e.g., Avicenna) to draw the natural conclusion that there must be an actually infinite multitude of human souls.

answer questions about mathematical subjects? One possibility is metaphysics, since its subject matter is inclusive of all things. The subject matter of metaphysics, or first philosophy, is "being as being." This formula implies two ways in which metaphysics is distinct from all other sciences. In one way, it differs from all other sciences in its subject matter, since its subject is more universal than that of any other science. Hence metaphysics is the only science to consider beings in general, to consider what properties belong to all beings, for example, and to consider what differences divide *being* as a whole. In another way, metaphysics differs from other sciences in the way that it considers its subject; it considers them as beings. Other sciences must also consider beings, but they do not consider them precisely because they are beings, or consider what belongs to them as beings.[8] Natural science, for example, is about "mobile being" or "being as mobile," so that it is indeed about certain beings, not as beings, but as mobile. What science, then, will study what belongs to them as beings? Metaphysics, or first philosophy. Since it is about "being as being," metaphysics is both about being in general, and also about certain particular beings insofar as there is something to say about them as beings. Thus, as regards their subject matter, the particular sciences differ from metaphysics in two ways: (1) they consider a more particular subject than metaphysics does, and (2) they consider their subject for a more particular reason—because it is mobile, or because it is quantified, or because it is a corporeal life form, for example, and not because it is a

8 As St. Thomas Aquinas explains, when Aristotle says the subject of first philosophy is being, he adds "*insofar as it is being,* because other sciences, which are about particular beings, of course consider being, since all subjects of sciences are beings, yet they do not consider being insofar as it is being, but rather insofar as it is being of such a sort, whether a number, or a line, or fire, or something of the sort," *Sententia Metaphysicae,* lib. 4, lect. 1, n. 530 in the Marietti edition.

being.[9] This leaves the door open to the possibility that certain questions about the subjects of the particular sciences, such as the subjects of mathematics, will fall to the science of being as being to raise and answer.

Take, for example, the question whether mathematical things subsist in a realm outside human thought and apart from the sensible and changeable world.[10] That question is about mathematical things, but it is not a mathematical question, since it is asking what sorts of beings mathematical things are.[11]

Or take the question whether *dog* as a species subsists apart from individual dogs. Natural science has plenty to say about dogs, and can even show that the species *dog* has a certain existence in the soul of man apart from individual dogs,[12] but it cannot say whether the species also exists apart from the human soul and apart from natural materials. That is to ask about the canine species not as a principle of dogs, or as a principle of natural, changeable beings in their specifically natural existence, but to ask whether another subsistence besides natural and material subsistence is possible for that species, which is a job for the science of being as being.[13]

9 "For none" of the particular sciences "draws conclusions about being simply, that is, about being in general, nor even about any particular being insofar as it is a being," *Sent. Meta.,* lib. 6, lect. 1, n. 1147 Marietti.

10 It is not in a mathematical work, but in his *Metaphysics,* Book 3, ch.1, at 995b15, that Aristotle raises the question whether there are any separately existing mathematical things; he returns to the question in Book 13, ch. 1, beginning at 1076a16, and takes it up again in ch. 6, beginning at 1080a12.

11 St. Thomas observes that "Arithmetic does not draw conclusions about number insofar as it is a being, but insofar as it is number. For it is proper to the metaphysician to consider any being insofar as it is a being," *Sent. Meta.,* lib. 6, lect. 1, n. 1148 Marietti.

12 See, e.g., Aristotle's *De anima,* Book 3, ch.4, and the commentary of St. Thomas thereon.

13 Hence it is in his *Metaphysics,* Book 3, ch.1, at 995b15, that Aristotle raises the question whether there are any separately existing species, mentioning the question again in Book 13, ch.1, 1076a16, and discussing it in Book 13, ch.4, 1078b6 ff.

One can also ask whether the essence of a dog is just its soul, or also includes its materials. That might seem to be a question of natural science, since a dog is a natural thing, its soul is a natural principle of a natural thing, and its materials are also natural principles of a natural thing and can be natural things in their own right when they exist by themselves. And yet the question does not belong to natural science, but to metaphysics, since it is really a question about what things constitute essence (even if a material essence in particular).[14]

What about the question whether the number six is "six ones" or "one six," and whether those are just two ways of saying the very same thing? It is a properly mathematical question is to ask whether taking six once ("one times six") is equal to taking one six times ("six times one"). But what about asking whether six has its own essence and special unity or is instead nothing but a name for a collection of things? Aristotle, supposing there is a special unity to a number, asks what it is that causes that unity, and he asks this question not in a work of mathematics but in his *Metaphysics.*[15] Even questions pertaining to the unity of number, then, do not always belong to mathematics, but sometimes to the universal science of essence and of the one.

Another question about mathematical things which

14 Hence Aristotle considers what constitutes the essence of a material substance in Books 7 and 8 of his *Metaphysics,* and St. Thomas discusses the same question in his *De ente et essentia.* It is the science of metaphysics that "is about sensible substances insofar as they are substances, not insofar as they are sensible and mobile" (St. Thomas, *Sent. Meta.,* lib. 11, lect. 1, n. 2159 Marietti; see also lib. 6, lect. 1, n. 1165 Marietti). Of course, to consider a dog as a dog belongs to the science of nature: "All substances, insofar as they are beings or substances, belong to the consideration of this science" of metaphysics, "but insofar as they are a substance of such and such a sort, such as a lion or an ox, they belong to the special sciences" (*Sent. Meta.,* lib. 4, lect. 1, n. 547 Marietti).

15 *Metaphysics,* Book 1, ch.9, 992a1. See also Book 5, ch.14, 1020b6, where he says that six is what it is once.

might not be a mathematical question is whether the points in a line (and consequently, the parts of the line these points terminate) exist in it actually or potentially, prior to dividing it. In his dialouge *Two New Sciences,* Galileo's shrewd and charming character, Salviati, has this famous exchange with the bumbling Aristotelian, Simplicio:

> *Salv.* The very ability to continue forever division into quantifiable parts implies the necessity of composition from infinitely many unquantifiables. For, getting down to the real trouble, I ask you to tell me boldly whether in your opinion the quantified parts of the continuum are finite, or infinitely many?
>
> *Simp.* I reply to you that they are both infinitely many and finite; infinitely many potentially [*in potenze*]; and finite actually [*in atto*]; that is, potentially infinitely many before division, but actually finite [in number] after they are divided. For parts are not understood to be *actually* in their whole until after [they are] divided, or at least marked. Otherwise they are said to be *potentially* there.
>
> *Salv.* So that a line twenty spans long, for instance, is not said to contain twenty lines of one span each, actually, until after its division into twenty equal parts. Before this, it is said to contain these only potentially. Well, have this as you please, and tell me whether, the actual division of such parts having been made, that original whole has increased, diminished, or remains still of the same magnitude?
>
> *Simp.* It neither increases nor diminishes.
>
> *Salv.* So I think, too. Therefore the quantified parts in the continuum, whether potentially or actually there, do not

> make its quantity greater or less.[16]

Galileo's Salviati marvelously displays the characteristic reaction of mathematicians to the distinction (here drawn by Simplicio clumsily and without nuance) between the actual and potential existence of points and parts in lines. It seems to be a distinction without a difference. A yard is still thirty-six inches long whether those inches are "actually" divided somehow or not. So what does this difference between the "actual" and the "potential" amount to? Zero. Anyone concerned primarily or exclusively with how long something is or how much area something contains will find the distinction of no particular relevance or use. The difference between actual and potential, though it is somehow found in magnitudes (even when abstractly considered), makes no difference to their measure. The reasons for saying the indivisibles and parts of an undivided line or number are present in it potentially rather than actually do not seem to be particularly metrical reasons, and might therefore not pertain to mathematics to explain.[17]

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16 Galileo Galilei, *Two New Sciences,* op. cit., 42–43.

17 Hence Aristotle and St. Thomas give the reasons for saying such things not in mathematical works, but in works of first philosophy, the universal science of actuality and potentiality (such matters also pertain, in a more particular way, to natural philosophy). And the matter is subtle. The parts of a continuous whole are in it potentially, whereas those of a non-continuous whole are in it actually (*Sent. Meta.,* lib. 5, lect. 21, n. 1102 Marietti), and in particular the units in one number are in it actually (Ibid., n. 1108 Marietti). So there is a difference between the way the points and parts of a line are in a line, and the way the units of a number (and, presumably, the partial or lesser numbers) are contained in a whole number. Then again, just as a magnitude is one thing composed of parts, so is a number, and so a number will not be one, and will not be something composed, if it is just a pile of units with no unity to them; for that reason, the units composing a number cannot be present in it actually (*Sent. Meta.,* lib. 7, lect. 13, n. 1589 Marietti; cf. lib. 7, lect. 17, nn. 1672–73 Marietti, and also lib. 8, lect. 3, n. 1725 Marietti; again, a multitude is what is divisible *secundum potentiam* into non-continuous parts, according to

A question very close to the question whether indivisibles and parts are present actually or potentially in a whole quantity is whether a continuum is composed of the sorts of indivisibles that can divide or terminate it. Is a line composed of points, a surface of lines, a solid of surfaces? Here again is a question that can be asked about mathematical things, but even so one might wonder whether it is truly a mathematical question. Euclid does not ask it anywhere. And when Aristotle and St. Thomas ask about it, they do so in natural philosophy.[18] Euclid's first

Sent. Meta., lib. 5, lect. 15, n. 978 Marietti). If these assertions about numbers are not self-contradictory, there must be a distinction at work. One might, for example, distinguish being distinct as points or parts of the continuous are distinct from being distinct as one complete number is distinct from another. The parts of a number are distinct from one another as actually distinct points or parts of a magnitude are; three of the five horses, for example, are actually distinct from the other two, and from each other. But if five horses are all there are, then no four of them are also the actual number of horses, although they could become that number if one dies. In this way, the parts of a number seem to be not actually whole numbers, but materials or parts of a whole number, yet actually distinct things, unlike, say, the parts of an undivided straight line. Accordingly, St. Thomas sometimes speaks of one number as having actually distinct parts, whereas the parts of one magnitude are not actually distinct. Even the parts of continuous wholes seem to admit of more and less actual distinction. An animal is in some sense continuous, but its organic parts are either in it actually or else with a potentiality that is very close to actuality, since they are actually distinct from one another in form, even if they are not distinct living beings (*Sent. Meta.,* lib. 7, lect. 16, n. 1634 Marietti). Similarly, one must admit that the parts of an undivided magnitude, such as a circle, are actually present in some degree, since they are to some degree distinct (and the distinction of things makes them actual; Ibid., n. 1633 Marietti). The right and left halves of an undivided circle are not distinct and actual figures (e.g., two semicircles), but they are distinct (hence actual) in some less perfect manner. And the center of a circle seems to be somehow actually present prior to finding it; the construction that finds the center does not simply cause the circle to have a center. So too the maxima, minima, and inflection points of curves in a coordinate system seem to be in some way more actual than other points in them are.

18 See Aristotle, *Physics,* Book 1, ch. 6, and St. Thomas's commentary *In Physicorum,* lib. 6, lect. 1.

postulate in some way respects the fact that a line is not composed of points; if, as his postulate states, it is possible to draw a straight line between any two distinct points, then it must not be possible for two distinct points to be right up against each other, and it must be possible to take as many other new points between the original two as we please. The impossibility of two points being right next to each other is the reason why it is impossible to compose a line of points. To show that prior impossibility, however, belongs to the science that considers the continuous universally, namely natural science, since the reason it is impossible for two points to be successive is not so much something peculiar to points, but something true of indivisibles in any continuum (and natural science alone has reason to consider all sorts of continuous things: magnitudes, motions, times, etc.). St. Thomas goes so far as to say that the geometrical postulate that it is possible to draw a straight line from one point to another point is proved by natural philosophy.[19]

Many or most mathematicians today regard a line as a certain infinite set of actually distinct points. As long as they agree (and they do) that there is no point right next to any given point, and that between any two distinct points on a line there is an infinity of other points, they are, imperfectly, respecting what natural philosophy has to say on the question. But they usually do not arrive at the conclusion that a straight line is something really other than the points that can be taken in it, and that these are potentials in it rather than components of it. Hence it appears that this conclusion is not a properly mathematical one.

This last example is very close to the question whether 9.999… = 10. The failure to see that 9.999…, if taken to mean an actual infinity of distinct things, cannot possibly constitute a finite whole, and in fact is self-contradictory, is a failure to see

19 *Exp. Post. An.,* lib. 1, lect. 5, n. 50 Marietti. Cf. lib. 2, lect. 11, n. 515 Marietti.

what sort of existence the quantitative infinite can have. And if its existence is really only a coming-into-existence of its parts in succession, it seems to belong to the science of coming-into-existence, or natural philosophy, to consider such a question.

The equality can be taken to mean that 10 can always be divided so as to contain more terms of the series, as many as we please, and that it is the smallest number (or numbered magnitude) to have that capacity. Or it can be taken to mean that all the terms of the series, existing together in order, constitute the finite sum of 10. This latter interpretation involves an impossibility, but perhaps that impossibility is one that should be seen in the universal science of the infinite, which is natural philosophy. Nothing special about 10, or about the specifically mathematical way of considering an infinite series, makes plain the impossibility of all the terms existing together as one whole. After all, it is impossible for all the terms of an infinite series to exist distinctly and all together in a complete and finite whole, whether the terms are abstractly considered mathematical quantities, or steps in a journey, or successive intervals of time. And the reason is always the same: the finite whole has an end, whereas the infinite series does not. Hence the question really belongs to natural philosophy, since the answer to it requires a more universal consideration than mathematics can make.

If that reasoning is correct, then the impossibility of an actually infinite multitude of things constituting a finite whole is something mathematics should not contradict, but need not state or explain. On the other hand, how is mathematics to avoid contradicting the impossibility if it has no reasons of its own for asserting it? It must listen to another science, such as natural philosophy, and take that science's word for it. But as long as sound and exact natural philosophy does not exist in a living and well-respected community of natural philosophers, there is in some sense no one to listen to on the matter. So if

mathematicians sometimes speak as though an actually infinite multitude can constitute a finite whole, they are perhaps not to blame; especially since that way of speaking is so natural and convenient in mathematics.

I would sum up the thoughts in this essay on the question whether 9.999… = 10, and on the question about which science that question should call home, as follows. If some of the many, making no distinctions, simply reject the statement that 9.999…= 10, they are guilty of a failure to discern the beautiful and powerful sense in which it is true, although it is a mitigating circumstance that it is not their job to make such a distinction, and another mitigating circumstance that those whose job it is rarely perform that particular duty. Insofar as mathematicians assert that 9.999… = 10, and in so doing take 9.999… to signify a limit and not a completed infinite sum, then they are not guilty of saying anything false, uncertain, or inexact. If, on the other hand, any of them take 9.999… to signify not merely a limit, but either a completed infinite sum or else a complete whole constituted of nothing but an infinity of actually distinct parts, then they have said something false and impossible, since no such sum can be completed by a process of addition, and no such whole can exist. In their case, too, there is a similar mitigating circumstance. Although it is probably the job of mathematicians to distinguish between a limit and a sum completed by a process of successive additions, it is perhaps not their job to explain why a finite whole constituted of an infinity of distinct and actual parts is an impossibility. At least, if the foregoing line of argument was sound, then that duty falls to the philosophers, specifically those who study nature. In that case, the ultimate culprits for the confusion over whether 9.999… = 10 are (1) the imperfect manner in which the infinite exists, and (2) the ongoing, and somewhat natural, dearth of natural philosophers.

EUCLID'S *ELEMENTS*: DEMONSTRATIVE SCIENCE

Ronald J. Richard

Introduction

Euclid's *Elements* was considered the exemplar of demonstrative science for two millennia. With the introduction of algebra, however, the attitude of mathematicians began inexorably to change. The eventual result was that the geometry of Euclid was considered to be only a kind of geometry, with other, so-called non-Euclidean geometries standing alongside it. Additionally, Euclid's arithmetic was replaced by number theories within which Euclid's numbers were only one kind.

But are the moderns right? Has *Elements* been superseded? Or is *Elements*, in spite of modern mathematicians" views, really a demonstrative science? The purpose of this paper is to argue that it is.

The paper is divided into two main parts. The first presents the required philosophical foundations. The second considers *Elements*, and is divided into two parts, corresponding to the two parts of *Elements*: geometry and numbers. Each of these parts finishes with a consideration of whether non-Euclidean

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geometries and modern number theories can be demonstrative sciences.

I - Philosophical Foundations

A. Science

Aristotle begins *Metaphysics* by stating: "All men naturally desire to know."[1] The English verb "to know" has a variety of meanings, ranging from mere acquaintance with some individual thing or event to deep-seated, philosophical knowledge. What is Aristotle's meaning here? The Greek word used is εἰδέναι, and Aristotle speaks about it at the end of I.9 of *Posterior Analytics*, in a brief passage that includes three different meanings of "to know":

> It is difficult to know (γνῶναι) whether one knows (οἶδεν) or not. For it is difficult to know (γνῶναι) whether or not it is from the principles of each thing, which is to know (εἰδέναι). Now, we suppose ourselves to know (ἐπίστασθαι) if we have a syllogism from some true and first things. But this is not so; it must moreover be of the same genus with the first things. (76a26-30)

In this passage, the English "to know" translates four distinct Greek words. The first occurrence (along with the third), γνῶναι, derives from the root verb γιγνῶσκω, which is cognate with the Latin *nosco*, and could be translated as "to perceive" or "to discern," "to be aware of," "to recognize." The second, οἶδεν, derives from εἴδω, whose root meaning is "to see" and is cognate with the Latin *video*. The third one, εἰδέναι, which is also the word used in the above passage from *Metaphysics*, also drives from εἴδω. The fourth one derives from ἐπίστᾶμαι, which results from joining together the Greek preposition ἐπί, whose meaning is

1 Except where noted, all translations are by the author.

"upon" and the Greek verb ἵστημι, which means "to stand". This third kind of knowing results from syllogistic demonstration. The context seems to indicate that ἐπίστᾶμαι. means the same thing as εἰδέναι. But it does not, as we will see later.

Next we see what Aristotle means by syllogism. In *Prior Analytics* he tells us that

> A syllogism is speech in which, certain things being put down, something other than those laid down necessarily follows by these being [put down]. (24b13)

The things put or laid down are statements and are called premises, from the Latin *praemitto*. In a syllogism, there must be two premises. Both premises can be true, in which case the conclusion must also be true, or one can be true and the other false, in which case the conclusion must be false, or both can be false, in which case the conclusion can be either true or false. He also states,

> a syllogistic premise simply [speaking] is an affirmation or denial of something about something else . . .; and it is demonstrative if it is true and taken from the first principles. (24a28)

Since our goal is to know, and we can only know what is, both premises must correspond to what is, i.e., they must be true.

At the beginning of I.4 of *Posterior Analytics* he states,

> Now, since that of which there is knowledge (ἐπιστήμη) simply cannot have itself otherwise, what is known (ἐπιστητὸν) according to demonstrative knowledge (ἀποδεικτικὴν επιστήμην) must be necessary. But demonstrative [knowledge] is that which we have by having a demonstration (ἀπόδειξιν). Demonstration, then, is a syllogism from necessary things. We must grasp, then, from what and from what sort demonstrations are. (73a21-5)

We note first that the Greek ἐπιστήμη is from the verb ἐπίστᾶμαι, the root of the fourth word for "to know" in our original passage from *Posterior Analytics*. This kind of knowledge is also called scientific knowledge. So, to know in this sense is to have scientific knowledge, the whole body of which in a particular genus is called a science. So, a science is a body of knowledge based on appropriate first things.

Next, we distinguish. To syllogize is to come to the conclusion that necessarily results from two premises. It is not the goal of a syllogism *per se* to arrive at a truth; its only task is to reach the conclusion that necessarily follows from the given premises. To demonstrate, on the other hand, requires syllogizing from premises that are true. So, the conclusion of a demonstration is always true. Succinctly, to demonstrate is to syllogize from true premises that are ultimately fundamental.

At the beginning of *Posterior Analytics*, Aristotle tells us how we achieve scientific knowledge:

> All teaching and all learning (μάθησις) from reasoning (διανοητικὴ) comes about from perception (γνώσεώς) had beforehand. This is clear by looking at all [instances]. For, of the sciences (ἐπιστημῶν), the mathematical (μαθηματικαὶ) come about in this way . . . (71a1-3)

We begin by noting that γνώσεώς is from γνῶναι. Three other things are worth noting. First, as we have seen, coming to know something scientifically requires demonstration. Second, Aristotle gives mathematics as an instance of such endeavors. Third, Aristotle begins *Physics* by telling us more exactly what we must be aware of beforehand:

> Since in every inquiry in which there are principles or causes or elements, understanding (ειδέναι) and scientific knowledge (ἐπίστασθαι) result from perceiving

> (γνωρίζειν) these (for we think we perceive each thing when we are aware of the first causes and the first principles and as far as the elements). (184a9-14)

The above discussion shows why ἐπίστασθαι is translated as scientific knowledge; but why is ειδέναι translated as understanding? As we said above, the root meaning of εἴδω is "to see." Now, that which we know by seeing we know directly. Thus, by sight I know color, size, shape, etc. If someone I never met before is walking toward me, I do not know his name, or where he is from, etc. But I do directly know what I see, namely his color, shape, etc. Now, not everything can be demonstrated since, otherwise, there would be an infinite regress. Thus, there are some things which we must know without demonstration. These are things which we know directly, things which we can say we "intellectually see". They, then, are the things from which demonstrations proceed. So, we can say they "stand under" the demonstrations. Thus, they are things which must be understood, things which we must understand.

Therefore, in this opening passage of *Physics*, Aristotle is speaking of knowledge in the senses both of knowing the most basic things and of knowing the things that demonstratively follow from them. He then goes on to tell us what these basic things are: principles, causes, and elements.

In Book V of *Metaphysics* Aristotle says what he means by these three terms. In Chapter 1 he discusses principle, giving six possible meanings. I will begin by noting three of these that are relevant to our consideration:

> Principle is said to be [1] that of a thing from which one would first move, such as, of a line or a road, there is a principle from which one moves in one direction . . . [2] that from which each thing would best come to be, such as, in learning, sometimes one should not begin

> from what is the first and the principle of a thing, but from what one would most easily learn . . . [6] further, that from which a thing is first knowable is said to be a principle of the thing, such as the hypotheses of demonstrations. And causes are said equally; for all causes are principles. It is common to all principles to be the first from which a thing is or comes to be or comes to be perceived. (1012b34-1013a19)

The first way is the one we will be concerned with. The starting line of a race and the beginning point of a line would be examples.

In Chapter 2 (repeating *verbatim* what he says in *Physics* II.3) he states that there are four kinds of causes:

> In one way, then, cause is said to be that from which, being present in it, some existing thing comes to be, like the bronze of a statue and the silver of a bowl, and the genera of these. In another, the species {form} and the paradigm; this is the account of the "what it was to be" and the genera of this (as, of the octave, the [ratio] two to one, and in general, number), and the parts which are in an account. Further, that from which there is the first beginning of change or of rest, as a counselor is a cause, and the father of a child, and in general, the one making of the one made and the one changing of the one being changed. Further, as the end. This is that for the sake of which, as health is of walking. (194b23-33)

The first is commonly called the material cause; the second, the formal cause; the third, the moving or agent cause; the fourth, the final cause. In Chapter 3 he states:

> Element is said to be the first constituent of which an existing thing is composed and which is indivisible in kind into different kinds. Likewise, element is said of geometrical propositions (διαγραμμάτων), and, on the

> whole, of demonstrations; for the first demonstrations, which exist in many demonstrations, are said to be elements of demonstrations, which are such as the first syllogisms from three [terms] through one middle [term]. (1014a26-b3; also 998a25-27)

B. Abstraction

Next, we must consider what "abstract" means.

This word comes into English from the Latin *abstractus*, a participial adjective derived from the verb *abstraho*, whose root meaning is "to draw away from". Thus, something is abstracted by being drawn away or separated from something else. More particularly, it is separated from that which underlies it. Thus Aristotle says that form is physically abstracted—separated—from matter. He does not mean that form can exist without matter; since the matter underlies the form, a form cannot actually exist without its matter.

We can understand what Aristotle does mean by looking at *Physics* II.2:

> . . . those who speak about nature also clearly speak about the shape of the moon and of the sun . . . The mathematician, certainly, also treats of these things, but not as each is the limit of a natural body . . . Whence, he also separates {abstracts} [them]. For they are separable from motion in thought. (193b29-34)

He also says, "For geometry looks into natural lines, but not as natural, while optics looks into mathematical lines, but not as mathematical, but as natural" (194a10-12). St. Thomas's commentary on these passages makes clear what Aristotle is saying:

> 160. He says, therefore, first that the mathematician and the natural scientist determine about the same things,

> namely points, lines, and surfaces, and things of this sort, but not in the same way. For the mathematician does not determine about these things insofar as each of them is the limit of a natural body, nor does he consider those things which happen to them insofar as they are the limits of a natural body, through which way natural science considers them. On the other hand, it is not unsuitable that the same thing should fall under the consideration of diverse sciences according to diverse considerations.
>
> 161. Thereupon, when he says, "Whence, he also separates …," he concludes to a sort of corollary from what he has said.
>
> For since the mathematician considers lines and points and surfaces and things of this sort and their accidents, [but] not insofar as they are limits of a natural body, he is therefore said to abstract from sensible and natural matter. And the reason why he is able to abstract is this: since according to the intellect they are abstracted from motion.
>
> As evidence for this case we must consider that many things are joined according to a thing, [the understanding of] one of which is not derived from the understanding of another; as white and musical are joined in the same subject, and yet [the understanding of] one of these is not derived from the understanding of the other, and so one can be separately understood without the other. And this one is understood to be abstracted from the other. It is manifest, however, that the posterior are not in the understanding of the prior, but conversely; whence the prior can be understood without the posterior, but not conversely. As for instance it is clear that animal is prior to man, and man is prior to this man (for man is had from addition to animal, and this man from addition to

man). And because of this, man is not in the understanding of animal, nor Socrates in the understanding of man. Whence animal can be understood apart from man, and man apart from Socrates and other individuals. And this is *to abstract the universal from the particular.*

Similarly, on the other hand, among all the accidents which come to substances, quantity comes first, and then sensible qualities, and actions and passions, and motions consequent upon sensible qualities. Thus therefore, quantity does not include sensible qualities or passions or motions in its understanding; nevertheless it does include substance in its understanding. Therefore quantity can be understood without the matter [which is] subject to motion and sensible qualities, but not apart from substance. And so in this way *quantities and those things which belong to them are, according to the intellect, abstracted from motion and from sensible matter*, but not from intelligible matter, as is said in *Metaphysics* VII.

Since, therefore, they are in this way abstracted from motion according to the intellect, because they do not include sensible matter subject to motion in their understanding, so the mathematician is able to abstract them from sensible matter. And it makes no difference, as far as the truth is concerned, whether they are considered in one way or the other. For, although they are not abstracted according to being, mathematicians, nevertheless, in abstracting them according to understanding, do not lie; since they do not assert that these things exist outside sensible matter (for this would be a lie), but consider them apart from a consideration of sensible matter, which can be done without lying. As for instance, one is able to consider white apart from musical, and truly, even though they come together in the same subject. Nevertheless, it would not be a true consideration if one

were to assert that the white [thing] is not musical.

> 164. . . . For geometry, of course, considers the line which has being in sensible matter, which is the natural line. Nevertheless, it does not consider it insofar as it is in sensible matter, according to which it is natural, but abstractly, as was said. But perspective, conversely, takes the abstract line which is in the consideration of the mathematician, and applies it to sensible matter, and thus determines about it not insofar as it is mathematical, but insofar as it is physical . . .

The meaning of this passage is clear without further commentary. But we must make sure we understand something that St. Thomas says: "for man is had by addition to animal." Clearly, he does not mean that there is an individual substance called "animal" to which we add something to get an individual substance called "man." Rather, intellectually we get the species "man" by adding the notion "rational" to the genus "animal."

Euclid's *Elements* is a mathematical science, and its subject matter consists of points, lines, surfaces, solids, and numbers insofar as they are abstracted from sensible matter. We will analyze *Elements* in light of what we have seen in Sections A and B. But since *Elements* begins with definitions, we must first see some things about definitions.

C. Definition

A definition can serve two main purposes: First, to give an idea of what a word means to one who first encounters the word; second, to lay down what the word most fundamentally means. The latter is the kind that must be used at the beginning of a science.

As we advance from infancy, we acquire a language. We do so primarily by usage. In this situation, we come to know the meanings of words not by being told what they mean via other

words. For example, we learn what a shoe is not by other words but by being shown one or more.

But as Aristotle says at the beginning of *Physics*, we are confused when we first learn about things. This is true even of words. Thus he says at the very end of *Physics* I.1, "And children, at first, address all men as "fathers" and all women as "mothers," but later on distinguish each of these" (184b12-14). What happens is that the first words that children usually speak are "papa" and "mama." When they first learn these words, however, they sometimes call every man "papa" and every woman "mama" because, at first they are naturally able to distinguish between men and women but are confused as to what the words actually signify. So, being confused, they speak as if the word "papa" signifies any man and "mama" signifies any woman. But this situation does not last very long, so Aristotle concludes the above statement by saying "but later on they distinguish each of them." That is, they learn that "papa" signifies only one particular man, while other words, such as "uncle," signify other men, and similarly with respect to "mama."

Somewhere along the line our vocabulary becomes large enough that we can be told what a word means by means of other words. That is, the word is defined. Such a definition is often expressed in terms of a property of the thing the word signifies. For most people, for most of the time, such working definitions are sufficient, but not for one desiring scientific knowledge.

Scientific knowledge cannot be confused, but must be clear. That is why a science begins not with working definitions but with fundamental ones. When starting out, though, the scientist is much like St. Augustine when he was considering time and said, "What then is time? If no one asks me, I know; if I would explain it to the one who asks, I know not" (*Confessions* XI.14). This is the dilemma of the scientist: to express the fundamental *what* of something.

As Aristotle says in *On Expressions* (Περι Ἑρμηνείας,

16a20-17a1), words signify by convention. And, as Socrates points out, a discussion can proceed fruitfully only if the participants agree on the meanings of the terms used. So, since a name signifies something, in order to converse we must know what it is that the name signifies. For most conversations, all we need to know is the meaning of the name, which is called the *quid nominis*, i.e., the whatness of the name. This is to be distinguished from what is called the *quid rei*, the whatness of the thing which is named. For example, we could give the *quid nominis* of a unicorn as "a horse-like animal with a pointed horn protruding from its forehead." But we cannot give its *quid rei*, because there is no such thing in reality that has a whatness or essence.

We can, however, give both a *quid nominis* and *quid rei* of "man." We could specify the first simply by pointing to several instances, the way children first learn the meanings of names. We could also say what the name signifies by presenting properties, e.g., a "featherless biped," provided the hearer knows what these two names signify. The *quid rei*, on the other hand, specifies the essence of the thing named, so for man it would be "rational animal."

II - Euclid's Elements

Euclid's *Elements* is an elegant instance of demonstrative science. In order to see this is the case, we must see that its foundations are true and rock solid. These foundations are the Definitions, Postulates, and Common Notions.

A. Geometry

Definitions

General Discussion

Elements begins with definitions of the geometrical beings Euclid

will consider, and the teachings which follow are based on them. So, there are two questions that must be asked about them. First, are the definitions true? Second, does each give the *quid rei*? That is, does each express the essence of what is defined? For all properties flow from the essence. And, as we have seen from the beginning of *Physics*, demonstrative knowledge is knowledge of the cause as cause. For example, we can argue as follows: "All rational animals are risible. All men are rational animals. Therefore, all men are risible." Since rationality is the cause of risibility, this argument is a demonstration. So, a demonstration must be based on the *quid rei*.

Strictly speaking, though, a definition cannot be true, or false, since only statements can be said to be true or false, while a definition is not a statement. It corresponds to the predicate of a statement, the subject of which would be the term being defined.

If we take definitions as being (incomplete) statements, then could they be true? In a way yes, in a way no. If one says the predicate simply signifies what he means by the term, we would have the *quid nominis*, which need not be either true or false. For example, I might begin a discussion by stating that by the expression "parallel lines" I mean those that meet only beyond a certain distance. In order to follow my discussion you must accept this definition. You can (nay, should) then be skeptical of the things I then go on to say about parallel lines. But, since I intended to specify only what I mean by the name then, within the discussion the expression would be neither true nor false. If, however, I intended to present what the term signifies in reality, then the expression would be true or false. Now, in Definition 1, Euclid is intending to specify not only what he means by the term "point" in the ensuing discussion, but what in reality the term is intended to signify. So, we can ask whether it is true. (We should note that in *Elements* Euclid presents some definitions as statements. The first definition, for example, is stated as: "Point is

what has no part." Thus, in the first definition, the subject would be *point*, and the predicate would be *what has no part*.)

A definition, therefore, can be considered to be true if is understood to be the predicate of a statement that is true. But this is not sufficient for demonstration. For example, man can be defined as "featherless biped," and such a delineation would be true and could be sufficient for a particular discussion, for instance, one in which man is to be distinguished from eagle. What science requires, though, is that the definition express what a thing is most fundamentally, not simply what can be truly said about it. This is the *quid rei*, and is the kind of thing Aristotle is seeking in *De Anima*,[2] when looking for the definition of "soul." Just as every property of a thing depends on what the thing is, everything else that can be truly known of the thing represented by the term must depend on the *quid rei* of the term.

In order for *Elements* to be a scientific presentation of mathematics, then, it must begin with definitions which express the *quid rei*, i.e., definitions that express most fundamentally what the terms defined mean. This is what Euclid indeed does, which can be illustrated by examining Euclid's first three definitions.

As we have said, there can be no circular reasoning or infinite regress in demonstration, so the very first statements must be known in some way other than by demonstration. Similarly, there can be no circular reference or infinite regress in defining. That is, the first definition cannot include a term that is ultimately defined by the terms of the first definition. Neither can there be infinite regress. That is, there must be a first definition. Moreover, this first definition cannot be defined in terms of some other, more fundamental thing existing in the science; otherwise, it would not be the first definition of the science. So the terms in the first definition must be known from something

2 See the first book of *De Anima* as a whole, and the first two chapters of the second book.

that is prior to and more fundamental than the science. In the case of the first definition, we would look to common experience and metaphysics.[3]

First Definition *Point is what has no part.*

The first definition is "what has no part." Aristotle, in *Metaphysics* V.25 presents five senses in which the word "part" is used, the first being the sense in which the word is used here.[4] But, the student who first studies *Elements* does not yet know metaphysics, and so he begins only with what he knows from common experience. Nevertheless, in order for *Elements* to be scientific, it must ultimately be based on metaphysics.

As we have said above, the first definition is "what has no part." How does this fit with common experience? We say that "X marks the spot," but strictly speaking it is not the entire letter but only the position where the legs cross that marks the spot. In fact, we could eliminate all the parts of the X except the part where they cross. The only reason to keep the entire X is to make the spot more apparent. Indeed, we could simply use a large dot to mark the spot. The larger the dot, the more apparent it is. Unfortunately, the larger the dot, the more uncertain we are about where the spot is. But if we are only interested in accuracy, the smaller the dot the better. But no matter how small the dot is, it still has some size, and so includes uncertainty. The only way completely to eliminate uncertainty is completely to eliminate size. This cannot be done physically, but only in the intellect. And, in doing so, we arrive at an indicator of position that has no part. And so the geometrician arrives at *the* first definition of *Elements*.

3 Cf. *Categories*, Chapter 6, and *Metaphysics* V.25.

4 "Part is said of that into which a quantity can in any way be divided" (1023b12).

Now, a true definition gives the genus of the term and the specific difference which produces the species. The genus of the first definition is called "what" and the difference is called "partless." Right away we seem to have a difficulty. What does the term "what" signify? Taken most broadly, "what" signifies "the being which." So, the definition would be "the being which has no part." But Aristotle shows in *Categories* that the term "being" is used in ten different senses. When we read Euclid's first definition, though, we are not in a quandary as to which category the "what" is in; it is in the quantitative category, i.e., the second one. That is, *Elements* deals with quantitative being.

More exactly, the first definition deals with geometrical being. And, as Aristotle says at the beginning of V.13 of *Metaphysics*, and in Chapter 6 of *Categories*, a geometrical being is a measurable, continuous quantity, also called a magnitude. He then goes on to give the three possible magnitudes: line, surface, and solid.

We must be careful, however, for a difficulty now arises. First, Aristotle does not give a point as an example of magnitude; and he could not. For he begins Chapter 13 of *Metaphysics* V by saying that "Quantity is said of what is divisible into what is in it." But, since a point has no part, it is not divisible at all. Moreover, a part of a line is not a point, but a line, and a part of a surface is a surface, while a part of a solid is a solid. Thus a part of any magnitude is not something from a lower dimension, but something of the same dimension. So point cannot be in the category the way line, surface, and solid are.

In the material world, there can be no surface without a body, no line without a surface, and no point without a line. But in geometry we proceed demonstratively from the most basic things, and so we go the other way around. We can see this is the case with the *Elements* by looking at some definitions. Examining Definitions 2, 3, and 4, we see that there cannot be lines if there

are no points; from Definitions 5 and 6, there can be no surfaces if there are no lines; and, from Definitions 1 and 2 of Book XI, there can be no solids without surfaces. This is so because all three kinds of magnitudes are limited in extent, and geometrical beings of a lower dimension are needed to limit their extension. So, without points, none of the extended quantities could exist. Furthermore, the parts of geometrical beings have common boundaries (Aristotle, *Categories* 5a 1-6). A point, thus, can be the common boundary of two parts of a line. Likewise, a line can be a boundary of two parts of a surface, and a surface of two parts of a solid. But we must be careful here. For the parts of a surface need not be joined by a line, or parts of a solid by a surface. For example, the vertex point of an Apollonian cone is the common boundary of the two parts of the conic surface and of the cone.[5]

So, how is point in the category quantity? It is in the category by being the principle of the extended things, the word "principle" being used in the first of the senses presented by Aristotle in *Metaphysics* V.1.[6]

Let us investigate this matter by analogy. Concerning conic sections, we could ask whether the vertex point, the original straight line, and the base circle are conic sections. For a conic surface can be cut by a plane in such ways as to result in each of them. The answer is yes, but in two ways. They certainly can result by cutting a conic surface with a plane. But they are

5 "If from a point a straight line is joined to the circumference of a circle which is not in the same plane with the point, and the line is produced in both directions, and if, with the point remaining fixed, the straight line be rotated about the circumference of the circle until it returns to the same place from which it began, then the generated surface composed of the two surfaces lying vertically opposite one another, each of which increases indefinitely as the generating straight line is produced indefinitely, I call a conic surface, and I call the fixed point the vertex" (Apollonius, *Conics*, Definition 1).

6 See 1012b34; cf. Section I.A above.

conic sections more because they are the principles of the generation of the conic surface: they are in the conic surface from the very beginning.[7] And so they are principles of conic sections spoken of strictly.

What distinguishes geometrical beings from numerical ones? Aristotle tells us at the beginning of Chapter 6 of *Categories* that they are differentiated by the fact that geometrical beings have position (*Categories* 4b21-22). So, though "point" and "one" are alike in that neither of them has parts, they differ in that the former has position while the latter does not. This is the case because geometrical beings exist only in geometrical space, while numerical ones need not. This is so because geometrical solids are abstractions of physical bodies, which can only exist by being in a place. In order to arrive at numerical beings, however, we must abstract even further, leaving even place behind. For we can number even things that do not have place, e.g., thoughts.

Thus, although a point does not have extension, whereas all geometrical quantities, strictly speaking, do, it does have position. In fact, in Postulate 1, a straight line is positioned by its end points. Furthermore, all other geometrical beings ultimately receive their positions from those of straight lines: see, e.g., Postulate 3 and Proposition I.1. In fact, a point differs from a geometrical location only in thought: the notion of location does not include extension in any way; the notion of point does, even if only by denying it. Thus, one might define the point as "extensionless geometrical being."

Thus, the *quid rei* of point is: partless geometrical being. It is because of what a point is that we have the statement of the third definition. The boundary of a line cannot be part of that line, because any such part would itself have parts since, being a continuous quantity, it is infinitely divisible. This realization also

7 See footnote 5.

originates in the physical world. We do not consider the end of a string to be part of the string. For, if we did, we would be faced with the problem of wondering where the end of this part is. So, the boundary of a line can only be something that has no length. Thus, a point has the property of being able to bound a line only because it is completely without parts.

Second Definition *Line is breathless length.*

Note that Euclid does not say that a line is also depthless. We should wonder about this, since he does say in Definition 1 of Book XI that "solid is that [geometrical being] which has length, and breadth, and depth."

Moreover, Definition 5 of Book I states that "surface is that [geometrical being] which has length and breadth only." We can speak analogously of extended geometrical beings as being the three rungs of a ladder: line, which has length only, is the first rung; surface, which has length and breadth, is the second rung; and solid, which has all three, length and breadth and depth, is the third rung.

As with the definition of surface, Euclid might have said that line is that geometrical being which has length only. But what Euclid seems to have in mind in Definition 2 is that a geometrical being can have depth only if it has breadth. Therefore, Definition 2 expresses most frugally what a line is: there can be no third rung of the ladder without a second rung. Since a line has no breadth, it cannot have depth.

Furthermore, the form of the definition is more like that of Definition1 than that of Definition 5. As we have already discussed, a line has boundaries: but only with respect to length. For, with respect to breadth and depth, a line is like a point. (A surface, on the other hand, also has breadth (Definition 5), and so can be bound only by something that has no breadth, i.e.,

point or line. A solid, on the other hand, additionally has depth (Definition XI.1). So it can be bound only by things that have no depth, i.e., by surface, line, or point.)

Furthermore, the point-like character of a line is seen by the fact that when two lines intersect, what is common to the two lines is always a point. (This fact can lead to the erroneous statement that lines are composed of points.)

Moreover, a line is the first extended geometrical being, and is the basis of all other geometrical beings. Thus, it is to higher rung geometrical beings as point is to it. In this way, a line is more like a point than it is like surface.

Third Definition *The extremities of lines are points.*

We first note that the third definition does not look like a definition; i.e., it does not say what something is. Rather, it asserts that points do indeed exist, at least as the extremities of lines. This is important, for definitions do not assert that what is defined actually exists. As we saw above, it only tells us what we mean when we use the name. In fact, given our discussion of the first two definitions, we can see that the third definition necessarily follows from the first two by a simple syllogism: Every geometrical being without extension (i.e., length, breadth, and depth) is a point. All extremities of lines are geometrical beings without extension (i.e., length, breadth, and depth). Therefore, all extremities of lines are points.

If the third definition is in fact not a definition, what is it doing in with the definitions? The Greek word translated as "extremity" is πέρας, whose original meaning was *end, limit, or boundary.* Now a limit or boundary need not belong to what it bounds: my neighbor's fence limits or bounds my yard, yet does not belong to my yard (my own fence would). But the end of something must belong to that something. Thus an end is an

extremity. So, Euclid is saying that the points that limit or bound a line belong to that line.

Furthermore, the word translated as "definition" is ὅρος, whose original meaning was also *boundary*. Only later did it come to mean *definition*. So, perhaps Euclid is here equivocating on ὅρος: "partless geometrical being" is the ὅρος of point, while a point is the ὅρος of a line. Note that in English we could say that the end points of a line define that line. This discussion also applies to the sixth definition.

> Fourth Definition *Straight line is one which lies evenly with the points on itself.*

A learner usually begins his studies with a working knowledge of the words defined. Thus, the learner begins *Elements* by knowing what a straight line is, at least to the extent that he can distinguish one from a bent or curved line. As with St. Augustine in the case of time, he may not be able to say what a straight line is but, as the expression goes, he knows one when he sees it.

Fundamental definitions must be approached gradually. So, when a successful learner reads and understands Euclid's definitions he probably has the following reaction: how stupid of me, and how brilliant of Euclid, to see something so simple. So, from the experiences that arise from living, a learner begins *Elements* already knowing what a straight line is, but not knowing how to express that knowledge most fundamentally.

In order to judge whether a definition is true we must at least compare it with what we already know with certainty about the term defined. What certain knowledge does the learner possess about the straight line when beginning *Elements*? He has an image of a straight line in his imagination, which image originates from physical lines that, by convention, are called straight. What are we sure of about material straight lines? We can answer

the question by invoking the lore of the carpenter. How does a carpenter decide if a board is straight or not? He does so by sighting along the board's long edge. If when lining up the two ends of the board no bulge or dip appears, i.e., all he can see is the near edge of the board, then he says the board is straight. We translate this notion to the geometrical world by saying that straight lines have no bulges and no dips. That is, if we imagine looking at a straight line, say the side of a square, it will always look like a line, except when we look directly down it. When we do so, the straight line disappears, since the near end point covers all the other possible points of the line, and the line itself, and we see only a point. This is what Euclid means when he says that a straight line is "that [line] which lies evenly with the points on itself." Here, "even" has the notion of flatness, so that we can say of flat ground that it is even, and that rough ground is uneven. Thus, the definition abstracts from what we see in the world of the imagination to what must be said in that of the intellect.

The straight line is unique in that any part of any straight line can fit anywhere else on that straight line and also anywhere on any other straight line. And so, except for length, every part of every straight line is exactly like every part of every other straight line. Thus, straight lines are like points in that they differ from each other by location. They differ from points by having extension, and so shape. But the shape of every straight line is identical in all its parts with that of every other straight line. This is not true of any other kind of line. The circumference of a circle comes closest to having this property. Any part of a circumference can fit anywhere on the same circumference. It can also fit anywhere on the circumference of an equal circle. But it cannot fit on that of a larger or smaller circle. Thus, universal superposition is a unique property of the straight line.

Moreover, a straight road or path in the material world possesses a direction. If two roads or paths have different directions,

then they must eventually meet if we sufficiently prolong them both forward and backward. But if they lie in the same direction they will never meet. An imagined straight line also possesses a definite direction.[8] Since geometrical space is homogeneous and isotropic, there is no way to specify the absolute direction of any straight line. But having drawn, via Postulate 1, one straight line, we are able to specify the directions of all other straight lines relative to it. In Descartes's *Geometry*, this would be the line *AB* in the four-line locus problem. Direction is also an irremovable property of the abstracted straight line. If two straight lines in the same plane have the same direction, then they will never meet. If they have different directions, however, they will eventually meet, if they are produced both ways. When they meet, the fact that they have different directions will be manifested by the fact that there will be an angle between them. Thus, using Euclid's terminology in Definition 8, we say that lines lying in different directions have different inclinations.

We now skip to the last definition of Book I.

> Twenty Third Definition *Parallel lines are straight lines which, being in the same plane and being produced infinitely both ways, do not meet one another in either way.*

The Greek word translated as "parallel lines" is παράλληλοι, the nominative plural of παράλληλος, an adjective whose root meaning is *beside one another*, or *side by side*. In the material world, railroad tracks lie side by side, and so can be called parallel in the root sense of the word. The railroad tracks never meet because the straight parts of both tracks always run in the same direction, and the curved parts always have the same orientation.

In the geometrical world, as Euclid shows in Proposition I.27,

8 Strictly speaking a straight line has two directions: call them forward and backward.

parallel straight lines do not meet because they have the same direction, i.e., they have equal inclinations to the same straight line.

Postulates

Having set down the necessary definitions, Euclid is ready to form statements with them. Now, the first statements cannot be ones that must be proved. Rather, they must be the most fundamental ones, whose truths must be knowable by knowing the definitions of the terms. The first group of these statements that Euclid lays down are what in Heath's translation are called *postulates*. The word postulate translates the Greek noun αἴτημα which originally meant a *request* or *demand*, but which came to mean *assumption* or *postulate*. (According to the *OED*, the original meaning in English of postulate was *request* or *demand*.) If one acquiesces to a request (or demand), the request is said to be *granted*.

Postulate 1

Heath translates the first word of the first postulate as "Let the following be postulated:" From the above discussion, we could alternately translate it as "Let it be granted." What one is expected to grant is: "to draw a straight line from any point to any point." Why should this be granted?

First, the demand is not to draw *some* line from any point to any point, for common experience shows that even a child could draw some line between two dots. As a matter of fact, he could draw many such lines. Indeed, the third definition takes this situation for granted. What one grants is that it is always possible to draw a *straight* line from any point to any point. Again, one knows this to be possible by common experience. Euclid does not bother to say that the second "any point" is different from the first one, because it is obvious that this must be the case. For since a point has no extension while a line does, it

is not possible to draw a straight line from a point back to the same one. In order to do such a thing, the line would have to first depart from the point, then return to it. This would be possible with curved lines, e.g., a circle or ellipse, but not with a straight line. For in order to return to the point, the line would have to change direction, and a straight line cannot do this. Moreover, from the discussion of the properties of straight line given above, we see that this straight line is unique. Thus, a full statement of the postulate would be: "Let it be granted to draw the unique straight line from any point to any other point."

We now consider what "to draw" a line means. In the material world we typically draw a line by putting the tip of a pencil down on a piece of paper and then dragging the tip across the paper. Since it is the tip of the pencil that forms the original point, it is as if the line were drawn by drawing out (or stretching) the original point.

If we put the tip down on the paper and then pick it up without moving it sideways, then the tip would form a dot, the material analog of a point. We could then place the tip down right next to the original dot, thus having two dots touching each other. This we could continue doing until we had something looking like a line. But we must be doubly wary, lest we jump to a false conclusion. First, looking at the so-called line carefully, we would see that it would not have a smooth outline. Rather, each side of the so-called line would be formed of touching semi-circles. When we drag the pencil, however, the sides of the line will be smooth. Thus, we do not form a line by forming touching dots. Second, we cannot transfer this procedure to the geometrical world, since we cannot put a point down in such a way that it touches another one. Since points have no extension, the so-called second point would coincide with the first one. Thus they would have the same location and so be the same point. If the points are to be distinct, then they

must have distinct locations, which requires that there be some distance between them. In this case, since there would be a gap between the points, there would not be a continuous quantity, and so there would not be a line. Thus, drawing a line does not mean forming successive points. And so, a line is not composed of actually existing points.

Postulate 2

The second thing to be granted is "to produce a finite straight line continuously in a straight line." Again, the postulate does not require that *some* line be produced. For common experience shows us that having drawn some line for some distance, it is always possible to extend it even further. Moreover, even if one has drawn a straight line from the first point to the second one, the first postulate states that it is always possible to draw another straight line from the second point to a third one. What the second postulate grants is that it is always possible to extend any already drawn straight line in the same direction. This possibility depends on the fact that each straight line has a unique location and direction, which location and direction are completely determined by the two original points. This postulate, thus, makes clear that for Euclid a straight line has a determinate direction.

Postulate 3

The third thing to be granted is "to describe a circle with any center and radius."

Definition 15 states: "A circle is a plane figure contained by one line such that all straight lines falling upon it from one point among those lying within the figure are equal to one another." The next definition states that this point is called the center. Now, it is by the first postulate that straight lines can be drawn from the center point to various points on the circumference.

And, there can be more than one straight line from the center point only if the lines have different directions.

What does "to describe" a circle mean? First, Euclid uses different verbs in Postulate 1 and this one,[9] which are rightly translated by different words in English. Heath probably uses "to describe" here because the Latin translation in the Heiberg edition uses *describere*, which can be translated as *to describe* or *to draw*. Euclid uses different words because the actions portrayed by the two words, though similar, have an important difference. A straight line is a breadthless length, whereas a circle is a figure.

Thus, recalling the discussion of Postulate 1 about what "to draw" signifies, we similarly say that describing a circle means dragging a straight line drawn from the center in such a way that the center point remains fixed until this line returns to its original position. Materially, this would correspond, for example, to laying a piece of chalk flat on a blackboard then rotating it while keeping one end fixed. (In the material world when we use a compass to draw a circle what we really draw is the circumference of what Euclid calls a circle, which is the region enclosed by the circumference.) This can occur only because straight lines can have different directions.

Postulate 4

The fourth thing to be granted is "that all right angles are equal to one another."

This postulate, and the next one, differ radically from the first three. Those three were about existence. The first one states that there can be a straight line anywhere and of any length. The second states that a straight line can always be made longer. The third states that there can be a circle with any center and with any radius. The fourth and fifth postulates, on the other hand, state not what can be but what can be truthfully said.

9 Postulate 1: ἀγαγεῖν; postulate 3: γράφεσθαι.

Although the truth of this postulate can be seen by a simple *reductio ad absurdum* argument, no such argument is needed. As with the first three postulates, this one emanates directly from what a straight line is. As we have seen, the shape of every straight line is identical in all its parts with that of every other straight line. Therefore, whenever any straight line meets any other straight line somewhere in its midst in such a way that the adjacent angles are equal, then it must always be the case that the meeting line must be inclined to the other one in exactly the same way i.e., the angles formed must always be exactly the same. Since these angles are called right angles, all right angles must be equal.

Postulate 5

The fifth thing to be granted is "that if a straight line falling upon two straight lines make the interior angles on the same side [of the falling line] less than two right angles, then the two straight lines being produced infinitely meet on that side [of the falling line] on which the angles are less than two right angles."

First we note that though this postulate is usually called the parallel postulate, it is not. Rather, it is the non-parallel postulate. As Euclid will show us in the propositions, there is no parallel postulate.

Next, the truth of the fifth postulate depends on the truth of the fourth one. For, if not all right angles are equal, then two straight lines meeting a third one at right angles could make different angles with the third one, and so be differently inclined to the third one. If this were the case then the statement "make the interior angles on the same side less than two right angles" would be meaningless.

The fifth postulate requires special attention because controversy about it eventually led to the introduction of the so-called non-Euclidean geometries. The earliest extant

written discussion of the status of the fifth postulate occurs in *Primum Euclidis Elementorum Librum Commentarii* by Proclus Diadochus (5th century). He begins the pertinent passage by stating the postulate, then says,

> This ought to be struck from the postulates altogether. For it is a theorem—one that invites many questions, which Ptolemy proposed to answer in one of his books—and requires for its demonstration a number of definitions and theorems. Moreover, Euclid himself proves the converse as a theorem. But, perhaps, some might mistakenly think that this proposition deserves to be ranked among the postulates on the ground that the angles' being less than two right angles makes us at once believe in the convergence and intersection of the straight lines. To them Geminus has given the proper answer when he says that the founders of this science have taught us not to pay attention to plausible imaginings in determining what propositions are to be accepted in geometry. Aristotle likewise says that to accept probable reasoning from a geometer is like demanding proofs from a rhetorician. And Simmias is made by Plato to say, "I am aware that those who make proofs out of probabilities are impostors." So here, although the statement that straight lines converge when the right angles [they make with a third straight line] are diminished is true and necessary, yet the conclusion that because they converge more as they are extended farther they will meet at some time is plausible, but not necessary in the absence of an argument proving that this is true of straight lines. That there are lines that approach each other indefinitely but never meet seems implausible and even paradoxical, yet it is nevertheless true and has been shown for other species of lines. May not this, then, be possible for straight lines as for those other lines? Until we have demonstrated that they meet,

> what is said about other lines strips our imagination of its plausibility. And, although the arguments against the intersection of these lines may contain much that surprises us, should we not all the more refuse to admit into our tradition this unreasoned appeal to probability?[10]

In order to refute Proclus's claim that Postulate 5 is really a theorem we must see that what Euclid states about the given lines is not simply probable but necessarily follows from what precedes the postulate, i.e., the Definitions and the prior Postulates. (Additionally, to rebut Proclus is simultaneously to refute Lobachevskian and similar so-called non-Euclidean geometries, because they proceed under the assumption that the inclined straight lines might not meet.)

Let us begin by granting that Postulate 5, unlike the others, looks like a syllogism, more exactly, an enthymeme. For its form is "If A, then C." So, A is a premise and C is the conclusion. For there to be a complete syllogism, there must be another, unstated, premise, B. Simply put, premise A states that two straight lines are inclined toward each other. The conclusion, C, is that these two lines meet. So, premise B must be that inclined lines meet. So the syllogism might be

A: These straight lines are inclined toward each other.
B: Straight lines inclined toward each other meet.
C: These lines meet.

But clearly this is not a syllogism. For the so-called premise B is itself the fifth postulate.

We now advance the discussion by examining Euclid's propositions I.27 and then I.28:

10 Translation taken from: *Proclus, A Commentary on the First Book of Euclid's Elements*, translated with Introduction and Notes by Glenn R. Morrow (Princeton, NJ: Princeton University Press 1970).

> *If a straight line falling across two straight lines make the alternate angles equal to one another, the straight lines will be parallel to one another.*

We first note that this proposition (along with the following one, quoted below) can be called a parallel proposition. (This is why we said earlier that there is no parallel postulate.) The argument Euclid uses is a syllogism, for he proves it via a second premise, namely I.16: *For every triangle, one side being produced, the exterior angle is greater than each of the interior and opposite angles.*

Next, we examine I.28:

> *If a straight line falling across two straight lines make the exterior angle equal to the interior and opposite angle on the same side, or the interior angles on the same side equal to two right angles, the straight lines will be parallel to one another.*

Now, the given of I.28 is essentially the same as that of I.27, just specified differently. The proof amounts to showing that the givens are equivalent statements. Thus, I.28 is effectively syllogized by using I.16 as the second premise. But the second form of the given in Proposition I.28 is a denial of the given in Postulate 5.

So, can we conclude that denying this premise is tantamount to denying the conclusion? Emphatically, no. Otherwise, the universal result would be: If A, then B; but not-A, therefore not-B. But an example shows the foolishness of such a claim: Red is a color; therefore, not-red is not a color! How do we know this reasoning to be invalid? Not by way of a syllogism, or any other argument. Rather, we know it immediately simply by knowing what we mean by "red" and "color". And by way of a small number of such examples, we see the universal. So, denying the given of I.28, which yields the given of Postulate 5, does not deny the

conclusion of I.28, and so does not produce Postulate 5.

At this point, one might wonder as follows. Proposition I.28 is demonstrated; so it is syllogized by using two premises. Should not, therefore, any conclusion that results from denying the first premise also require a second premise? Therefore, Postulate 5 would need a demonstration.

Such a discussion as we have just given, as interesting and accidentally enlightening as it might be, would be rendered superfluous if we could directly see that Postulate 5 is indeed a postulate. This we will do.

Now we are ready to consider the Fifth Postulate directly. We begin by examining a case of local motion in the material world. Let two people start walking side by side, a few feet apart from each other. From our physical experiences, we realize that there are two possible outcomes of these travels. If the paths have the same direction then they will never meet. Moreover, there will everywhere be the same distance between the paths. This is the physical basis of the geometrical notion of parallel lines. If they have different directions, however, there are two possibilities. First, as in the case of the parallel paths, the two paths never meet. In this case, however, they do not remain at the same distance, but continually get farther away from each other, that is, they diverge. We will return to this case shortly, but must first examine the second possibility. In this case, the paths come closer to each other, and experience shows us that they will eventually meet. Returning to the first case, experience also shows that if the walkers were to return to the starting points and continue walking in the opposite directions (as in the Second Postulate), their paths would eventually meet. The general rule here is that if two paths have the same direction, they will never meet. If they have different directions, however, they, or their backward extensions, must meet.

How would we know (or specify) the directions of the

paths. They start out from different places, so we do not have two straight paths having a common point forming the vertex of an angle. The only way to make the specification is to consider another straight path joining the two original places and measuring the angles between the original paths and this new one. If the original paths make the same angle with the joining path, then they have the same orientation, and so will never meet. (Note that in this case, the interior angles on what Euclid calls the same side when taken together will equal two right angles.) If, however, the angles are not equal, but when taken together on the same side add up to less than two right angles, then they do not have the same direction, and will eventually meet. The Fifth Postulate is the mathematical abstraction of this situation. Thus, the Fifth Postulate is a direct consequence of what it is for a line to be straight.

The straight line is truly unique with respect to shape. As was said earlier, every straight line, either in whole or in part, can fit on every other straight line, either in whole or in part. Some circles can fit on other circles, but only if they are of the same size. Thus, their shapes are not the same in the strictest sense of same. All straight lines strictly speaking have exactly the same shape, no matter where they are or how they are oriented. This actuality is the basic reality that leads directly to the Second, Fourth, and Fifth Postulates.

Common Notions

Knowledge of the Common Notions follows directly from our everyday experiences, including knowing the meanings of the words equal, whole, part, addition, subtraction, and coincidence, so no further discussion is warranted.

Conclusion

Since the foundations of Euclidean geometry—the definitions, postulates, and common notions—are true and fundamental, then all that is needed for this geometry to be a demonstrative science is that the arguments for the propositions be valid, which they are. Therefore, Euclidean geometry is a demonstrative science.

Non-Euclidean Geometries

We have seen that Euclidean geometry is a demonstrative science. But this does not prove that other, non-Euclidean geometries are not demonstrative sciences. So, are there demonstrative non-Euclidean geometries?

There are two types of so-called non-Euclidean geometries. One, discussed by Nikolai Lobachevsky in 1840 in *Geometrische Untersuchungen zur Theorie der Parallellinien* (*Geometrical Researches on the Theory of Parallels*), denies the fifth postulate. In this case, there can be more than one straight line from a given point that is parallel to, i.e., does not meet, another one. This geometry is called *hyperbolic geometry*. The other type accepts the fifth postulate but denies Proposition I.28. This geometry is now called *elliptic geometry*, and was introduced in 1854 by Bernhard Riemann in *Über die Hypothesen, welche der Geometrie zu Grunde liegen* (About the Hypotheses Which Lie at the Foundation of Geometry). In this case, all straight lines eventually meet and so there are no parallel lines. It is also the case in this geometry that all straight lines are of finite length.

Since we have shown that Euclid's Postulate 5 and Proposition I.28 are true, then there cannot be any non-Euclidean geometries, and so no demonstrative non-Euclidean geometries. But there is a way in which there can be elliptical and

hyperbolic geometries.

Mathematicians speak of geodesics, which are the shortest lines between two given points on a surface. In a plane the geodesics are straight lines. On the surface of a sphere, for example, they are great circles, i.e., circles whose plane includes the center of the sphere. If, rather than limiting ourselves to lines in plane surfaces, we allow curved surfaces, then there can be elliptical and hyperbolic geometries.

If we deal with lines on the surface of a sphere or of an ellipsoid, then we can have elliptic geometry. If, on the other hand, we have a saddle shaped surface, then we can have hyperbolic geometry. But the fact that these geometries occur on curved surfaces does not make them non-Euclidean, as we see from the fact that the geometry of Apollonius's conic surfaces is Euclidean, as is the geometry of Ptolemy's spherical surfaces. The only thing which would make then non-Euclidean would be for these lines to be straight. But they cannot be so. Therefore, there are no non-Euclidean geometries.[11]

B. Numbers

Euclid begins his formal treatment of numbers in Book VII, where he presents 22 definitions. No postulates are presented because none are needed; everything required is known from daily experiences.

11 Modern astronomers and physicists speak of the universe as being delineated by curved spacetime. For them no motions, whether of bodies or of light, take place in straight lines but along curved paths. But we can know what curved is only by comparing it with straight. Thus, even if no material being travels from one place to another along a straight path we can imagine a straight path between the two places. This path is the physical basis of Euclidean straight line.

Definitions

First definition *Unit is [that] according to which each of the existing things is called one.*

This definition states the way in which things are to be considered when they are to be treated numerically. For example, for a dozen eggs, the unit is one egg. For a gross of eggs, the unit could be one dozen since there are 12 dozen in a gross. But most basically, the unit is one egg. For one dozen is not an individual existing thing, whereas one egg is.

Definition 2 *While number [is] a multitude composed out of units.*

This definition supplies the *quid rei*. We should note that a number is not simply a multitude, but a multitude insofar as it is considered composed. In a room there might be a chair, a sofa, a table, and an ottoman. But unless we consider them to be unified, at least in the mind, they do not form a composed multitude. If we do so, and consider the unit to be a piece of furniture, then we would say that there are four pieces of furniture.

Definitions 6 and 7 declare that there are two fundamentally different kinds of numbers, and so set out an important difference between numbers and geometrical quantities. Definition 6 is based on the reality that some numbers can be divided into two equal parts, while Definition 7 on the reality that some numbers cannot be so divided. All geometrical quantities, on the other hand, are divisible into two equal parts. Proposition I.10, for instance, shows how to divide a straight line into two equal parts, and by doing so shows that all straight lines can be so divided.

This distinction is based on the facts that geometrical quantities are continuous, and so can be diminished without end, while numbers are discrete, and so are not diminishable

without end. Rather, numbers can be diminished only until one arrives at the unit.

We also note that there are certain other terms that Euclid uses but does not bother defining, such as equality, addition, subtraction, greater than, multiple and measure. He does not define them because he treats the learner as one who already knows what these names signify. Evidence for this is that he used some of these terms in the Common Notions listed in Book I. Other evidence is that though he does not define them, the learner does not pause because he is unsure about what they mean.

Modern number theories include Euclid's numbers as only some of the numbers. The question we must consider is whether Euclid's are the only numbers or are there others that can be defined. In order to answer this question, we will examine various possibilities.

Is 1 (One) A Number?

Is 1 (one) a number? Taking Euclid's definition strictly, the answer is no. What it is is the element of numbers. Just like the numbers taken strictly, however, it can be used in additions, subtractions, multiplications, and divisions. So, 1 is not a Euclidean number. Rather, what we call 1 is what Euclid calls the unit.

This position is supported by comparing Propositions 9 and 15 of Euclid's Book VII. The things given and the conclusions are similar yet different. The givens differ in the following way. Proposition 9 begins by stating, "If a number be part of a number." Proposition 15, on the other hand, begins, "If a unit measure any number."

Now, Definition 3 states, "A number is a part of a number, the less of the greater, when it measures the greater." If Euclid's unit were a number then it would be a part of and also measure all other numbers. If this were the case, then there would be no

need of Proposition VII.15.

But if we extended the definition of number to be "A number is either a unit or a multitude composed of units," then the unit clearly would be a number, and we could dispense with Proposition VII.15.

The unit can be a number, however, only if it is the same kind of thing as a number. The first evidence we have that it is comes from the discussion we just finished. That is, the unit in VII.15 plays the same role as a number does in VII.9. More fundamentally, when we set out to number (count) the things in various boxes, if a box contains only a single item, we do not skip over it. Rather, we say that there is one thing in it. So 1 answers the question, "How many?," the answer to which is a number.[12]

Generally speaking, based on what Aristotle says in the *Categories* (6a26), quantity A is the same kind as quantity B if they can be said to be equal or unequal. If they are unequal, then one of them is less than the other, and by being multiplied sufficiently can be made larger than the other. A point, for example, cannot be a line since it is not the same kind of thing as a line. For, if it were, then by taking a sufficient number of points we could end up with a line greater than any given line, which is impossible, since no matter how many points we try putting next to each other we never get away from the location of the original point, and so cannot form a line.

The unit, on the other hand, is unequal to any given Euclidean number by being less than any such number. And by being multiplied sufficiently it will form a number greater than the given number, because there is no greatest number. Thus the unit is the same kind of quantity as a number, and so could be a number.

12 At the beginning of Chapter 4 of *Categories* Aristotle, giving a list of the 10 categories, states, "Of what are said without any intertwining at all, each signifies either substance, or how many [or much] . . ." (1b25).

Therefore, 1 can be a number by extending the definition. For the rest of this paper we will use this extended definition, and call such numbers integers.

Are Fractions Numbers?

It seems that they are. Because fraction is a name, and, as we see in Aristotle's Περί Ἑρμηνίας, a name signifies by agreement, and mathematicians agree to call a fraction a number. Therefore, a fraction is a number.

We note, however, that such agreement is necessary primarily so that a conversation can take place. If the participants do not agree on what the words they use mean, then one of them cannot adequately understand what the other one means when he speaks. For example, an author of myths might speak of a centaur. In order for the hearer to understand what is being spoken he must know what the author means by the word "centaur." But there is no need that a centaur actually exist outside the mind.

The question we are concerned with is does one speak truly when he says that a fraction is a number? In order to answer this question, we must know two things: (a) what a number is, and (b) what a fraction is.

We begin by considering that Euclid says a number is a multitude composed of units. Thus, the numbers would be 2, 3, 4, 5, etc.

Now fractions come about in the material world when we change a unit of measurement. For example, let the unit of weight be the pound. Twelve units would then be 12 pounds. But if the object weighed less than one pound, it would be convenient to use a smaller unit in order to specify its weight. So, let us use the ounce, which is one-sixteenth of a pound. If the object weighed eleven of these new units, then we would say it weighs 11 ounces. Returning to the original unit, we could also say that

it weighs eleven-sixteenths, i.e., 11/16, of a pound.

Is a fraction a number, then? If it is, is it a new kind of number? The short answers are Yes and No, respectively. To see the reason for these answers, we begin by examining the words used to name the two parts of a fraction.

In English the first and second numbers of a fraction are called *numerator* and *denominator*. Other European languages have similar words. In our example, the numerator is 11 and the denominator is 16. Examining the example, we see that the denominator names the unit as a part of the original unit; in our case the new unit is a sixteenth of the original unit. On the other hand, the numerator, as the name implies, tells us how many of the new units there are. That is, the numerator names the number of units. So the number is 11.

What about mixed fractions (also called mixed numbers), such as 3⅝? How we speak leads us to the answer. In speech we say "three and five-eighths." This fraction contains two numbers: *three* and *five*. Two numbers are required because two different units are used. If we were to use only the smaller unit, then we would get "twenty nine-eighths," in which case the number is "twenty nine" (smaller units).

What about decimals; are they a new kind of number? No. They are just like mixed fractions except that the denominators are limited to being 10 or powers of 10. Expressed as a decimal, our example becomes 3.625, i.e., "three and six hundred twenty five-thousandths." Using only the smallest unit, the number becomes "three thousand six hundred twenty five thousandths."

Thus, fractions are not new numbers. Their use comes about only when one introduces a new unit which is less than the original unit. So, fractions are thought to be a new kind of number only because they don't look like the original ones. Still, fractions are numbers.

Doesn't the inclusion of fractions as numbers make it

possible to divide all numbers in half, thus negating Definition 7? For example, isn't 5 divisible into two equal numbers, namely 5/2 and 5/2? But as we have seen, we get 5/2 by changing the unit, in which case the number is 5 not 5/2.

The integers along with fractions form what are now called rational numbers.

Is 0 (Zero) A Number?

Next, we inquire whether 0 (zero) is a number. It seems that it is because 0 is discussed in arithmetic, and arithmetic deals with numbers.

But this is not a sufficient argument, for the following reason. Geometry primarily considers abstracted bodies. In so doing it treats of solids, surfaces, lines, and points. But points are not lines, surfaces, or solids. From Definition 3 and Postulate 1 of Book I of *The Elements,* we see that lines start from points and end at points. As long as we remain at the beginning point, we do not have a line. So a point is not a geometrical quantity.

Zero is like a point. When we count we start from zero. The first integer we get to is 1. So, just because 0 is considered in arithmetic does not mean it is a number. In order to treat the question more definitely we examine what happens with respect to the arithmetical operations.

Let us first consider adding integer *B* to a given integer *A*. The result would be an integer different from both *A* and *B*, no matter what *B* is. But if *B* were 0, this would not be the case. The situation is similar if we consider subtraction rather than addition.

Next consider multiplication. Basically, multiplication is nothing but repeated addition. To multiply *A* by *B* means to add *B A*s together. But if *B* were 0, there would be no *A*s, and so no multiplication.

If we were to divide *B* by *A*, we would again get a number

different from both *A* and *B*, unless *B* were 0.

Finally, if we were to divide *A* by *B*, we would get a number different from both *A* and *B*. This seems to be the case even if *B* were 0. But if we were to divide different numbers *A* by the same *B*, the results would also be different numbers, unless *B* were 0.

The operation of dividing *A* by *B* is equivalent to asking the number of times *B* fits into *A*. If *B* is not 0, then the result will be a whole number or fractional number. On the other hand, if *B* were 0, there is no number that is the answer. It is like asking how many points fit in a line. No matter what number of points are brought together no extension results, so there is not a number of points in a line.

The above arguments against zero being a number, however, are not determinative; they are only probable. In order to firmly determine the answer we have to move beyond dialectical considerations and look at the matter more fundamentally.

We begin with the quasi-historical question: why do we speak of 0 in the first place? Consider three numbers: Thirty-four, Three Hundred and Four, and Three Hundred and Forty.

When we speak them there is no need of saying zero. This is true of all integers. We can also add them to get six hundred seventy-eight. Again we need not say zero.

If we express them in writing using the Roman Numeral system, or the Greek system, there is no need of zero. In the Roman Numeral system, our three numbers are written XXXIV, CCCIV and CCCXL. There is a major difficulty with systems like the Roman Numeral one, though: the number of different letters (symbols) required to express ever larger numbers increases without end. Moreover, adding large numbers together symbolically is difficult. The situation is even worse with respect to multiplication and division.

The decimal system, on the other hand, has the seeming

advantage of requiring only 9 symbols, and because the numbers of units, tens, hundreds, etc., are indicated by positions, the arithmetic operations are relatively easy. Yet, when we try to write the three numbers in the decimal system, a difficulty arises.

The first number, Thirty-four, presents no difficulty. It contains four units and three tens, and so is written 34.

The second number, Three Hundred and Four, does present a problem though. It is composed of four units and three hundreds, but no tens. Thus, in writing down the number symbolically, we would have to leave a gap between the three and the four: 3 4. But in handwriting numbers a problem arises. Since handwriting is irregular it is possible that someone reading the number might not realize that there is a gap between the three and the four and think that the number is thirty-four.

The third number, Three Hundred and Forty, presents a serious problem. Expressed symbolically, just as with the number Thirty Four, there is no gap between the three and the four, but there does have to be a space after the four: 34 . But, as in the prior situation, a space after the number of tens is relatively indeterminate.

The solution to such problems is to introduce a symbol to indicate the gap or space. Whatever symbol is used, therefore, does not indicate a numerical symbol but rather indicates the absence of a numerical symbol where there could be one.

In English, the name of the symbol used to fill this gap/space is *zero*. Etymologists agree that this name derives from French, Medieval Latin, Arabic, and ultimately from Sanskrit, where the transliterated word is *sunya*, which means *emptiness* or *void*. The symbol used for zero is 0. Using this symbol to indicate a gap or space, which in turn indicates the absence of a numerical symbol, our three examples are written 34, 304, and 340.

At this point the symbol 0 looks like it symbolizes a number. In fact, children are generally taught that it does represent a number, not a gap or space in symbolic presentations. But the

need of a symbol for the lack of a number is not limited to representations like the decimal system.

Suppose there is a cabinet with four drawers and we are given the task of writing down how many things there are in each drawer. For example, let us say that there are Thirty Four things in the first drawer, Three Hundred and Four things in the second drawer, Three Hundred and Forty things in the third drawer, but the fourth drawer, is empty, i.e. it does not have anything in it, i.e., there is nothing in it. Thus, we would write down:

Drawer 1: Thirty-Four,
Drawer 2: Three Hundred and Four,
Drawer 3: Three Hundred and Forty,
Drawer 4: Empty

But what if we were told to use numerical symbols? Then we would need a symbol for every drawer, including the fourth one. This would be the case no matter what system is used to indicate the numbers symbolically.

What symbol should be used? Now in choosing a symbol to represent nothing, we are completely free, as long as we do not use one of the existing numerical symbols, i.e., 1, 2, 3, 4, 5, 6, 7, 8, 9. We could, for instance, use a dash, —, or the letter E, which is the first letter of the word *empty*, or N, which is the first letter of the word *nothing*.

But haven't we already introduced a symbol to represent the situation with the last drawer, namely, 0? So we would have

Drawer 1: 34, Drawer 2: 304, Drawer 3: 340, Drawer 4: 0.

We must be careful, though, because we are equivocating. For, in Drawers 2 and 3, 0 symbolizes the absence of a numerical symbol where there could be a numerical symbol. For the fourth drawer, however, it symbolizes the absence of material substance

where there could be material substance.

As we saw earlier, a number is the answer to the question "How many?" But before asking this question, another must be asked, namely "Are there any?" (cf. Aristotle, *Posterior Analytics* 71a27). If the answer is "Yes," then "How many?" is asked. If, however, there are not any, then "How many?" is not asked. So 0 cannot be an answer to "How many?" Therefore, 0 is not a number.

Is it the case, then, that zero is not an arithmetical being? No. As we discussed above, it is an arithmetical being the way a point is a geometrical being. The geometrical quantities are lines, surfaces, and solids. Nevertheless, points do exist in geometry as, for example, the ends of lines, the centers of circles, and the vertices of cones. Thus, points are non-quantitative geometrical beings. In a similar way, zero is a non-quantitative arithmetical being. It indicates that there are not any arithmetical beings in cases where the answer one looks for is a number. Additionally, as lines begin from points, numbers begin from zero.

Are There Negative Numbers?

We begin by examining situations where so-called negative numbers might be useful. In the first situation, positives and negatives are used to indicate opposite directions. We begin our examination by considering four geological features: a hill, a mountain, a valley, and a canyon. Suppose the hill is 100 ft. high, the mountain 1000 ft. high, the valley 120 ft. deep, and the canyon 1000 ft. deep. The current convention is to indicate distances above the Earth's surface as positive and those below the surface as negative. So, in symbols, the locations of our four features are written as

> hill: +100 ft., mountain: +1000 ft., valley: –120 ft., canyon: –1000 ft.

For the sake of convenience, however, positive symbols are not always used, but are understood to be there. So, we indicate the locations as

> hill: 100 ft., mountain: 1000 ft., valley: –120 ft., canyon: –1000 ft.

Now we consider the question, how high above the hill's top is he mountain's top? We get the answer by subtracting 100 ft. from 1000 ft. to get 1000 ft. — 100 ft. = 900 ft.

Next, we ask how high above the valley's floor is the mountain's top. We get the answer by subtracting –120 ft. from 1000 ft. to get 1000 ft. — (–120 ft.). The algebraic rule is that subtracting a negative is equivalent to adding the corresponding positive, so that in our case we have

1000 ft. — (–120 ft.) = 1000 ft. + 120 ft. = 1120 ft.

But why is subtracting a negative equivalent to adding the corresponding positive? We can see the reason why in the current case by examining the situation more closely. The bottom of the valley is indicated as negative because all locations are designated relative to the surface of the Earth. If, on the other hand, measurements were to be made from the bottom of the valley, then the Earth's surface would be at +120 ft. and the mountain's top at 1120 ft. These distances we could verify by using a measuring stick that starts at the bottom of the valley.

So which locations are positive and which are negative depends on where the base level is located. In fact, if all measurements be taken from the center of the Earth, then all the distances would be positive. Therefore, the negative sign does not indicate that a number is negative, but rather shows the *direction* of measurement from the base location. In brief, in the material world there are no negative distances.

Perhaps we could find a better example from the world

of finance.[13] The monetary values of all someone's possessions constitute his assets; the monetary values of all he owes constitute his liabilities. Subtracting the liabilities from the assets produces his net worth. If his assets are greater than his liabilities, he is said to have a positive net worth. But if the liabilities are greater, then he is said to have a negative net worth. For example, if his assets totaled $100,000, but he owed $120,000, his net worth would be calculated as –$20,000. But does this –$20,000 actually exist?

We can see what the case is in the following way. He owes $120,000 because someone lent him $120,000. When he received the funds, they became an asset, but only an imperfect asset, because he is obliged to return them at some time. If he spends or donates any part of the loaned funds, that part ceases to be part of his assets but remains a liability. If he donated all of the loaned funds, then they would cease to be part of his assets, so his total assets would again amount to $100,000, while his liabilities would remain at $120,000. Again, he would have a net worth of –$20,000.

Now let us look at the situation from the lender's perspective. Suppose that before lending the money the lender had a net worth of $1,000,000. Do we now say that, after the loan his net worth is only $880,000? No, the $120,000 can still considered to be part of the lender's assets, because the borrower is obliged to return the funds, at some time. So the combined net worth of the lender and the borrower before the loan amounted to $1,100,000. Immediately after the loan the combined net worth is the same. But after the borrower gives the money away, their combined net worth is only $980,000, which equals the lender's

13 Indeed, the first known use of negative quantities was in finance in India during the 7th century A.D., when assets were denoted by positive quantities and liabilities by negative ones. Cf. Jan Gullberg, *Mathematics from the Birth of Numbers* (W. W. Norton & Company, 1997), 72.

existing $880,000 plus the borrower's $100,000.

If the borrower were to die, then the lender, being owed $120,000, would get the borrower's $100,000, but no more, since nothing more is available from the borrower. Thus the lender's net worth would be only $980,000, a decrease of $20,000, equal to the borrower's supposed negative net worth. So is this proof of the existence of the borrower's negative net worth? No, it is not.

Just as we combined the net worths of the lender and the borrower when the loan was made, so we must add the net worth of the receiver of the gift to the combined net worth of the lender and the borrower. Indeed, in order to see exactly what happens, this process of combining net worths must be continued until the net worth of the entire population of the world is reached, at which point there is no negative net worth. Doing this is equivalent to measuring distances from the center of the Earth in our first example. So the supposed negative sign in front of the net worth of the borrower is really a subtraction sign, indicating that this is an amount to be subtracted from the combined assets of the lender and the borrower. Therefore, a "negative" sign in front of a net worth is really just a book-keeper's symbolic reminder which indicates that, ultimately, this is an amount that is to be subtracted from a larger net worth. In brief, there is no such thing as negative money.

Let us examine another case. Physicists speak of electric charges, and that there are two kinds: positive charges and negative charges. Bodies that have like charges, either positive or negative, have a tendency to repel each other. Bodies with unlike charges, on the other hand, have a tendency to attract each other. Physicists speak of electrons having a negative charge and of positrons having positive charges. But this merely a convention; there is nothing intrinsically negative about electrons and positive about positrons. This can be illustrated by examining magnetism. As with electricity, there are like and unlike features,

called poles. But the poles are not characterized as positive and negative, but as north and south. As with charges, like poles repel and unlike poles attract.

In summary, in the material world there are no quantities that are intrinsically negative. Since numbers come about by abstracting from the material world, there are not negative numbers. In all cases, so-called negatives are introduced for the sake of convenience in mathematical calculations.

Corollary 1: Since there are no negative numbers, there are no imaginary numbers, because they would be based on the square root of –1.

Corollary 2: Since there are no imaginary numbers, there are no complex numbers.

Are There Irrational Numbers?

It seems that there are. This we can see by way of one instance. $\sqrt{2}$ equals $\sqrt{(1 + 1)}$ which equals the $\sqrt{(1^2 + 1^2)}$. Thus, the square of the square root of 2 equals $1^2 + 1^2$. But this is the numerical equivalent of the geometrical Pythagorean Theorem for the diagonal of a square with sides of unit length. Thus, the square root of 2 corresponds to the diagonal. Therefore, since the diagonal exists, so does the square root of 2.

But $\sqrt{2}$ is not a rational number, since rational numbers that are not integers can be expressed as a fraction, and $\sqrt{2}$ cannot be so expressed. This we can see by the following *reductio ad absurdum* argument.

Assume $\sqrt{2}$ can be expressed as a fraction. Then let

$$\sqrt{2} = p/q,$$

Assume that p and q are the smallest whole numbers for which this is the case, so that p and q cannot both be even. Squaring

both sides of the equation we get

$$2 = p^2/q^2,$$

or, $p^2 = 2\ q^2$. Thus, p^2 must be even, and so must p. But, as we have said, both cannot be even, so q must be odd. But, if p is even, then it must be double some other number, say m. So $p = 2m$, and $p^2 = 4\ m^2$. Therefore,

$$4\ m^2 = 2\ q^2,$$

so that $q^2 = 2\ m^2$. Therefore, q must be even. But we have already shown that q must be odd. But no number can be both even and odd. Thus, there is no possible q. Hence, $\sqrt{2}$ cannot be expressed as a fraction, and so is not a rational number. So at least one irrational number exists.

From this discussion we are led to the standard definition of irrational number: *a number that cannot be expressed as a fraction*. Referring back to Section I.C, we begin by asking whether this definition supplies the *quid nominis* or the *quid rei*?

Simply put, an irrational number is one that is not rational. Since the definition does not say what an irrational number is, but only what it is not, it only supplies a *quid nominis*. Though this definition does not give us the *quid rei*, it does not show that there is no *quid rei*. We now examine whether there is a *quid rei*, or whatness, of a so-called irrational number.

Dedekind, in *Continuity and Irrational Numbers* §4, presents the following definition:

> Now, every time a cut (A_1, A_2) is present which is produced by no rational number, then we create a new, an irrational number α, which we view as completely defined by this cut (A_1, A_2).

Here is what Dedekind means. Divide the rational

numbers in to two groups, A_1, A_2, such that all numbers in A_1, are less than all numbers in A_2. For example, let A_1 contain all numbers less than 7 and A_2, all numbers greater than 7. If we put 7 in one of the groups, then the group which combines A_1 and A_2 will contain all rational numbers.

Next consider a division not made by a rational number. For example, let A_1 contain all rational numbers whose squares are less than 2, and A_2 all rational numbers whose squares are greater than 2. Then, according to Dedekind, this cut would be made by an irrational number, specifically by $\sqrt{2}$. This then would be Dedekind's definition of $\sqrt{2}$.

This definition seems to give the whatness of irrational number, but does not. Consider $\sqrt{2}$. It seems that its whatness is that it is the number that lies between the numbers in A_1 and the numbers in A_2. But this cannot be the whatness, as we can see by examining the first example.

Following Dedekind's approach, we would define 7 as the number that divides the rational numbers into groups A_1, and A_2, where A_1 contains all rational numbers less than 7, and A_2 contains all rational numbers greater than 7.

There are two reasons why such a definition would not give the whatness, but only the *quid nominis*. First, we examine the case where A_1 and A_2 contain only integers. Then 7 would be defined as the only integer that lies between A_1 and A_2. Then we would know that 6 is the greatest integer in A_1 and 8 is the least integer in A_2. So we would know that 7 is 1 more than 6, or 1 less than 8, which would be sufficient for us to know how many 7 is. This then would give the *quid rei*. But note that the definition does not itself give us the *quid rei*, only enough information to determine the *quid rei*.

There is a second deficiency in the definition. To say that 7 divides the rational numbers into A_1 and A_2 does not present enough information to determine the whatness of 7. For there is

no greatest rational number in A_1 and no least rational number in A_2. So we do not know enough to determine the whatness of 7.

Universally, Dedekind's definition does not give enough information to determine the whatness of any irrational number. In fact, in most cases Dedekind's definition does not give the slightest idea of the *quid rei*. Consider, for example, π, which was originally defined as the ratio of the circumference of a circle to its diameter. For Dedekind, π is the irrational number that divides the rational numbers in to A_1 and A_2. But how are we to describe these two groups? For $\sqrt{2}$, we made the division by considering the rational numbers whose squares are less than 2 and those whose squares are greater than 2. This is an approach that will work for all roots of all rational numbers, but not for all irrational numbers.

Mathematicians now divide irrational numbers into two types: algebraic and transcendental. Algebraic numbers are roots of algebraic equations with integer coefficients. Transcendental numbers are irrational numbers that are not roots of such algebraic equations. In 1882, Ferdinand von Lindemann proved π is transcendental.[14] Therefore, π is not a root of any rational number, and so Dedekind's definition does not present us with a way to determine, even imperfectly, the value of π. In fact, Dedekind's definition is utterly worthless for determining the value of any transcendental irrational number: all the definition really says is that an irrational number is one that is not rational. Which gives nothing more than the *quid nominis*.

In order to specify the value of an irrational number mathematicians utilize so-called infinite series. For example,

$$\pi = 4\,(1 - 1/3 + 1/5 - 1/7 + 1/9 - \ldots).$$

14 F. Lindemann, "Über die Zahl π," *Mathematische Annalen* 20 (1882): 213-225.

Such series allow us to determine the value of supposed irrational numbers as accurately as we please, as long as we are pleased with an imperfect value.

Furthermore, such series expressions do not allow the simple arithmetic operations to be performed. The most basic such operation is addition, which requires that when adding two numbers which have more than one digit we begin adding with digits farthest to the right. But in infinite series there are no rightmost digits since the digits go on unendingly.

Moreover, mathematicians have produced multiple infinite series for irrationals. For example, here is another series for π:

$$\pi = 6[1/2 + 1/(2 \cdot 3 \cdot 2^3) + (1 \cdot 3) / (2 \cdot 4 \cdot 5 \cdot 2^5) + (1 \cdot 3 \cdot 5) / (2 \cdot 4 \cdot 6 \cdot 7 \cdot 2^7) + \ldots]$$

So, if one were to claim that it is possible for an infinite series to provide the *quid rei* of π, he would have to answer the question "Which series?"

Is Modern Number Theory A Science?

Every science must begin with definitions which give the *quid rei*. But for so-called irrational numbers, at best we have only the *quid nominis*. Therefore, there can be no science of irrational numbers. Dedekind agrees with this view. As we saw in Section I.B, a mathematical science deals with quantities insofar as they are abstracted from the material world. But in the Preface to the First Edition of *was Sind und Was Sollen die Zahlen?*, Dedekind says that "numbers are free creations of the human mind." That is, numbers do not come into being by abstracting from the material world. Since they are *free* creations, the mind is not in any way restricted by the material world. In fact, Dedekind said as much in the previous sentence of the preface: "I declare that I hold the number-concept to be entirely independent of the notions or ideas of space and time."

Moreover, in the same passage he continues, "I, rather, hold it to be a direct extension of the laws of thought." What does he mean by "laws of thought"? We get a clear idea from what he says at the beginning of the same sentence: "In calling arithmetic (algebra, analysis) only a part of logic." But, for Aristotle, the study of logic is made in the *Prior Analytics*, which precedes the *Posterior Analytics*. So, for Dedekind, arithmetic is not a science. Therefore, Dedekind agrees with our conclusion that there can be no science of irrational numbers. And, if one were to attempt to lump together all the various "kinds" of numbers (rational, zero, negative, imaginary, irrational) there could be no science of numbers.

This view of mathematics is expressed starkly by Bertrand Russell in *Mathematics and the Metaphysicians* (1901): "Pure mathematics consists entirely of assertions to the effect that, if such and such a proposition is true of anything, then such and such another proposition is true of that thing. It is essential not to discuss whether the first proposition is really true . . ."[15] He then goes on to say, "Thus mathematics may be defined as the subject in which we never know what we are talking about, nor whether what we are saying is true."[16]

This opinion about mathematics also applies to Lobachevsky, who says in Section 16 of *Geometrical Researches on the Theory of Parallels*: "In the uncertainty whether the perpendicular AE is the only line which does not meet DC, we will *assume* it may be possible that there are still other lines, e.g., AG, which do not cut DC, however far they may be produced" (emphasis added). Lobachevsky then proceeds to logically deduce propositions which follow from this assumption.

15 Bertrand Russell, *Mysticism and Logic* (Mineola, NY: Dover, 2004), 57.
16 Ibid, 58.

Conclusion

We began our presentation by quoting Aristotle: "All men naturally desire to know." We ended by seeing that Russell claims that "pure mathematics" does not involve knowing. Rather, it seems that it is only concerned with doing things according to certain rules. So modern mathematics is an art rather than a science.

THE SUBJECT OF LOGIC

Maurice Dionne

Prooemium

Here, first of all, is the order of the course. We have here at the beginning of the course a *prooemium*,[1] composed of two elements, namely, the *intention* and the *mode*, that is, the mode of proceeding. This prooemium will constitute the first part; the second, evidently the longer, will be the carrying out of the intention.

A. The Intention

The intention of the course is *the subject of logic*. We will try, during this course, to come to a fairly distinct knowledge of the subject of logic. The time has come, in fact, to make more precise what, in the first semester, we have seen summarily and

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1 [From the Latin "prooemium," which comes from the Greek prooimion from *pro* ('before') + *oimion* ('song'). In Classical philosophical usage it indicated the first part of a work that contained at a minimum an indication of what was to be done in the work, as Dionne explains further on. – Translator.]

commonly announced in the prooemium of St. Thomas to the *Peri Hermeneias.*

> Cum autem logica dicatur rationalis scientia, necesse est quod eius consideratio versetur circa **ea quae pertinent** ad tres praedictas operationes rationis.[2]

"Ea quae pertinent"—what exactly is that? This is what we propose to make more precise. Generally, it is a very appropriate order that we find ourselves following, namely, that from the confused to the distinct.

To seize well the intention of the course, we must still add a remark. In saying, "subject of logic," we must understand "subject of logic *in the strict sense*." Here are some explanations on this subject.

Man, in contrast to the other animals, must see to his own instruments, must discover and form them himself, whether we are talking about instruments for the good of the body or instruments for the good of his reason. And when one is concerned with instruments with a view to the good of his speculative reason, it is the speculative reason itself which forms them, and it cannot form them except in using discourses ("orationes"). Starting from this fact, St. Thomas, in his prooemium to the Posterior Analytics, understands logic in a very broad sense; he understands by "logic" every method, every art which directs discourse, and he calls "rational philosophy" all that thus assists reason in the formation of a discourse.

Towards the end of this prooemium to the *Posterior Analytics,* after having divided this rational philosophy into three parts, ordered to the direction of the three kinds of discourse of reason, St. Thomas ends by saying that it belongs really to rational philosophy, that is, to logic, (that is, to the study of

2 St. Thomas, *In Peri Herm.* I, prooemium, n. 2.

that which reason makes and forms), *to consider all this because to discourse belongs to reason.*

> Omnia autem haec ad rationalem philosophiam pertinent: inducere enim ex uno in aliud rationis est.[3]

But when we speak like this, we understand logic in a very broad sense. It is necessary to understand this well, and here are some explanations to so establish it.

In general, there are in a way three stages which reason passes through when it uses a discourse to form its instruments. First of all, reason already discourses when it works to compose a story: and this discourse is a poem. Afterwards, man's consideration becoming elevated and more properly rational, the reason comes to form a discourse that is an argument. One has already such a discourse in rhetoric. But, as St. Thomas says, the matter of rhetoric, which is the particular acts of men, is so contingent and singular that the orator cannot use a syllogism. So, in place of the syllogism, he uses the enthymeme and, in place of induction, the example. Finally, when man has been elevated to consider a more universal and necessary matter, he comes to the third stage: the syllogism, with all that it implies.

We can see these three stages a little like three parts of logic. To avoid confusion, it is necessary to remark immediately that we are thus introducing a division of logic into three parts which is a little different from that proposed by St. Thomas in his prooemium to the *Posterior Analytics*. The latter, in fact, taking as a criterion the degree of adhesion of the intellect to the conclusions of the discourse, divided logic into a part implying total certitude (the logic of demonstration: the *Analytics*); a part implying probability, and this in different degrees (dialectic, rhetoric, poetics); and a part implying falsity (sophistical refutations). For our part, and because we look more to making

3 St. Thomas, *In Posteriorum Analyticorum*, prooemium, n. 6.

precise that which must be understood by logic in a strict sense, we start from a criterion which is a little different: the degree according to which each treatise concerns the proper subject of logic. This lead us to three parts which are a little different: the logic ordered to demonstration (that is, looking only to pure truth; the *Analytics*, the *Topics*, and the *Sophistical Refutations*), the rhetoric, and the poetics (ordered to verisimilitude, or likeness to truth).

We can thus see better what we must understand by logic in the strict sense: this in only the first of the three parts. In fact, as St. Thomas says, in the *Peri Hermeneias*, in this first part, one is limited to declarative discourse, because this alone is ordered to the truth pure and simple, to the absolute truth. Here we remain "within the limits of intellect"—*infra limites intellectus*—whereas the two other parts have for their object not the true as such, but the seemingly true. It is remarkable, in passing, that the same word "seemingly true" is found in the *Poetics* of Aristotle and in the *Rhetoric*, however much with a certain difference, since that which is seemingly true poetically may not be so for the orator. But what is important to understand here is that rhetoric and poetics involve a new element, with respect to the preceding part, which latter is not occupied with anything but the truth of the things considered: and this new element is the *affective element*. The orator and the poet, indeed, do not make the intellect adhere only from the side of the nature of the object of their discourse, but they also use the affective dispositions of their hearer.

> De sola enunciativa est agendum; et dicit quod aliae quatuor orationis species sunt relinquendae, quantum pertinet ad praesentem intentionem: quia earum consideratio convenientior est rhetoricae vel poeticae scientiae. Sed enunciativa oratio praesentis considerationis est.

> Cuius ratio est, quia consideratio huius libri directe ordinatur ad scientiam demonstrativam, in qua animus hominis per rationem inducitur ad consentiendum vero ex his quae sunt propria rei; et ideo demonstrator non utitur ad suum finem nisi enunciativis orationibus, significantibus res secundum quod earum veritas est in anima. Sed rhetor et poeta inducunt ad assentiendum ei quod intendunt, non solum per ea quae sunt propria rei, sed etiam per dispositiones audientis. Unde rhetores et poetae plerumque movere auditores nituntur provocando eos ad aliquas passiones, ut Philosophus dicit in sua *Rhetorica*. Et ideo consideratio dictarum specierum orationis, quae pertinet ad ordinationem audientis in aliquid, cadit proprie sub consideratione rhetoricae vel poeticae, ratione sui significati; ad considerationem autem grammatici, prout consideratur in eis congrua vocum constructio.[4]

In our course, then, we will hold ourselves to the first part. It is in that case alone that logic is taken in the strict sense: logic insofar as it is ordered to demonstration, to the pure knowledge of truth. This is easy to grasp, but it was still necessary to say it.

So, our intention: the subject of logic, as far as logic is understood in its strict sense.

Evidently, St. Thomas says this as if in passing in this seventh lesson of the *Peri Hermeneias,* that the discourse of the orator and of the poet brings in appetite, but to manifest more what this signifies, one can rightly indicate an example, striking enough, of a discourse of this sort. It is taken from the Gospel of St. John.

It deals with the man born blind. Our Lord has just cured him. It is then that the Pharisees bring him in and begin to question him. St. Thomas, in his commentary, says that the

4 *In I Peri Hermeneias*, lect. 7, n. 6.

responses of the blind man are quite marvelous, to the point that the Pharisees, who are supposed to be doctors of the law, are embarrassed and furious. They end by saying: "You, be his disciple; we ourselves are disciples of Moses!" The Latin text is: "Tu discipulus eius sis!" (Jn 9:28). Here is what St. Thomas says in this regard:

> Quae quidem maledictio est, **si pravum cor eorum discutias** [*Here is an affective discourse; for to interpret "You, be his disciple!" as a curse, one must look to the intention of he who has offered the discourse, look to the malice which is at the principle of the discourse.*][5], non si verba perpendas: [*One does not come to this interpretation if one considers purely and simply the words pronounced.*] immo est summa benedictio.[6]

This is beautiful! It's a marvelous example, very striking! If one takes the words just as such, in abstraction from the appetite of those who pronounce them, we have a blessing, a good wish (the discourse remains all the same an affective one, one still sees an appetite at its principle, but this does not remove the validity of our example). What needs to be noted is this: that what is signified by this statement cannot be abstracted from the malice of its author, from his bad intention, whence comes the pejorative sense of the words used.

That's enough about the subject of logic, so far as to indicate what our intention is.

B. The Mode

Now let us attack the second point of the prooemium: the

5 [Dionne frequently intersperses comments in the quotations; we differentiate it from the words of the author quoted by presenting Dionne's comments in italics. – Ed.]

6 *Super Joannem*, ch. 9, lect. 3, n. 1342.

mode. We must stop here a little longer, because of its sovereign importance.

We know that the prooemium includes three intentions: to render benevolent, docile, and attentive, and that the Greek commentators have analyzed into many elements, called "heads," what is necessary to realize these three intentions. Not everything the prooemium can thus include is necessary on beginning every treatise or course; often, indeed, certain elements (the utility, the title, the difficulty, etc.) are manifest. But a prooemium is always necessary, at least with regard to rendering docile (with a purely and strictly intellectual docility) and with regard to the principal element ordered to this end: the intention. Indeed, it is always necessary at least to know what one is talking about.

But the question of *mode* also plays, immediately after, an absolutely fundamental role and must not be neglected. Now, this question can involve very great difficulty. And this is the case when one proposes to present the subject of logic. Even if one has taught logic for a very long time, even if one knows well enough the material that makes up the intention of the course, one can still spend a lot of time discovering a fitting mode of presentation.

a) About the Many Possibilities to be Rejected

Many possibilities seem to offer themselves. One first one, which seems, at first sight at least, to be relatively easy, above all for those who teach (if one can speak of teaching in the case of such a mode), would consist in the presentation of very determinate texts resolving the problem. But one must renounce such a mode. Why? The problem is that one finds these texts dispersed here and there, and some of them, among the most important, are disproportionate. To present them as such would be to

transgress the most fundamental rules of teaching.

First, such a presentation would be *deprived of order* (we will have occasion to speak of this fault later on). To lack order is already extremely grave. And secondly, many of the texts are disproportionate; and this either in themselves or by reason of their context, which is itself very difficult and would demand a lot of time to be situated. So, the second fault: the greater or lesser unintelligibility of the texts presented as such. These two faults impede any conformity with the natural mode of the intellect and particularly of the young intellect.

It is easy to cast aside this possibility when one sees a bit how necessary it is to return to the principles of manifestation appropriate to the art of teaching. Thus, in the first article of Q. 117 of the first part of the *Summa Theologiae,* St. Thomas says that the master leads the intellect of his disciple in two ways: and the first way is to use examples and other instruments resting on less universal propositions in a way that the disciple can judge in some way what is presented. It is necessary, then, to try to use less universal propositions and, for us here, neither to touch directly upon the subject of logic nor to try neither to describe the "quid" of it immediately nor to give a strictly logical definition of it. One does not lead the intellect in this way. After having recalled this universal necessity with regard to the mode of teaching, it can seem easy enough to decide upon a fitting mode for presenting the subject of logic.

But still, again, the problem is not easy. One can imagine starting from the word "logic." Indeed, every time at the beginning of a study that we can base ourselves on the word, we should do so. This analysis of the word allows us to advance progressively towards a more and more distinct knowledge of the thing considered. And this use of the word is possible in most cases. But here, it is necessary to reject this second possibility. Why? In itself, a word is a very proportionate instrument; one

must not forget that it is man who forms the word, that word which is a sensible sign. And looking a little at the way the word has been formed, the etymology, ought to clarify things for us. One ought to be able to pass from one sense to another, to start from a completely obvious sense, current, manifest, to clarify a further more difficult sense. If one is studying, for example, a speculative problem, the word used probably had at first been employed in the practical order. Well, one can normally base oneself on the practical order, which is more explicit and more manifest. At least, this is what one can do for the most part.

But the word, in the case which concerns us, does not lend itself to such use. And here, briefly, is the reason: to try to analyze the word "logic" and to give its different senses, would be to multiply unknowns. For the senses of this word are all difficult. For this reason, it is sure that one cannot base oneself on the word "logic" to try to say what the subject of logic is. Take, for example, in Aristotle's *De Anima*, at the beginning, when he defines anger as an "appetite for vengeance,"[7] a "desire for vengeance." Anger is in fact a passion; but if one defines it simply as an "appetite" or a "desire for vengeance," this definition is called by the ancients "logical." What does that mean, "logical"? This is even harder than the problem we are trying to study. And this is only one case. In the reading of the texts of Aristotle, one very often encounters the word "λογικῶς"; what does that mean? And the problem is the same in Latin. And what is the sense again of the word "logic" in the seventh book of the *Metaphysics*? St. Thomas says that Aristotle proceeds throughout this whole book "modo logico." What, exactly, does the word "logic" signify there?

So, there is no longer any question of using the word "logic" to manifest the subject of logic.

7 Aristotle, *On the Soul* 1.1, 403a29. St. Thomas, *In I De Anima*, lect. 2, nn. 24 ff.

And meanwhile, one must remain convinced not to abandon, for all that, the precepts of Q. 117. The word is one instrument in this line. One cannot use it here, but there are others. And it is along this line that we must seek. A little experience suffices to see that one must go this way. It is so conformed to the nature of the intellect. "Innatum est nobis," says St. Thomas.[8] More universal propositions must come later. This is permanent: at first, the "more known to us" and afterwards only, the "notius quoad se."[9]

b) The Mode and the Order which We Will Actually Employ

1. The Departure Point: A Text "Lost in the Sentences"

With regard to our course, the point of departure for putting into relief the mode and order has been to recover a little text of St. Thomas lost in the *Sentences*.[10] This text truly assures a very fitting departure. For it permits us to avoid the two grave drawbacks pointed out above. It involves, moreover, a particularly delightful order. When St.Thomas speaks, in the IIaIIae, of wonder, he says that an operation proportioned and conformed to nature is delightful. The text in question, then, which is very short, involves for this reason that delightful order. And if one takes account of the great difficulty of the subject (St. Thomas says in the *Commentary on the De Trinitate*: "Logica maximam difficultatem habet": whence, even with the best possible mode

8 St. Thomas, *In I Phys*., lect. 1, n. 6.

9 See Dionne, *Initiation àla Logique* (Quebec, 1969-70), notes recorded by a student, pp. 57 ff.

10 [This text is not presented or commented upon until later in the course. The text itself reads as follows: Passio potest sumi dupliciter; vel quantum ad naturam rei prout logicus et naturalis passionem, et hoc modo non oportet omnem poenam passionem esse, sed quamdam poenam, scilicet poenam sensus; vel quantum ad modum significandi, prout grammaticus considerat,et sic illud passive dicitur quod a verbo passivo derivatur (*In II Sent.,* d. 35, q. 1, a. 1, ad 5).]

of presentation, one cannot avoid entirely the difficulty), if, then, one takes account of the great difficulty of our subject, this text is not too abstract. The difficulty of the subject will be much softened thanks to the mode of presentation of this text. Finally, this text relies precisely on two instruments that respect the initial mode of knowing, and this is important.

2. The Value of the Point of Departure: It is Based upon Instruments of One Who is on the Road of Investigation

1) One Must Avoid Confining Oneself to the Particular.

The study of a particular problem always involves a great danger, one which is easy to understand: which consists in confining oneself to the particular framework of this problem. In other words, the danger of taking the particular as a point of departure. One does not consider sufficiently that the solution of the particular problem might depend, and ought to depend, on more common notions. This is again a precept that has its importance.

In this case, one is precisely taken with a particular problem: how to proceed fittingly to lead the intellect to a sufficiently distinct knowledge of the subject of logic? But to glimpse the solution, it is necessary to look a little higher, to raise oneself above the particular framework. And it is just this little text of the *Sentences* which gives us the occasion, because of the instruments which it involves. It allows us, indeed, to see that one is here treating of a problem concerning the way of investigation. (But it is necessary to pass this way in order to experience how long and difficult it can be to arrive at such a statement; it is here that we see how hard it is to teach.)

2) Some Words on the Way of Investigation.

It is necessary to say something about the way of investigation in order to grasp well the preceding consideration and also to

understand that which, taken from the text of the Sentences, will characterize the mode of our course.

On this subject we find in St. Thomas certain expressions which are very difficult to translate. It is a matter of a double division: first, "via inventionis" in as much as it is opposed to "via doctrinae"; but, on the other side, also the "via inventionis," as opposed to the "via iudicii." It is a matter of two clearly distinct divisions. And we see that this distinction which we have to make is very clear, above all in trying to translate the word "inventio." "Doctrina" is easily translated. "Iudicium" too. But "inventio" is more difficult. In the first case, "inventio" signifies *discovery*. The first division, in sum, says this: either a man can, by his own power, discover the truth, or he must take it from another. The other division is much more difficult to understand. "Iudicium" bespeaks knowledge which is completely distinct. The act of judgment is the act *par excellence*, the principal act of the intellect. The intellect is, when it posits it, in possession of principles; it is, indeed, when the intellect resolves into the principles that it judges truly, with the greatest certitude. "Via iudicii," then, designates the most perfect act of knowledge. But the road which leads to this term, the way of judgment, can be very long and it is a road which we name "via inventionis," which one must avoid translating by invention. When one says invention, indeed, one thinks immediately of the imagination rather than of the intellect. This is why the word investigation is much to be preferred. In a certain text on this subject, it is a question of a "vestigium," a term which gives us the idea of an intellect which, step by step, advances progressively, an idea which "investigation" renders well, since it is precisely taken from "vestigium."

> Investigare proprie est per vestigia alicuius euntis per viam, ad viae terminum perduci.[11]

11 St. Thomas, *In Div. Nom.,* ch. 1, lect. 1, n. 34.

And again:

> Vestigium enim demonstrat motum alicuius transeuntis.[12]

In this way of investigation, there are already some certitudes, but certitudes which are very proportioned because they are very close to sensation. But there is found here also a large part of inquisition, understood in a strict sense. Inquisition is, in the speculative order, what counsel or deliberation is in the practical order. In these two cases, it precedes judgment. Furthermore, counsel proceeds "ex communibus," and so does dialectic (or inquisition). There will be, then, in this way of investigation, as it were, two points: a first which involves certitudes, but very proportioned certitudes, very close to sense; but, at a given moment, it is necessary all the same to rise up to the universal and there the investigation becomes very difficult. And it is a part of logic called *Topics* which is going to direct this act of inquisition, this dialectic.

So the way of investigation is the way which is ordered to preparing the "via iudicii." But the reason, in the way of investigation, cannot advance by dint of syllogisms. This is not possible, because it is a way wholly proper to an intellect that is still imperfect; the most rigorous instrument of reason almost does not have a place there. *This is why likenesses and oppositions are necessary instruments to the way of investigation and to this inquiry* that it involves. So, because this act of inquiry that ought at first to base itself principally on instruments such as likenesses and differences, forms a part of the way of investigation and belongs to dialectic, Aristotle rightly arrays such instruments among the instruments of the dialectician.

Aristotle, indeed, enumerates, in the *Topics*, four instruments appropriate to the dialectician. (Do not forget, in passing,

12 *Summa Theologiae (STh)* I, q. 45, a. 7, c.

that dialectic covers every problem. The sciences bear on a determinate subject; dialectic does not. It bears on the common. It proceeds from the common.) The first instrument given by Aristotle consists in gathering the greatest possible number of opinions. Clearly, there is a choice to be made: not all opinions are worth the pain of being written down, of being retained; but among those which seem probable, it is necessary to gather the greatest number possible, because these different statements will serve for premises of a probable syllogism. This then is the first instrument.

The second instrument consists, he says, in being able to distinguish the "nomen multiplex." It is a question of the analogous name. It is necessary to be able to distinguish the different senses of the word. And why? Because the dialectician addresses himself to someone else, to an adversary, for example. Now when the adversary uses a word and forms an argument it is necessary that he who is truly a dialectician be able to know exactly in which sense he understands it. Supposing, of course, that the other is speaking fittingly. For not grasping this is extremely dangerous: he's going to be caught. Indeed, one can take the same word (the word, for example, which serves to signify the middle term) with a certain sense in the major and with another sense in a minor. And so the conclusion is bad and false.

So it is necessary to gather the greatest number of propositions and to be able to distinguish the different senses of the word. But, next, and these are the third and fourth instruments: *the dialectician ought to be able to discover likenesses and differences.*

What interests us here is these last two instruments.

3) Conclusion: The Text of the Sentences *Gives Us the Instruments for the Investigation of the Subject of Logic.*

Well, this little text of St. Thomas, in the *Sentences*, which allows us to avoid the two grave drawbacks pointed out (lack of order and unintelligibility), reposes precisely on these two instruments. There is, in this little text, likeness and opposition.

3. The Mode and the Order and the Plan of the Course.

Evidentially, we will not be content in this course with laying out this little four- line passage. But, again, the starting point is assured by it. And if we add another text, making a follow-up to the text of the *Sentences*, the plan of the course will appear. And that second text is in fact, much longer than the first. It is nothing other than a whole treatise.

Question (Gerald Allard): Will these two texts be in the "via inventionis"?

Response (Monsignor): Yes, that's it! But this will terminate, anyway, in the "via iudicii." We are going to travel toward the knowledge of the subject of logic by first going through this little text of the *Sentences*, and afterwards by this other discourse, which is much longer, which will be, let us say right away, *De Ente et Essentia*, by St. Thomas.

De Ente et Essentia is an *opusculum*, and an extraordinary *opusculum*. We will be able to pick out things here and there, texts which truly concerned logic—and this will not be against the order of our course. There are some such texts, above all in

Chapter 4. Chapter 4 is consecrated to the relation between *ens*, essence, and logical relations. But there are already some of these remarks in Chapter 3. Also, it will be good to run through the entire treatise, as it is not very long and it is, besides, extraordinary. It is magnificently structured, among other qualities.

Here, then, is how the plan of the course has appeared. Now he who says plan, says order. This is how we return to the mode of proceeding, for the mode of proceeding is the order.

In sum, the mode of this course is not much more difficult than the "innatum in nobis" at the beginning of the *Physics*, that is, the mode which consists in going from the more common to the less common, from the confused to the distinct. That is the order of the course. This is an order completely conformed and connatural to the intellect.

To resume in one phrase that which deals with the mode of discourse, let us say this: we will proceed *by likenesses and by differences,* and this in making use of a short text of the *Sentences*, and following it by *De Ente et Essentia.*

In the following classes, before entering the execution of the intention, we will speak about the order. This is not strictly a part of the plan of the course; these remarks will not touch strictly the mode of proceeding in our course. They will be simply more common considerations suggested by the more particular reflections which we are going to make on the mode of our course. We will be speaking, as it were, "for the good of the teaching." This is worth the trouble, for it is a question of a problem of universal import, necessary for all considerations with regard to particular problems, necessary for every moment of the intellectual life.[13]

13 [This concludes the first lecture, given on Jan 14, 1975.]

The Problem of Order

Today, we are going to speak about order (or, to take an equivalent word, of a plan, for he who says plan, says order). The problem of the order is an immense problem. As soon as one wishes to approach it, one feels lost, crushed. Whence the necessity to circumscribe, to fix certain limits to the problem. For the moment, it is easy enough for us to circumscribe such limits, because we are not speaking of order except in knowledge. Now, there is also order in things. And there is order in the arts. Recall for example, on this subject, the famous prooemium of St. Thomas to his *Commentary on the De Caelo,* where he speaks of four orders in art, which he transposes to the four orders of the speculative intellect. But here, it will be a matter of the order in speculative knowledge. And, by that fact, we will touch necessarily the order in teaching. But to speak in this way only of the order in speculative knowledge still leaves us with a very vast subject. One can approach it under many different aspects.

We will see that Valery,[14] by his words, helps us to reduce it more. This is because he has a very happy expression. It is precisely around a word that he uses that we will center certain of our considerations. But first, let us cite two texts of St. Augustine, drawn from his treatise *On Order*, which is a treatise from a wise man, and a wise theologian.

A. The Qualities and Defects that Accompany the Presence and Absence of Order According to St. Augustine

The first of these two texts indicates to us the necessity of order in teaching. He says, for example:

> If one wishes to teach fittingly, and not to be found unprepared, one must often prepare this order and to dispose

14 [Paul Valéry, French poet and essayist, 1871-1945.]

that which one ought to say.[15]

Because one finds the word "to dispose" here, it would be perhaps good to point out, in passing, that if one should wish to study the problem in a more extended way than the limits which we have fixed for ourselves permit, it would be necessary, evidently, that one take account of the two texts from [the Commentary of St. Thomas on] the *Metaphysics*: the one in Lesson 13, when Aristotle is determining about the before and the after, and the other, much simpler, on the word "disposition," in Lesson 20.[16] And it is interesting to see that these words, as St. Thomas remarks, are words that signify the perfection of being. Here, then, very briefly, is how disposition is described:

> Dispositio nihil est aliud quam ordo partium in habente partes.[17]

Let us pass right away to another text of St. Augustine. In this second text, St. Augustine enumerates for us, with remarkable conciseness, the different effects and qualities that follow according as one does not have or as one does have order in his study.

> Illud nunc a me accipiatis volo: Si quis **temere** ac **sine ordine** disciplinarum harum rerum cognitionem **audet irruere, pro studioso illum curiosum, pro docto credulum, pro cauto incredulum** fieri.[18]

15 St. Augustine, *On Order*, II, ch. 2, n. 7 (Vives II, p. 531).

16 The references are to the *Commentary* on Book V.

17 St. Thomas, *In V Metaph*, lect. 20, n. 1058.

18 St. Augustine, *On Order* (loc. cit.). "I wish that now you accept this from me: if someone boldly and without order of the disciplines dares to rush into knowledge of these things, he will become, in place of studious, curious, in place of taught, credulous, in place of cautious, incredulous."

a) General Explanation on the Occasion of the Examination of the Words used by St. Augustine.

1. "Irruere," "Temere," "Sine Ordine":

"Irruere" means "to *throw oneself* into." So: if someone throws himself into the knowledge of certain difficult things *with boldness and without taking account of the required order*. Think, for example, someone who says to himself, "I'm going to study metaphysics right away!"

2. "Pro Studioso, Illum Curiosum":

It is very difficult to translate "studiosus"; "studiositas" is a moral virtue, a potential part of the virtue of temperance, and it consists in restraining the natural desire to know in such a way that the will applies the intellect well for knowing this rather than that, and in this way rather than in some other way. He who acts in the way described by St. Augustine, instead of becoming virtuous ("studiosus," "diligent"), become "curiosus." "Curiositas" is precisely the vice opposed to "studiositas."

3. "Pro Docto, Credulum":

In order to grasp what "doctus" means, it is necessary to refer to the *Metaphysics*, where Aristotle distinguishes experience from art. Experience is well defined by this, that it consists in the "putting together" and the "comparison" of singulars conserved in the memory. In this context, art means simply universal knowledge. Aristotle adds that he who possesses art—but let it be repeated: it is necessary not to take art in the restricted sense of the sixth book of the *Ethics*; here, art means: *universal knowledge*, by opposition to experience—is able to teach, *because he knows the causes.*

> Artifices autem docere possunt, quia **cum causas**

> **cognoscant**, ex eis possunt demonstrare: demonstratio autem est syllogismus faciens scire.[19]

This is how we should understand "doctus" here: he who knows things in a universal way. Even here there are degrees, of course, but this universal knowledge allows him to *resolve* into certain causes at least. Meanwhile, he who does not know the causes cannot resolve in this way, and so cannot teach either. By "doctus," then, let us understand an intellect which, elevating itself above particular experience, can resolve into the causes, and is thus "capable of teaching" ("doctus" comes from "to teach").

Now, he who, as St. Augustine says, acts boldly and without order, instead of elevating himself above experience and so becoming able to resolve, becomes *credulous*. And it is not only St. Augustine who thus opposes credulity and the ability to resolve. We have already read this, with regard to the conditions of the disciple, in the little text *De Commendatione Scripturae*. The second of these conditions was called "rectitudo sensus," which means to say, judgment. And St. Thomas sends us back to the *Letter to the Ephesians*, where it is written: "Ut iam non simus parvuli fluctuantes" (Eph 4:14). Commenting on this passage, St. Thomas is going to say that the child, just because he is not fixed on anything (and to be well fixed implies precisely to be able to resolve into certain principles), believes anything.

> Conditio autem pueri est, quod non est fixus vel determinatus in aliquo, sed credit omni verbo.[20]

So he who is not concerned with order, instead of becoming a master, able to teach, and so to resolve, becomes like a child: "credit omni verbo." And it is surprising sometimes to

19 St. Thomas, *In I Metaph.*, lect. 1, n. 29.

20 St. Thomas, *Commentary on the Letter to the Ephesians*, ch. 4, lect. 5 (Marietti, 1929, II, p. 51).

see what some of those who pass for wise men claim; there are famous ignoramuses who hold manifestly stupid positions: they are like babies, like children. And they easily imagine themselves to be teachers.

4. "Pro Cauto, Incredulum":

"Cautio" is an integral part of prudence. But one can, clearly, transpose it into the exercise of the speculative life. When one says, "cautio," one finds oneself speaking of defense. In acting, evil is often mixed with good; also, he who is truly prudent, and who thus possesses this integral part of prudence, which is "cautio," is then able to pursue a good even while avoiding falling into evil. And this is not very easy, for if there are evils which are very gross, there are others nevertheless which are much more subtle. In the same way, in speculative things, we know very well that for the most part false is mixed with true. Again, the truly speculative man, to pursue the truth as a good efficiently, ought at each moment to take account of that which is true and also of that which is false in what is said.

Now, St. Augustine tells us that he who studies in this way, without order and with boldness, in place of becoming prudent, that is to say, "cautus," in place of being on his guard and of being vigilant to avoid pitfalls, becomes *incredulous*. This is to say that he exercises this vigilance haphazardly. Suppose, for example, that we propose to him the text of a great master. But he has proceeded badly, he is poorly formed; so it is his appetite, pure and simple, which will come into play: "St. Thomas is from the Middle Ages, so he's not worth reading!"

b) More Particular Examination of the Virtues and Vices

This little text is marvelous as a description of someone who does not pursue the good of the mind as he ought to pursue

it and who throws himself into things in this way with boldness and without order. Here there is disorder from the beginning and this definitively impedes progress. Such an impetuous man will share somewhat in the fault proper to the child, to be credulous, and sometimes in the fault proper to the old man, to be incredulous. And instead of habituating himself to apply his knowledge well, he will become the victim of "curiositas."

1. "Studiositas" and "Curiositas"

What is the sense of "curiosus," exactly? There is first of all the current way of speaking, according to which one sees in curiosity a good quality and where one makes of it a synonym of the desire to know. But the "curiositas" which is in question here is rather a very serious vice. Let us try to see better what it consists in. But first it is necessary to say something with regard to "studiositas," if one wishes to really understand what "curiositas" is. On this subject, a response to an objection in the *Summa Theologiae* can put us well on the way.

First, here is the objection in question:

> Studiositas, sicut dictum est, ad cognitionem pertinet. Sed cognitio non pertinet ad virtutes morales, quae sunt in appetitiva animae parte, sed magis ad intellectuales, quae sunt in parte cognoscitiva, unde et sollicitudo est actus prudentiae, ut supra habitum est. Ergo studiositas non est pars temperantiae.[21]

The response of St. Thomas is of extraordinary clarity.

> [D]icendum quod actus cognoscitivae virtutis [*Let us concede that "studiositas" concerns knowledge; does it follow from the fact that it concerns knowledge that it ought to be arranged among the intellectual virtues? No! But why?*]

21 *STh* II-II, q. 166, a. 2, obj. 2.

imperatur a vi appetitiva, quae est motiva omnium virium [*St. Thomas underlines the universality of the empire of the will over everything which concerns exercise, except, certainly, that which touches on the operations of the vegetative life; in other words, all that is able to fall under the command of man falls under the empire of the will*], ut supra habitum est.

Et ideo circa cognitionem duplex bonum potest attendi. [*One speaks of knowledge, yes; but what good are we concerned with? We might be concerned with two goods which are radicallydifferent; for example, the virtue of docility, because of these two different goods, is itself a double virtue: thus, in the prooemium, when the master renders docile, it is a question of intellectual docility and not a moral docility, the integral part of prudence; and meanwhile, the acquisition of docility, the intellectual virtue, depends on this other docility, the moral virtue and integral part of prudence; indeed, if someone is not morally docile, he does not listen, and he is not able to become docile intellectually, that is, capable of receiving a teaching according to the mode appropriate to the object treated; in that which concerns knowledge, it is necessary then to distinguish two goods*]. Unum quidem, quantum ad ipsum actum cognitionis. [*There is a first good. With regard to the act itself of knowing; this good belongs to the intellectual virtues; St. Thomas describes it briefly but marvelously.*] Et tale bonum pertinet ad virtutes intellectuales, ut scilicet homo circa singula aestimet verum. [*Here is the first good: to say the truth when one declares something.*]

Aliud autem est bonum quod pertinet ad actum **appetitivae virtutis, ut scilicet homo habeat appetitum rectum applicandi vim cognoscitivam** [*The second good consists in having right appetite, that is, in a will which applies the intellect well.*] sic vel aliter, ad hoc vel ad illud. [*Thus or*

> *otherwise, because he whose will is more or less morally indisposed is going to apply his intellect otherwise than he who is well disposed; for example, in the case of he who, by habit, because of the repetition of certain acts, is truly morally indocile, the will will not apply the intellect to the study of the great masters; and next, there is also in this case, this and that: a moral indisposition can lead one to wish to study that which is better left aside for the moment, because it is too difficult; and so on.*] Et hoc pertinet ad virtutem studiositatis. Unde computatur inter virtutes morales.[22]

In the body of the same article, St. Thomas ties "studiositas" to temperance. But why? This seems a little strange, at first sight, because when one says that someone is studious, one might say that this belongs more to the virtue of fortitude. It seems that it is more the irascible than the concupiscible that is involved. The thing is, when one speaks about man's knowledge, there are two things to consider. There is, on the one hand, a natural *desire* to know, which is very strong (however often, for all sorts of reasons, this desire is not followed); but there is also *the side of the body*, the fatigue of the body, for there is something laborious and painful in study. It is this second aspect that makes us see something of fortitude in the case of someone who studies well. But the name of the virtue is drawn rather from the first aspect, namely the natural desire to know, a desire that must be moderated. One ought not to study just anything nor in just any way. There is an exercise of intellect that would be immoderate. There are, moreover, many varieties of this immoderation, and these different excesses constitute precisely the different types of curiosity.

Concerning these aspects of curiosity, that which one

22 Ibid, ad 2.

might, above all, put one's mind on in the text of St. Augustine is that which concerns order: "he who throws himself into knowledge of these things with boldness and without order becomes 'curious.'" What interests us is to see what it is about this disorder, in this boldness, which brings along the vice of curiosity. St. Thomas can give us some clarity on this.

Having said, as we did above, that the knowledge of the truth, speaking *per se*, is a good, St. Thomas adds now that the appetite that applies to study in view of knowledge of the truth is able to involve either rectitude or perversity.

> Sed ipse appetitus vel studium cognoscendae veritatis potest habere rectitudinem vel perversitatem. [*There are many examples, and it is, above all, the fourth, which will interest us; but first, let us read another, to put us on the right track.*] Uno quidem modo [*A bad way of applying the intellect to knowing is if the end is taken from the motive of pride.*], prout aliquis tendit suo studio in cognitionem veritatis prout per accidens coniungitur ei malum, sicut illi qui student ad scientiam veritatis ut exinde superbiant. [*Such a one is not virtuous; but this is also far from that which interests us; let us go to the fourth mode, which seems to explain more directly the text of St. Augustine: "pro studioso illum curiosum"; what does this mean? It is necessary always to remember that this is someone who has thrust himself forward with boldness and without order, who has wished to attack certain truths, but without order.*]. . . .
>
> Quarto modo, inquantum aliquis studet ad cognoscendam veritatem supra proprii ingenii facultatem [*We see immediately that he is treating of someone who wishes to address questions which are beyond him simply; but there is also something more subtle than that.*]: quia per hoc

homines de facili in errores labuntur.[23]

It is a question, in sum, of one who has never concerned himself with simple and proportionate things, above all at the beginning, while this always remains necessary and there is no weaning in this matter. Not to be exercised in simple and proportionate things is a guarantee that the judgment is not developed. And, on the other hand, to follow a master who teaches with *manuductio* is the best, is even the only way to develop one's discernment. This is what we find St. Thomas saying when he prescribes that the master rely upon less universal propositions, give first sensible examples, speak of likenesses and of differences, etc… One can unite all these principles of manifestation, which are necessary for teaching, by saying, "present less universal propositions about which the disciple can form a judgment."

> Ducit autem magister discipulum ex praecognitis in cognitionem ignotorum, dupliciter. Primo quidem, proponendo ei aliqua auxilia vel instrumenta, quibus intellectus eius utatur ad scientiam acquirendam, puta cum proponit ei **aliquas propositiones minus universales, quas tamen ex praecognitis discipulus diiudicare potest**; vel cum proponit ei aliqua sensibilia exempla, vel similia, vel opposita, vel aliqua huiusmodi ex quibus intellectus addiscentis manuducitur in cognitionem veritatis ignotae...[24]

Someone who is exercised in this way, in simple and proportionate things, and for a long time—but for that, he must have received a teaching in this way—can become "studiosus." But for one who has not tasted, who has not acquired the taste for simple and proportionate things, that which he wishes to

23 *STh* II-II, q. 167, a. 1, c.
24 *STh* I, q. 117, a. 1, c.

learn, that which he wishes to know, inevitably goes beyond his power to know. And this is so even if, in fact, nature has given him a strong enough intellect: by lack of exercise, as a result of bad teaching, and because of always being in the clouds, he inevitably becomes "curiosus." His will applies his intellect to consider things that he will never be able to understand, which go beyond him.

One must introduce healthy teaching before such a bad disposition is engendered, [i.e., a teaching] which would make one experience very strongly the necessity of attaching oneself to simple things, that is, to the senses. Otherwise, the danger is always there of being tempted to approach questions that are not proportionate. And, in difficult questions, if the judgment, if the discernment, has not been developed, the faculty which will take the lead is the imagination, which, with the appetite, is the principal cause of error.

St. Thomas indicates another interesting case (however sad) of "curiositas," in Article 2. There he is seeking to know whether the vice of curiosity concerns sensible knowledge. Here too, there are some interesting things for us, if we approach this article in the context of the one we read in St. Augustine.

> Cognitio sensitiva ordinatur ad duo. Uno enim modo, tam in hominibus quam in aliis animalibus, ordinatur ad corporis sustentationem, quia per huiusmodi cognitionem homines et alia animalia vitant nociva, et conquirunt ea quae sunt necessaria ad corporis sustentationem. Alio modo, specialiter in homine ordinatur ad cognitionem intellectivam, vel speculativam vel practicam. Apponere ergo studium circa sensibilia cognoscenda, dupliciter potest esse vitiosum. Uno modo, inquantum cognitio sensitiva non ordinatur in aliquid **utile**, sed potius avertit

hominem ab aliqua utili consideratione … [25]

To tie this text to that of St. Augustine, let us make precise the sense of the word "utilis": for speculative knowledge, sensible knowledge, that is the knowledge of singulars, ought to be sought in the measure in which it is useful for the knowledge of the universal. Above, it was a question of the vice which follows from not having exercised oneself in simple and proportionate things: one is then carried along to apply oneself to consider things which are too difficult; what we are saying now concerns specially the role that the history of philosophy plays in the speculative life; and we know how it is fashionable today to consider singular opinions. Now, like every examination of singulars, the history of philosophy is not a good except insofar as it is useful for the more perfect knowledge of the truth. And it becomes a vice from the moment it turns away from considerations that are more useful for this end. St. Thomas, again, in the *Metaphysics*, formulates briefly but very clearly in what measure it is necessary to consider singular opinions: in the measure in which the truth would appear through this in a more limpid way.

> Adiuvatur enim unus ab altero ad considerationem veritatis… indirecte…inquantum priores errantes circa veritatem, posterioribus exercitii occasionem dederunt, ut diligenti discussione habita, **veritas limpidius appareret**.[26]

Here is the true sense of the examination of opinions and singular cases from the history of philosophy. Besides, in the *Summa Theologiae*, St. Thomas will again say that what perfects the intellect is not what each one thinks, but how the truth of the thing is disposed. The singular is subordinated to the universal

25 *STh* II-II, q. 167, a. 2, c.
26 St. Thomas, *In II Metaph.*, lect. 1, n. 287.

and to the truth.

To confine oneself too much to the examination of singulars is then another way of sinning through "curiositas."

2. "Doctus" and "Credulus"

He who has not developed his judgment and his discernment because of the vice of curiosity is like a child: he is not able to resolve. Whence: "Pro docto, credulum." It is remarkable that those who know the least, even while imagining themselves to be very wise, believe any sort of stupidity. Think of Fabre's discussion of the theory of instinct; it is marvelous, when he attacks those who deny the determination of instinct and take refuge in time. He shows how ridiculous it is to let oneself be seduced by such theories. Nature and what goes on in it is so beautiful, really, that it is folly for someone to prefer what has come out of his own imagination. This is an example of the "credulitas" of which St. Augustine speaks.

3. "Cautio" and "Incredulitas"

And in addition, in other cases, but always for the same reason: the judgment which is not firm, nor fixed, cannot discern the case in which it is truly necessary to pay attention and to be on one's guard and not to follow anyone at all, from that where it is fitting to place one's faith in another. For indeed, there are very often cases in which one ought not to give one's adherence in an absolute fashion. But there are many also in which faith (natural) ought to come in, while one is waiting to acquire some evidence. But it is on these occasions that the badly formed spirit, "curiosus," shows itself incredulous. It will refuse to have faith in a great master, for the most futile motives. And what is striking is that this incredulity manifests itself at the same time as a ridiculous credulity. The badly formed spirit will at the same time believe anything and refuse any great master, more or less at the

whim of his appetite and his imagination. "St. Thomas is history. He has nothing to teach us!" But has this fellow even read St. Thomas? No, it does not seem necessary to him. It is sufficient for him to know that he was from the Middle Ages.

The text of St. Augustine is truly extraordinary. We need such rules as he gives.

And now a last text on this subject, in order to show that order is something so profoundly rooted in man that it touches not only reason, but even sense.

> [S]ensus delectatur [*He is speaking about the external sense, but this also applies right up to the cogitative.*] in rebus debite proportionatis [*like painting, architecture, etc.; but St. Thomas adds:*] sicut in sibi similibus [*We know that likeness is the cause of love.*]; nam et sensus ratio quaedam est.[27]

See how strong this is! And yet the senses have for their object the singular; but already here, there is like a participation of reason: to the point that one can speak of this sense as of a certain reason; the idea of ratio here is above all tied to that of something properly proportioned, of an order; now order is proper to reason.

In conclusion, the text of St. Augustine gives us a clear idea of the necessity for the intelligence of taking account of order, because otherwise it risks following a false road and falling into the defects which we have described: "curiositas," "credulitas," "incredulitas."

The Necessity of Organically Ordering Teaching

> The problem which has driven me more and more into a corner is the problem of ordering my thoughts, and of

27 *STh* I, q. 5, a. 4, ad 1.

> ordering them not extrinsically [*Because one can give a course and number the classes 1, 2, 3, 4; but perhaps from the point of view of order, this is not of much value.*] but organically [*This is a marvelous expression!*].[28]

Let us hold onto this term, "organically." It is about this term that we are going to make certain considerations. For someone, at least, who has done a little philosophy, "organically" makes him think right away of the definition of the body, at least of the qualifying adjective determining the body of which the soul is the form. In the beginning of the second book of the *De Anima*, Aristotle defines the soul: "the act of an organic body,"[29] the act of a body "furnished with organs." In this the living body is distinguished from the inanimate body.

So, Valery tells us that the problem to which he is more and more driven is the problem of order, that of ordering his thoughts organically. And right away, as we have said, organically makes us think of the act of an organic body, the definition of the soul.

a) Likeness to a Natural Body

In regard to this definition, the Greek Themistius, who commented on the treatise *On the Soul* of Aristotle (of which the Latin translation of William of Moerbeke is found in the edition of Canon Verbeke) says that it is not just any soul which is a form of just any body.

> Non enim omnis anima omnis corporis species est [*The fact is that the body must be proportioned to the soul; one kind of body is fitting exclusively for the vegetative soul, another is fitting for the sensitive soul, and finally another is fitting for the rational soul.*], sed eius quod ad ipsam

28 Paul Valéry, *Cahiers* (Paris, Gallimard, La Pleiade), t. 1, p. 8.
29 Aristotle, *On the Soul* 2.1, 411a28.

> [*that is, soul*] organice constitutum est et habet se idonee ad potentias quae insunt animae.[30]

It is necessary that a body be apt to be the instrument of the instruments of that soul to which it is united.

St. Paul, in his *Letter to the Romans*, and, above all, in his *First Letter to the Corinthians*, takes the natural body as a likeness of the mystical body. He is led, then, to analyze the natural body a little. Let us see the broad outlines of this analysis.

First of all, though this is very simple, the body is not constituted of a single member. Right away, it is necessary to speak of multiplicity and diversity.

> Et, eodem modo, corpus hominis aut cuiuslibet animalis est unum, quia eius perfectio integratur ex diversis membris, sicut ex diversis animae instrumentis; unde et anima dicitur esse actus corporis organici, id est, ex diversis organis constituti.[31]

Once again: multiplicity and diversity. One must not forget that "organon" signifies, in Greek, "tool." The passage from tool to instrument is very easy. Well, to the extent that the members will be instruments of the soul, in speaking of a body which is united to the soul, we can say "organic body." This is a body which is organically constituted. There is diversity, and each member has its proper function, its proper act, its proper virtue. And all this is necessary to the integrity of the body.

St. Paul remarks, a little later, that some members are more or less noble than others. For example, what is connected to sight is more noble than the foot. But St. Paul remarks that the less noble members are nevertheless necessary. And, further, says St. Thomas, St. Paul even

30 Themistius, *In de Anima*, III, ch. 3, p. 110.
31 St. Thomas, *In I Cor.*, ch. 12, lect. 3, n. 732.

> comparat diversa membra ad invicem quoad necessitatem eorum, dicens quod membra corporis quae videntur esse infirmiora, sunt magis necessaria.[32]

And he gives an example from agriculture, which, among the parts of political society, is more necessary than the more noble arts, even than those which concern intellect.

So then, we ought never to neglect the instruments which, however weak, are nevertheless particularly necessary (and this will be very important when we transpose all this to the order of knowledge).

> Perfectio corporis non tota consistit in uno membro, quamvis nobiliori sed ad eius perfectionem requiruntur etiam ignobiliora.[33]

St. Paul then compares certain members according to their dignity.

> Horum tamen sensuum dignior est visus quam auditus [*If one compares the eye to the ear, it is easy to see that the ear is inferior.*], quia et spiritualior est et plura demonstrat, ac per hoc oculus est dignior aure. Dicit ergo "et si dixerit auris" [*If one gives speech to the ear, and it should say:*] quae est ignobilius membrum, "non sum de corpore, quia non sum oculus" [*This will not do at all; all are necessary because each has its proper role, its proper virtue, its proper act; and indeed, the senses and the different members ought to help each other in view of the perfection of the body.*], qui est membrum nobilius, non ideo non est de corpore? etc.[34]

It is not necessary here to give more details than this.

32 Ibid., n. 746.
33 Ibid., n. 738
34 Ibid., n. 739

b) Application of the Likeness

In the same way, in a course, there is a multiplicity and diversity of parts. Take, for example, the prooemium. This has its own proper function. It *directs* the entire work. It is not for nothing that the Greeks, who had so often analyzed and broken down the prooemium into seven or eight elements, called these elements, "heads." The prooemium, then, has a virtue entirely proper to it. On the other hand, still speaking of a treatise, for what one says about a course is said *a fortiori* of the treatise—and it is in this context of the parts of teaching with their proper function that one sees the perfection of a commentator like St. Thomas, who brings to light all this order, placing the different parts and instruments in their respective functions—there are also preliminary notions which play their role. There will be principles. And proper principles. And there will also be conclusions. And the execution of the intention will involve instruments that are fitting and necessary. This is to say that the master will use, sometimes, the instrument *par excellence* of reason, namely, the syllogism. But not always, for sometimes this is impossible: the matter does not lend itself to it. Or, again, this might not befit the intellect to which one addresses oneself, if it is a question of oral teaching. So the master will sometimes use the instrument *par excellence* of reason, namely the syllogism. But as this reason, as Dionysius teaches, "is nourished by the senses from the beginning,"[35] the master must never neglect anything which comes from nature for the sustenance of reason, attaching it to the senses with the aid of instruments which are less noble, less rigorous, and so weaker, but often more necessary, such as induction, which Peter Victorius, who commented on the *Rhetoric* of Aristotle, called "praesidium rationis." "Presidium" signifies "help," "aid," and has a more particular sense in agriculture, namely, "garden

35 St. Thomas, *In Div. Nom.*, ch. 8, lect. 1, n. 704.

stake." This is a marvelous expression. Induction is like the stake of reason, which disposes reason and permits it to grow up fittingly and straight. The master can also use, along this line, the example. And, in sum, from all that intellect can attain, he can seize upon the best. "Quod plenius consequitur intellectus,"[36] as St. Thomas says, when he asks whether faith is more certain than the intellectual virtues of the natural order. He makes this distinction:

> [B]y certitude, one can understand two things: one can speak of certitude as founded on its formal motive; and so faith, because it bases itself upon the divine witness, on the divine truth itself, is more certain. And so, it is more certain simply because the most proper judgment that one can make about a thing is that which is based on its cause. But one can also understand certitude in a certain respect, *secundum quid*, that is to say, in looking to the intellect which understands: that which the intellect more fully follows is called the more certain, that which the intellect can grasp, see [*It is better to say grasp, because this word refers to touch, the sense of the most certain knowledge.*] most fully.[37]

In this regard, certainly, the most noble and the most intelligible things are those which the intellect has the most trouble in knowing and that it does not hold onto, that it does not possess as fully.

> Primo igitur modo, dicendum est quod certitudo potest considerari dupliciter. Uno modo, ex causa certitudinis, et sic dicitur esse certius illud quod habet certiorem causam. Et hoc modo fides est certior tribus praedictis [*wisdom, science, and the understanding of principles*]: quia fides innititur veritati divinae, tria autem praedicta

36 *STh* II-II, q. 4, a. 8, c.
37 Ibid.

> innituntur rationi humanae. Alio modo potest considerari certitudo ex parte subiecti, et sic dicitur esse certius **quod plenius consequitur intellectus hominis**. Et per hunc modum, quia ea quae sunt fidei sunt supra intellectum hominis, non autem ea quae subsunt tribus praedictis, ideo ex hac parte fides est minus certa. Sed quia unumquodque iudicatur simpliciter quidem secundum causam suam, secundum autem dispositionem quae est ex parte subiecti iudicatur secundum quid, inde est quod fides est simpliciter certior, sed alia sunt certiora secundum quid, scilicet quoad nos.[38]

All these instruments, then, are necessary for teaching and their ensemble ought to be well ordered, to the point of forming as it were a *body of doctrine*, organically constituted, comparable to a natural body.

Here is why the expression of Valery is so happy: "to order his thoughts organically." A course ought to be ordered *organically*. A treatise ought to be composed organically.

For example, at the beginning of the *Physics*, Aristotle speaks of an absolutely fundamental teaching:

> Innatum est nobis ut procedamus cognoscendo ab iis quae sunt nobis magis nota, in ea quae sunt magis nota naturae; sed ea quae sunt nobis magis nota, sunt confusa, qualia sunt universalia; ergo oportet nos ab universalibus ad singularia procedere.[39]

Here is something absolutely rooted in us, this is the mode of the soul in knowing, a principle which is absolutely fundamental.

St. Thomas commented on this text, as did Averroes before him. But whereas it is a very common order that Aristotle intends to be speaking of, Averroes understands this order, this

38 Ibid.

39 St. Thomas, *In I Phys*., lect. 1, n. 6.

process, in the line of the "ordo determinandi" proper to the science of nature and not of the order of determination which is natural to us. St. Thomas answers him: Aristotle will speak of the mode of demonstrating; but that is in the second book, not in the first. The body of doctrine of Aristotle, and above all at the beginning, faced with such fundamental things, is, as it were, dismembered by Averroes, who introduces a foreign part into it. St. Thomas, in commenting on St. Paul (we didn't mention this earlier), says that if there were a division between the members of the body, this would be like a schism in the body.

> Quantum ad membra corporis naturalis, schisma esset in corpore si debita proportio membrorum tolleretur.[40]

In the same way, when a body of doctrine is a true body, organically constituted, to dismember it is like introducing a schism into the body. And with regard to Averroes: he provokes as it were a schism in the intention pursued by Aristotle. The arrangement of parts is broken. And this is all the more grave because it is a point of departure, and a point of departure that is utterly fundamental.

But on the other hand, the body of doctrine can be marvelously, organically constituted, and, to seize the different parts, each one in its place and having a certain sense in context, demands (and this is above all the case when Aristotle is in question), because of the conciseness and the brevity of the word, an intellect which is very strong. Yet an intellect can be unable to unite into one intention that which is in fact united, and not see, because of its weakness, this union.

Whence, the reproach of St. Thomas to Averroes:

> Eius expositio non est conveniens, quia non coniungit

40 *In I Cor*., ch. 12, lect. 3, n. 750.

totum ad unam intentionem.[41]

Averroes did not know how to tie the whole to one and the same intention. The same kind of remark will often be found in the *On Interpretation*, when St. Thomas relates opinions {about the text}. Note that this does not happen in the case of *The Commentary on the Posterior Analytics*—in this commentary, there is no question of opinion; it directly concerns Aristotle; but in the *On Interpretation*, it very often happens that St. Thomas gives two or three or four interpretations, and he will very often say: "No! This interpretation does not fit, because it does not seem to be in line with the intention of Aristotle." This is exactly what we are speaking about now. Sometimes he will say this about an interpretation which seems a little complicated, though this is less serious: "it seems rather contorted." But it is much more serious when he says that an interpretation does not enter into the intention, into the single intention of Aristotle.

In sum, to take things up a little bit in another way, when we speak about what Valery said, "to order his thoughts organically," and also about what St. Augustine says, "he ought to dispose what he says with order," it is a question of *a disposition animated by intelligence*. This is what is opposed to what Valery calls extrinsically ordered; it is necessary in teaching that the disposition of the instruments proceed from within the intellect. It must not be something arbitrary or artificial in the pejorative sense. It is necessary that one notion call up another.

Once the intellect has tasted order well, it does not wish to be deprived of it. For if already "sense is pleased by things with proper proportion," *a fortiori*, the intellect itself will find delight in well-proportioned objects. Also, when, once habituated to St. Thomas, one falls upon a work which tries to explain Aristotle, but that does not explain him in so articulate a way, one finds

41 *In I Phys*., lect. 1, n. 8.

these explanations more or less lack-luster. St. Thomas, in fact, even while commenting on the truth exposed by Aristotle, puts all this order into the light: "he does two things; about the first…, etc." St. Thomas does the same thing again with a no less rigorous word, namely the word of St. Paul. The intellect has trouble being satisfied with less once it has tasted this. And when it returns to St. Thomas, even if it does not always understand, it always finds him truly superb.

c) In Teaching: Two Matters, Two Orders

A last remark, but one that has its own importance. Since we are speaking about order, of the order in a course, of the order of a treatise, let us apply all this in a common way to teaching. One can easily be mistaken about order, and believe, for example, that, in a given course, there is not much order, when, in fact, there is. The following distinction might help us to see this better.

It is necessary to distinguish carefully two orders, and what rules this distinction is the distinction between the two matters proper to teaching, namely, the material, that is, that which is taught, and the intellect to whom one addresses oneself.

For example, with regard to the order ruled by the second matter, namely, by the intellect to which one addresses oneself, oral teaching is best, because here it is absolutely necessary to take into account the matter studied. Because of this, one cannot, with young students, just open Aristotle, who proceeds rigorously, scientifically, concisely, and according to an order about which one might say that it is not addressed to us. It was necessary that Aristotle go before us, we have need of a written word like that one. Because writing bespeaks something permanent. But one cannot expect, in a treatise of Aristotle, an order just like that which a master follows in oral teaching, proportioning himself more to such and such particular intellects.

To understand this better, let us read some texts in Fabre, taken from his *Entomological Memoirs.*

> The book is the book, that is to say, a text [*thinking above all about a great master, like Aristotle*], laconic [*that is, brief and concise*], invariable, very wise I agree, but, alas! in many cases, obscure. The author, it seems, wrote for himself. He understood, so the others ought to understand. Poor novices, left to yourself, pull yourselves out of there however you can.
>
> For you [*before a great written word*] there is no return of the difficulty presented in another way; **no circuit sweetens** the hard road [*"circuitus": taking a likeness is a sort of circuit around the saying; for example, in place of directly attacking a logical definition, one might define in terms of an operation, of an end.*] and prepares access [*It often happens that, with regard to a question, St. Thomas treats it both in the* Summa*, and in the* Disputed Questions*; it takes very little from one text to clarify the other for us, sometimes a single supplementary sign will do.*]; no secondary opening to let in a little daylight [*The written word is there; if you have the intelligence necessary to decipher it, great! But…*]; incomparably inferior to speech, which begins again with other means of attack and knows how to vary [*This is manuductio, very well-defined.*] its footpaths [*Sometimes an example, sometimes a likeness, sometimes an opposition.*] approaching the light, the book says what it says, and nothing more.
>
> Its demonstration over, really, whether you understand it or not, the Oracle is inexorably mute. You reread the text, meditating upon it obstinately; you pass, and pass again with your shuttle over the woof of the reckoning. Efforts are useless, the obscurity persists. Often, what would be needed to give an enlightening ray? A nothing, a simple word; but this word, the book does not speak.
>
> **Happy is he whom the word of a master guides!** His progress does not know the miseries of enervating stops.[42]

Fabre spoke about this also in the previous chapter, though in a less complete way. He speaks, then, of the fact that he has been deprived of a master and that he has had to study by himself.

> On this, it seems, the book explained itself badly, or rather, employed too abstract a method. I have read much, reread it, meditated upon it, yet the obscure text guarded its obscurity. Here is the bad side of books in general: it says that which is printed, nothing more. If you do not understand, there is no counsel on its part, no attempt at another way in which it might lead you to the light. **A little word would sometimes suffice to put you on the right road, and it does not say this word, frozen as it is in its edition.**
>
> How preferable to this is speech! It goes forward, and retreats, it begins again, it goes around an obstacle and varies the means of attack, if only the shadowy might be, in the end, illuminated. I lacked the incomparable lighthouse of *an authoritative speech*, and I was shipwrecked, without hope of aid, in this perfidious sea of the rule of symbols.[43]

This is magnificent! One must remember, above all: "happy is he whom the word of a master guides!"

Look to at the beginning of the same chapter.

> To learn under the direction of a master has been refused

42 Henri Fabre, *Souvenirs Entomologiques,* IX, ch. 14 (Souvenirs mathematiques - ma petite table).

43 Ibid, ch. 13 (Le binome de Newton).

> to me. I would have been wrong to complain of it [*One must understand what he wishes to say, this can be understood, as we are going to see.*]; solitary study has its value [*This is fair; the comparison which he is going to make is not too bad, but one must understand it well; he understands teaching, as it is very often given, that is, badly; solitary study is a way of discovery as opposed to the way of teaching.*]; it does not run in an official mold [*All the same, the teaching which is given well does not mold the intellect in that way.*], it leaves you full originality. [*Careful! The mere fact of learning from someone does not remove our originality; and besides, here, the word fecundity would be more proper than originality; the disciple keeps his fecundity, which moreover becomes greater and greater and stronger and stronger. Here is a fairly pretty comparison:*] Wild fruit, if it comes to maturity, has a different taste than the product of the hothouse; it leaves, on lips which know how to appreciate it, **a blend of bitterness and sweetness** the merit of which grows by contrast.[44]

There is something here; on the subject of pleasure, St. Thomas shows first that contemplation is more pleasant in itself than research. But *per accidens*, the latter can involve a particular pleasure, from the fact that it proceeds from a greater desire to know. So too, to discover by oneself some new thing is pleasant, but it involves bitterness in the sense that it is not easy.

> Dicendum quod delectatio duo habet, scilicet quietem in bono, et huiusmodi quietis perceptionem. Quantum igitur ad primum, cum sit perfectius contemplari veritatem cognitam quam inquirere ignotam, contemplationes rerum scitarum, per se loquendo, sunt magis delectabiles quam inquisitiones rerum ignotarum. Tamen per accidens, quantum ad secundum, contingit quod

44 Ibid.

> inquisitiones sunt quandoque delectabiliores, secundum quod ex maiori desiderio procedunt, desiderium autem maius excitatur ex perceptione ignorantiae. Unde maxime homo delectatur in his quae de novo invenit aut addiscit.[45]

Fabre continues, "If it were in my power, yes, I would begin again."[46] He insists, though a bit too much here; all the same, the text was, with regard to the rest, a magnificent description of oral teaching.[47]

It is necessary to add this to what we said at the end of the last class: *a commentary (a good one!) lessens the distance between the great written word and oral teaching.* And we could exemplify this immediately, but we're going to wait and do it rather in a different context a little later where we will be able to kill two birds with one stone. For the moment, just think about St. Thomas commenting on a fairly difficult passage in Aristotle; without this commentary, without this division of the word which one finds there, either one would not be able to approach an understanding of the word of Aristotle at all, or at least this would take much more time and would present many more difficulties.

The Root of Intellectual Customs

We have analyzed, in the preceding classes, a beautiful passage from St. Augustine in his treatise *On Order*:

> Illud nunc a me accipiatis volo: Si quis temere ac sine ordine disciplinarum in harum rerum cognitionem audet irruere, pro studioso illum curiosum, pro docto credulum, pro cauto incredulum fieri.[48]

45 *STh* II-II, q. 32, a. 8, ad 2.
46 Fabre, loc. cit.
47 [Here ends the lecture from January 15, 1975.]
48 Loc. cit.

This passage from St. Augustine touches on a point which one can very justly designate by "intellectual customs." This question of intellectual customs ought to be the object of a course in the first year of philosophy. For those who truly intend to consecrate themselves to a speculative life, it is quite necessary that they receive some direction concerning intellectual customs. Intellectual customs touch at once both the intellect as such, in its proper dispositions, and also every disposition or indisposition of the will. Concerning knowledge, for example: docility, "studiositas," etc.

The passage from St. Augustine gives us an occasion to speak here a little bit about this subject, above all, if we add another passage from St. Augustine, which also touches on intellectual customs and which, even if one does not see at first sight what we wish to draw from it, will permit us, when we look at it more closely, to determine, to fix, so to speak, what is at the root of intellectual customs.

To lead a true intellectual life, it is absolutely necessary to have good intellectual customs, both with regard to the intellect, and on the affective side. Here, in a rough way, is what this signifies. *On the side of the intellect*, he who has good intellectual customs is he who respects the "modus animae in cognoscendo," which consists in going from the sensible to the intelligible—as St. Thomas says in his *Commentary on the Trinity of Boethius*—and so on. In what concerns the dispositions of the intellect itself, these good intellectual customs, in sum, consist in not contradicting nature, in following the natural mode of the intellect, in respecting a certain initial mode of knowing. But on the other side, there is also the *affective aspect*. This is to say that to have good intellectual customs also demands—and here, we are going to use a very general and common expression, before having more distinct knowledge of the problem—that the will, which has empire over the exercise of all the faculties (except, of

course, those of the vegetative life), adequately applies the intellect to study this rather than that, and in this way more so than in that way.

We are going to begin by reading the second text from St. Augustine on the question and we are then going to make certain remarks with a view to fixing, from that text, what might be at the very root of intellectual customs. This is enormous, this is an extremely important subject. And the text from St. Augustine will give us, indeed, a good instrument to limit the problem. Without it, even if we understand what we are about, we would easily lose ourselves in its multiple aspects, while with the text, we will be able to go to the very root of the problem.

This is a text with a completely theological context. But this makes no difference, for one can easily transpose what he says there into the natural order. Note in passing that St. Augustine takes care, when the occasion presents itself, to give counsel to the intellect to which he is addressing himself so that they might efficaciously pursue the truth. And also, he is keen to analyze the sentiments of his adversaries. This is exactly what happens here.

A. Reading of the Text

> Lecturus haec quae de Trinitate disserimus, prius oportet ut noverit, stilum nostrum adversus eorum vigilare calumnias, qui fidei contemnentes initium [*And here now is the expression, which must evidently first of all fittingly be translated and then analyzed*:], **immaturo et perverso rationis amore falluntur.**[49]
>
> Before reading our treatise on the Trinity, it is necessary that one know well that our pen is awakened to push back the calumnies of those who, mistaking this principle of

49 St. Augustine, *De Trinitate* I, ch. 1, n. 1 (Vives, 27, p. 158).

> the Faith, go astray through a love of reason which is "immaturus et perversus."

The translation which the Vives edition gives of "immaturus" is not admissible: it speaks of a love "out of season." It is certainly true that "immaturus" bespeaks something like that, fruit which is not ripe, which has not had the time to ripen, which comes before its time and so, out of season; what would be clearer would be to speak of love "without maturity," and so "without experience," "without wisdom," "without prudence." With regard to "perverso," we can say that this is easy, in Latin: that which is "perversus" is that which is reversed; so one can certainly translate it by unruly. In sum, it is a question of an unruly love, disordered, not formed (for "immaturus" think of an animal born before its time, and so incompletely formed). It is very important here to note that one is faced with a love of reason, not of just anything, and an unruly *love of reason*. And this unruly love, St. Augustine says, is the cause of errors.

St. Augustine continues by dividing into three categories those who have this imperfect love of reason. The first try to measure this mystery—the mystery of the holy Trinity, the greatest, the most difficult mystery—to measure then this mystery by things perceived by the senses: this is extremely crude.

> Quorum nonulli ea quae de corporalibus rebus, sive per sensus corporeos experta noverunt, sive quae natura humani ingenii et diligentiae vivacitate vel artis adjutorio perceperunt, ad res incorporeas et spirituales transferre conantur, ut ex his illas metiri atque opinari velint.[50]
>
> Many among them, trying to carry over what they have learned from bodies by the sense experience of bodies to incorporeal and spiritual things, or which the ingenious

50 Loc. cit.

> nature of man, diligent care, and the resources of art have allowed them to discover, wish to measure the things of God and to form an idea of them by means of corporeal things.

Others also try to measure the divine things, but this time not by taking corporeal things as their basis, but spiritual things; but they take this spiritual thing from among us, from our soul, for example.

> Sunt item alii qui secundum humani animi [*The human soul is already something spiritual.*] naturam vel affectum de Deo sentiunt, si quid sentiunt, et ex hoc errore, cum de Deo disputant, sermoni suo distortas et fallaces regulas figunt.[51]
>
> There are also those who form an idea of God, if indeed they have, on this point, some idea, entirely like that which they have of the nature and the manner of the being of the human soul, and as a consequence of this error, they follow in their discussions, when they speak of God, erroneous and mistaken rules.

But it is above all the third category that interests us. And it is above all with respect to them that we must retain and apply this notion of an immature and perverse love of reason whence errors follow.

> Est item aliud hominum genus, eorum qui universam quidem creaturam, quae profecto mutabilis est, nituntur tanscendere, ut ad incommutabilem substantiam quae Deus est, erigant intenionem [*They do not wish to measure the things of God by corporeal things, nor even by our own spiritual things, like our soul, for example, which is spiritual, but all the same the form of a body.*]; sed [*So, they have a desire to know divine things; but is it right desire? Is it virtuous? Could it be efficacious? This*

51 Ibid.

is another question; think for example of he who, in an army, wishes to engage in a battle: certainly the virtue which ought to be chief here is the virtue of fortitude; but if someone does not have this virtue of fortitude and is not guided except by the passion of audacity, then, before combat, he will not seem to have a problem, he will throw himself forward, and with boldness! But in the middle of combat everything goes slack; so too, here, there is at the beginning a very strong desire to seize the mystery, but...] mortalitatis onere praegravati, cum et videri volunt scire quod nesciunt [*Already this is a grave fault.*], et quod volunt scire non possunt, praesumptiones opinionum suarum audacius affirmando [*Unable to know, they nevertheless are going to affirm their presumptuous opinions with audacity; again, presumption.*] intercludunt sibimet intelligentiae vias [*This fault of wishing to appear to know what one does not know and of not being even able to discover what one does not know is grave.*], magis eligentes sententiam suam non corrigere perversam, quam mutare defensam [*They have held such an opinion and prefer not to correct it at all*].[52]

Finally, there is a third sort of man, who certainly tries to lift himself above the created world subject to change, to put all their attention on the immutable substance, which is not other than God; but led below by the weight of their mortal condition, as they wish to appear to know what they do not know, and they are not able to learn that which they do not at all know, they affirm with an excessive audacity their presumptuous opinions, and close for themselves all the ways of understanding, because they love more not changing at all their sentiment, however bad, than to change it after having held it.

52 Ibid.

We will pass over the end and go right away to Number 2.

It is once again to be understood that divine things are very difficult. This mystery of the holy Trinity is incomprehensible. It is necessary to have faith in order to know it. Now, we will see how God arranges things to lead the intellect to a better and better knowledge of divine things.

> Ut ergo ab huiusmodi falsitatibus humanus animus purgaretur, sancta Scriptura [*It is here that one sees that God is a great pedagogue and a model for the art of teaching.*] **parvulis congruens** [*Scripture allows itself to be ordered by the second matter of teaching: the understanding to which it is addressed.*], nullius generis rerum verba vitavit, ex quibus **quasi gradatim** ad divina atque sublimia noster intellectus **velut nutritus** assurgeret [*"Manuductio," as effected by God.*][53]
>
> To purify the spirit of man from all these errors, holy Scripture, **putting itself in the reach of little ones**, has not had any problem in having recourse to expressions that denote existing objects, **proper for nourishment**, if I may so speak, and for raising, **by degrees**, our intellect to sublime and divine things.

In the first paragraph, he was dealing with evils, with faults and vices that impede one from discovering divine things. To avoid them, there is at hand the teaching given by Scripture. Indeed, this uses speech borrowed from corporeal things. And rightly so. One must not measure divine things by corporeal ones, but it is still necessary to use locutions borrowed from these last in order to speak about God.

> Nam et verbis ex rebus corporalibus sumptis usa est, cum de Deo loqueretur; velut cum ait: "In tegmine alarum

53 Ibid., n. 2, p. 159.

tuarum protege me." [*God uses what we know in the natural order, and he uses it as a similitude to lead us; he counts on something that one knows in the natural order to elevate us to the supernatural order.*] Et de spiritali creatura multa transtulit, quibus significaret illud quod ita non esset, sed ita dici opus esset; sicuti est: "Ego sum Deus zelans" et "Poenitet me hominem fecisse." [*Scripture cannot speak otherwise because of our natural mode of knowing; whence, evidently, it is necessary to interpret Scriptures.*][54]

Indeed, it uses locutions borrowed from corporeal things to speak about God, for example: "Protect me with the shadow of your wings." Scripture transfers to God the sense of many words which belong to spiritual creatures to express things which were not at all what these words were made to express, but which one is obliged to render thus; for example: "I am a jealous God" and again, "I repent that I have made man."

Those who fall into the third error are those who stray the furthest. Their appetite is wholly unruly.

Unde perniciosius et inanius evanescunt, qui tertio illo genere erroris a veritate secluduntur.[55]

Thus those who fall into this third error, and turn themselves away from the truth . . . lose themselves in conceptions which are as vain and vapid as they are deadly.

And a little later:

Rebus enim quae in creatura inveniuntur, solet Scriptura divina velut **infantilia oblectamenta** formare [*because*

54 Ibid.
55 Ibid.

what is known and presented in such a proportioned way is particularly delectable] quibus infirmorum ad quaerenda superiora et inferiora deserenda, pro suo modulo tanquam passibus moveretur affectus. [*This is marvelous as an analysis of the process of teaching.*][56]

Holy Scripture ordinarily uses things existing among creatures in order to make of them, as it were, **children's playthings**, by which it excites the weak to advance, I would say, step-by-step, and with a walking proportionate to their weakness, to the research of things above, and to remove them at the same time from things below.

We will pass over the end and go to Number 3:

Proinde substantiam Dei sine ulla sui commutatione mutabilia facientem, et sine ullo suo temporali motu temporalia creantem, intueri et plene nosse difficile est: et ideo est necessaria purgatio mentis nostras, qua illud ineffabile ineffabiliter videri possit: qua nondum praediti, **fide nutrimur, et per quaedam tolerabiliora**, ut ad illud capiendum apti et habiles efficiamur, itinera ducimur. Unde Apostolus in Christo quidem dicit esse omnes thesauros sapientiae et scientiae absconditos: eum tamen quamvis jam gratia eius renatis, sed adhuc carnalibus et animalibus, tanquam parvulis in Christo, non ex divina virtute in qua aequalis est Patri, sed ex humana infirmitate ex qua crucifixus est, commendavit. Ait namque: "Neque enim judicavi me scire aliquid in vobis nisi Jesum Christum, et hunc crucifixum." Deinde secutus ait: "Et ego in infirmitate et timore et tremore multo fui apud vos." Et paulo post dicit eis: "Et ego, fratres, non potui vobis loqui quasi spiritualibus, sed quasi carnalibus. Quasi parvulis in Christo, **lac potum dedi vobis, non escam**: nondum enim poteratis; sed nec adhuc

56 Ibid.

quidem potestis."[57]

> It is then difficult to contemplate and to know well the substance of God, Who without undergoing any change still makes changeable things, and without any temporal movement, temporal things; this is why it is necessary to purify our soul in order to see this ineffable being with an ineffable sight; but while it is not yet purified, **the faith nourishes us and leads us by certain very practicable ways** and renders us apt and able to grasp it; this is what the Apostle does; even while saying that "in Christ are founded all the treasures of knowledge and wisdom," he does not present this to them who have already received, it is true, a second birth by grace, but who, being still carnal and animal, are like small children in Jesus Christ; he does not present Him to them in the divine power according to which He is an equal to the Father, but in that human weakness according to which He was crucified. Indeed, he says: "for I have made profession to know nothing among you except Jesus Christ, and Jesus Christ crucified." A little later, he continues in these terms: "Meanwhile, my brothers, I have not been able to speak to you as to spiritual men, but as to carnal persons, as to little children in Jesus Christ. I have only **nourished you with milk, not with solid food**, because you were not yet capable, and up to now you still are not.

Here is the mode of teaching. But now, how will those of the third category react when faced with this teaching that is adapted to their weakness? In the way of discovery, we have seen that they are nil, that they end up with nothing. But nonetheless, they wish to appear to know that which they do not know. And they continue, even if they have not arrived at knowing what they wished to know, to uphold their pernicious errors anyway. So,

57 Ibid., n. 3, p. 161.

they have suffered a complete lack of success in the way of discovery. But, in the way of teaching, will they be able to make up for it?

> Hoc cum dicitur quibusdam [*precisely those of the third category*] **irascuntur**.[58]
>
> When one says this to certain men, **they grow angry**.

Instead of having a conformed and correct movement of the appetite, what they feel is anger. Now, anger is a passion that causes an indisposition to the intellectual life; St. Thomas says this when he asks if mildness is the greatest virtue (a question he asks with regard to practically all the virtues). In fact, it is evident that mildness cannot be the greatest of all the virtues; it is a moral virtue, and the theological virtues have more weight. But, in a certain respect, mildness plays a role of the first order, and that respect is that it disposes the intellect in a particular way to receive teaching. Now, cases occur in which a person is so angered that he is not even "sui compos"; this already shows very clearly that anger goes against reason. But there is another effect of anger which interests us much more: it is that someone who is very strongly inclined to be irascible is going to be inclined always to contradict. And this clearly goes against docility. Such a person is defined in the line of the "Sed Contra." Thus, when the master says something, in stead of hearing it and being happy to receive it, he always finds an occasion to contradict. It is the same thing, here, for those who "irascuntur."

> Hoc cum dicitur quibusdam irascuntur, et sibi contumeliose dici putant [*If one gives them simple things, they cannot accept such a teaching; they do not have the simplicity necessary to accept it; thus, once again, "they close the intellect to the ways of knowledge," and this time, to*

58 Ibid.

those of knowledge acquired by teaching.]; et plurumque malunt credere eos potius, a quibus hoc audiunt, non habere quod dicant [*It is easy to transfer this into the natural order; there are also those who do not like to hear very simple things in the teaching of philosophy; it is not elevated enough for their taste.*], quam se capere non posse quod dixerint. Et aliquando afferimus eis rationem, non quam petunt cum de Deo quaerunt; quia nec ipsi eam valent sumere, nec nos fortasse vel apprehendere vel proferre [*These persons pose questions such that, to begin with, they would not be able to understand the answers to them and which, next, even those to whom they pose them might not be able to respond.*]: sed qua demonstretur eis quam sint inhabiles minimeque idonei percipiendo quod exigunt. Sed quia non audiunt quod volunt, aut callide nos agere putant ut nostram occultemus imperitiam, aut malitiose quod eis invideamus peritiam; atque ita indignantes perturbatique.[59]

When one says this to certain men, they grow angry, and they imagine that one speaks to them thus only due to contempt. Thus, most often, they like to think that those who make them listen to such words speak in this way because they have nothing else to say to them, and they do not imagine that it is they who are not able to understand what is said to them. Often, too, we offer reasons that, because they are not to their taste, are not those which they wanted when they question us about God. And perhaps we ourselves are neither able to grasp, nor to present them to them; which shows nevertheless to what extent they are unable and inapt to perceive what they ask. But because they do not at all hear what they want, they either figure that we are playing a game with them to disguise our own inability or that we begrudge them

59 Ibid.

knowledge, and so go away indignant and perturbed.[60]

B. The Root of Intellectual Customs

a) General Considerations: the Love of Reason, at the Beginning of Intellectual Customs

Here is a question that we have posed on the subject of this text: what is "amor" doing there? This question implies some very interesting considerations. Let us see first what is said about charity in the IIaIIae. What one finds there is perfectly evident in the natural order. St. Thomas asks: "Whether a man ought to love himself from charity?" Evidently, if St. Thomas had been content with speaking strictly of supernatural charity, this would be strictly theological. But this is not what he does. He does speak of it, but he is going to make a distinction and the first member of the distinction interests us directly.

> Dicendum quod, cum caritas sit amicitia quaedam [*This is a very special friendship, between God and man.*], sicut dictum est, dupliciter possumus de caritate loqui. Uno modo [*This is the aspect which interests us.*], sub communi ratione amicitiae. [*Let us understand not this special love, which is charity, but let us consider this common notion of friendship, which we encounter in the human and natural order.*] Et secundum hoc dicendum est quod amicitia proprie non habetur ad seipsum [*If we understand friendship (no longer thinking of charity) in the strict sense, we are not able to say that man loves himself with a love of friendship.*], sed aliquid maius amicitia. [*Man naturally loves himself, but not with a love of friendship; he loves himself with a more elevated and greater love.*] Quia amicitia unionem quandam importat, dicit enim

60 [Here ends the lecture given January 21, 1975.]

> Dionysius quod amor est virtus unitiva; unicuique autem ad seipsum est unitas, quae est potior unione. [*Unity bears on union to another and so will be at the beginning of a more powerful love.*] Unde sicut unitas est principium unionis [*The lover and the beloved make but one.*], ita amor quo quis diligit seipsum, est **forma et radix amicitiae** [*Just as unity is a principle and cause of union, so the more powerful love of which unity is the principle is the cause and root of that less powerful love which is implied in the union of two different beings, such as is friendship.*]: in hoc enim amicitiam habemus ad alios, quod ad eos nos habemus sicut ad nosipsos. [*Whence: "you will love your neighbor as yourself."; what we desire for ourselves, we can then desire for others.*] Dicitur enim in IX *Ethic*. quod amicabilia quae sunt ad alterum veniunt ex his quae sunt ad seipsum. Sicut etiam de principiis non habetur scientia, sed aliquid maius, scilicet intellectus.[61]

This last similitude is very well chosen: science is to the understanding of principles what friendship is to the love of one's self. Now, as the understanding of first principles has the upper hand over science, so love of oneself has the upper hand over friendship. Thus, man loves himself, even though one cannot say that this is properly and truly friendship, just as the intellect knows with much greater firmness the first principles though one cannot say that it knows them with science. Furthermore, just as the understanding of principles is the cause of the firmness of the knowledge of conclusions in science, so too the stronger love which one bears toward oneself is the cause and root of the love and of the friendship which one is then able to bear toward other people.

Let us see another article, in order to make things a little more precise. For we must not forget that we are always looking

61 *STh* II-II, q. 25, a. 4, c.

to determine the love of reason, about which St. Augustine speaks. This time, St. Thomas has asked the question: ought man to love his body with a love of charity? And he says "yes."

> Corpus nostrum secundum duo potest considerari, uno modo, secundum eius naturam; alio modo, secundum corruptionem culpae et poenae. Natura autem corporis nostri non est a malo principio creata, ut Manichaei fabulantur, sed est a Deo. Unde possumus eo uti ad servitium Dei, secundum illud Rom. 6, exhibete membra vestra arma iustitiae Deo. Et ideo ex dilectione caritatis qua diligimus Deum, debemus etiam corpus nostrum diligere.[62]

Let us leave aside the second aspect. If we consider our body according to its nature, it is a perfection, and so an object of love. And so man, loving himself naturally is naturally going to love his body, and *a fortiori*, his soul, and so the powers of his soul. Thus, the love of reason is a natural love.[63]

We said yesterday, touching the text of St. Augustine concerning the love of reason, that we would make some remarks with a view to trying to touch on intellectual customs at their root. Here is a little text that will better orient us along this road. St. Thomas, again referring to St. Augustine, says:

> Dicendum quod, sicut Augustinus dicit, XIV *de Civ. Dei*, **amor praecedit omnes alias animi affectiones, et est causa earum**.[64]

Here is why, in leading intellectual customs back to love, whether one considers them on the part of the intellect or on the part of the appetite, one touches on that which they have first of all. And St. Thomas gives an example:

62 Ibid, q. 25, a. 5, c.

63 [Here ends the lecture on January 21, 1975.]

64 *STh* II-II, q. 162, a. 3, ad 4.

> Et ideo potest poni pro qualibet aliarum affectionum. Et secundum hoc, superbia dicitur esse amor propriae excellentiae.[65]

However much pride also involves other aspects like presumption, it remains that love is so radical and fundamental a movement that it is the cause of all the others; one finds it everywhere.

We have seen a few texts on the love of self, taken from the treatise on charity. There is yet another very beautiful text, in this same question on charity, and this one can put us on the track to finishing this series of considerations. St. Thomas asks himself: do sinners love themselves? The response is marvelous.

> Dicendum quod amare seipsum uno modo commune est omnibus [*good or bad*]; alio modo proprium est bonorum; tertio modo proprium est malorum. [*What is important is to see well the distinction between the first and the other two taken together.*] Quod enim aliquis amet id quod seipsum esse aestimat, hoc commune est omnibus. Homo autem dicitur esse aliquid dupliciter. Uno modo, secundum suam substantiam et naturam. [*If we consider man in his nature, body and soul, this is universal: all love themselves.*] Et secundum hoc omnes aestimant bonum commune se esse id quod sunt, scilicet ex anima et corpore compositos. Et sic etiam omnes homines, boni et mali, diligunt seipsos, inquantum diligunt sui ipsorum conservationem. [*This is wholly natural: all men, whatever their dispositions might be, good or bad, desire their preservation with a natural love; but that is not what interests us here.*]
>
> Alio modo dicitur esse homo aliquid secundum principalitatem [*One can consider in men something principal.*]: sicut princeps civitatis dicitur esse civitas [*in the sense in which the prince represents the common good of the whole city*]; unde quod principes faciunt, dicitur civitas facere. Sic autem non omnes aestimant se esse id quod sunt. Principale enim in homine est mens rationalis, secundarium autem est natura sensitiva et corporalis, quorum primum apostolus nominat interiorem hominem, secundum exteriorem, ut patet II ad *Cor*. 4. Boni autem aestimant principale in seipsis rationalem naturam, sive interiorem hominem, unde secundum hoc aestimant se esse quod sunt. Mali autem aestimant principale in seipsis naturam sensitivam et corporalem, scilicet exteriorem hominem. [*Thus the good man loves principally that which is most perfect in him, namely, his rational part; the two do not love a man in the same way, because they do not love the same thing in man.*] **Unde non recte cognoscentes seipsos, non vere diligunt seipsos**.[66]

A love which will be in the least unruly will be at the principle of a pile of faults, vices, and, in what concerns us, of faults or vices concerning knowledge itself, like presumption, indocility, precipitation, etc.

What is important here, is this: *not knowing themselves truly, they do not love themselves truly*.

> Unde non recte cognoscentes seipsos, non vere diligunt seipsos, sed diligunt id quod seipsos esse reputant. [*They love that which they believe they are, given their disposition; the man who is morally indisposed and who follows the inclinations of his sensible appetite follows an apparent good, which he wrongly believes to be that which is a principal in him, while, on the contrary.*] **Boni autem, vere cognoscentes seipsos, vere seipsos diligunt.**[67]

65 Ibid.

66 Ibid., q. 25, a. 7, c.

67 Ibid.

Here we have exactly what we need. When we speak about intellectual customs and about good intellectual customs, we must lead back these good intellectual customs, with regard to that which is on the side of the intellect, to this expression: *to know reason truly*; and for that which is on the side of the appetite, to this other expression: *to love reason truly*.

Now we see better the profundity of St. Augustine's remark: "Amor immaturus et perversus rationis," as the cause of error.

b) More Precise Considerations: to Know and Love Reason Well

Introduction

Evidently, this will become a little difficult, if we wish to enter into more precision, for there is interdependence between these two aspects. Thus, sometimes one knows badly because one loves badly: when one is indisposed, his judgment is more or less corrupted by this very indisposition. But, without wishing to say everything here on the subject, we can all the same define intellectual customs a little in their root, both from the point of view of the intellect, and from the point of view of the appetite. This is what we are going to seek to see well at this point. We will examine first of all what it is to know reason well, which is opposed to being mistaken about it. We could use some examples, but it is not a question of entering into the details. For the moment, let us cite Descartes, Kant, and Hegel: they did not truly conceive what reason is and this was at the source of their serious errors.

We must note that when we wish to analyze, as we now wish to do a little, what knowing and loving reason ought to be, the simpler of the two is what concerns the knowledge of reason. For, on this subject, one can make more absolute considerations. In the other case, however much we wish to attach to love this entire affective side of intellectual customs, we find ourselves settling on a principle, one finds himself before all the contingency

and the variety of moral matters. This is why, in a course, even a detailed one, which bears on intellectual customs principally from the affective side, the disciples ought to be warned that one is trying to delineate only the principal movements of the appetite, and not all of them: in other words, we cannot dream of giving an exhaustive course on this; this is absolutely impossible. But one must at some moment rely on the experience the disciple acquires with the general principles given to him.

Indeed, the number of movements of the appetite that dispose or cause indisposition to the life of the intellect is extraordinary: the reason for this is that all the passions, in a sense, may be involved.

Let us remark that a good principle of order in such a course would be to examine the role of the different passions and virtues as they are attached to the four cardinal virtues. Certainly, these latter interest us only in the measure in which they concern knowledge. It would not be a question, for example, of temperance in the proper sense; temperance, in fact, does not truly concern intellectual customs, insofar as it ought to moderate the passion that bears on the delights of touch. But here there will be a part of temperance, a part one can call potential, because it does not bear on the principal matter of temperance, because it bears on a matter that falls away from this principal matter. For whatever the matter on which a virtue bears, so long as it is a question of restraining and of moderating, it will be classed under the virtue of temperance, and called a potential part of it. At the same time, to give another example, every virtue that consists in strengthening the appetite will be classed, on the contrary, under the virtue of fortitude, and will be called a potential part of fortitude. And again, the same thing is true for that which the other cardinal virtues treat. St. Thomas clearly expresses the above when he arranges the virtue of humility under that of temperance.

> Dicendum quod, sicut supra dictum est, in assignando partes virtutibus praecipue attenditur similitudo quantum ad modum virtutis. Modus autem temperantiae, ex quo maxime laudem habet, est refrenatio vel repressio impetus alicuius passionis. Et ideo omnes virtutes refrenantes sive reprimentes impetus aliquarum affectionum, vel actiones moderantes, ponuntur partes temperantiae. Sicut autem mansuetudo reprimit motum irae, ita etiam humilitas reprimit motum spei, qui est motus spiritus in magna tendentis. Et ideo, sicut mansuetudo ponitur pars temperantiae, ita etiam humilitas.[68]

Thus, then, what characterizes temperance, above all, is that it moderates and restrains the appetite. And since the movement of the appetite toward the delights of touch and the things of generation, because they are so natural, is that which is most difficult to restrain, it constitutes as it were the principal matter of temperance. But we will be speaking all the same of temperance, using the title of potential parts, with a virtue that consists in refraining the appetite in less difficult matters, as, for example, in what concerns the desire to know.

But in any case, to look through these virtues, the potential parts of the four cardinal virtues that have some relation with the application of the intellect to study, would constitute an enormous matter and could not be done exhaustively. At the same time, with regard to what concerns the side of intellectual customs that touches the intellect more directly, it is relatively easy to give some fundamental rules according to which one would know well enough how to govern his intellect.

Let us try to say some more precise words about each of these two aspects of intellectual customs.

68 *STh* II-II, q. 161, a. 4, c.

What It Is to Truly Know Reason

So, let us speak about knowing reason according to truth, of knowing truly, "recte", "intelligentes operationes."

1) The Fundamental Rule

"Sensus propter intellectum," the sense is for the intellect. The sense is the principle of the movement of the intellect. This is very curious because, on the side of affectivity, the inverse is true: it is the will that is the principle of the sensible appetite, which can and ought to govern and direct; it is the sense that is naturally submitted to the will. Now, it is not the same thing when one looks at the relation between sense and intellect. The sense is so necessary as a principle of the intellect that, for example, someone who lacked the common sense in a radical way would find himself, in the life of his intellect, before an absolutely incurable obstacle. It is the sense that is the principle of intellect in this way, that the intellect must necessarily receive from the sense. Now we are entering completely into the subject of the customs of the intellect: because it is thus its principle, *sense imposes limits on intellect, limits which the intellect cannot pass*. This does not mean to say that one ought not or cannot elevate oneself above sensible knowledge, no! But this intellectual knowledge, to which our intellect comes and which is, in fact, above sensible knowledge, finds itself singularly limited by the fact that our intellect is the faculty of a soul that is the form of a body and thus must pass through the senses, etc. From this nature of our intellect it unfolds that the principle that it ought to find in sense is for it a *permanent* principle. One cannot then go outside certain limits beyond which the senses are not able to serve as a principle.

There are many texts that speak about this, about this idea of the permanent role of principle played by the sense. To read

the principal ones, it would be necessary to go, for example, to the *Commentary on the Treatise on the Trinity*, to Question Six, when St. Thomas speaks of phantasms and asks himself whether, with regard to divine things, one must cut oneself off from the imagination. But there is also another excellent, but less known, text. It is truly worth the effort of reading it. It is a question about Adam. Adam was endowed with preternatural gifts, and, among others, with a wholly exceptional intellect. Well, St. Thomas poses this question: in his state of innocence, did Adam know the angels in their essence? He poses the same question first with regard to God. But this, evidently, is easy to reject. But in the case of the angels, this poses a certain difficulty. This is interesting also, because already Aristotle, in the *Posterior Analytics*, says that one cannot have a science (a natural science, clearly) that would have separated substance as its subject. And the reason is always the same, the limits imposed by sense.

> Scientiae speculativae non sunt de ipsis essentiis substantiarum separatarum. Non enim per scientias demonstrativas possumus scire quod quid est in eis; quia ipsae essentiae harum substantiarum sunt intelligibiles per seipsas ab intellectu ad hoc proportionato; non autem congregatur earum notitia, qua cognoscitur quod quid est ipsarum, per aliqua priora.[69]

But here is how St. Thomas responds to a question posed with regard to the knowledge of Adam concerning angels. He says that one must distinguish between the knowledge of the "whether it is" and of the "what it is" of the angels. With regard to the "whether it is," even we can come to it; *a fortiori*, Adam. This "whether it is" of the angels can be known both by natural knowledge and by revelation. And so, he says this about Adam: "multo familiarius et plenius..."

69 *In I Post. An.*, lect. 41, n. 363.

> Dicendum, quod duplex est cognitio qua aliquid cognosci potest. Una qua cognoscitur de re **an sit**; et sic Adam in statu innocentiae angelos cognoscebat et naturali cognitione, et divina revelatione, multo **familiarius et plenius** quam nos cognoscamus.[70]

What we know, imperfectly and feebly, Adam knew, much better in his first state.

But with regard to the knowledge of the "what" of angels, it remained impossible for Adam. This point, and the way in which St. Thomas proceeds here, is what is important for us. He speaks first of all of the natural knowledge of Adam.

> Quod autem cognitione naturali angelos per essentiam non cognoverit, ex hinc potest certum esse.[71]

It is because, says St. Thomas, there must be a correspondence between the passive ability and the active ability. Now then, the faculty that plays a role of passive ability in us in knowledge is the possible intellect and the active ability is the agent intellect.

> In nullo enim genere potentia passiva naturalis se extendit ultra id ad quod se extendit potentia activa eiusdem generis; sicut potentia passiva in natura non invenitur nisi respectu eorum ad quae aliqua potentia activa naturalis se potest extendere, ut Commentator dicit IX *Metaphys*.
>
> In animae autem humanae intellectu duplex potentia invenitur: una quasi passiva, scilicet intellectus possibilis; et alia quasi activa, scilicet intellectus agens.
>
> Unde intellectus possibilis naturaliter non est in potentia

70 *Q. D. de Veritate*, q. 18, a. 5, c.
71 Ibid.

ut in eo fiant nisi ea quae intellectus agens natus est facere: quamvis per hoc non excludatur quin aliqua alia in eo fieri possint operatione divina, sicut et in natura corporali per operationem miraculi.[72]

Here now is what he says. What is the action of the agent intellect? What is the object of its action?

Actione autem intellectus agentis non fiunt intelligibilia ea quae sunt de seipsis intelligibilia [*What is in itself already intelligible cannot be rendered intelligible by the agent intellect; the agent intellect is going to render intelligible what is not intelligible except in potency.*] Cuiusmodi sunt essentiae angelorum; sed ea quae sunt de seipsis in potentia intelligibilia, qualia sunt essentiae rerum materialium [*This is why the object of our intellect is the quiddity of material things.*], quae per sensum et imaginationem capiuntur. Unde in intellectu possibili [*Because of this wholly limited action of the agent intellect, which is not able to have for an object beings which are purely and simply intelligible, like the essence of angels. But the possible intellect is limited in such a way that it cannot know immediately anything but the essence of corporeal things; it will also come, though mediately, to the knowledge of that which is intelligible, but only with regard to its "whether it is," and no further, except a certain "what it is not," of course; but in this context we speak of "what it is" in a completely strict sense; thus, this limited action of the agent intellect being given, we can now see a little the sorts of intelligible forms that are impressed on the possible intellect; these go together; it is the agent intellect which is the efficient cause of the intelligible form, not of the mental word, no!, but of the intelligible form, which will be then actuated by the possible intellect.*] naturaliter non fiunt nisi illae species intelligibiles quae sunt a phantasmatibus

72 Ibid.

abstractae [*in such a way that if—per impossibile, of course, for this would be against divine wisdom—the intelligible angelic form were impressed on our intellect, we would never be able to use it; in our case, the conversion, that is, the constant return to the phantasms, is necessary*]. Per huiusmodi autem species [*namely: "species which are extracted from phantasms"; by these species, it isn't possible to come to see the essence of separated substances, because it is wholly disproportionate to them*], impossibile est pervenire ad intuendam essentiam substantiae separatae, cum sint improportionabiles, et quasi alterius generis [*If we compare our intelligible forms to the intelligible forms of separated substances, they are like two sorts of forms which differ with regard to their genus.*] cum ipsis essentiis spiritualibus.

But let us look at the rest. What we have said touches on the restrictions that concern natural knowledge.

Et ideo naturali cognitione homo non potest pertingere ut cognoscat angelos per essentiam.[73]

But by revelation, by a supernatural knowledge now, could Adam have grasped and seen the essence of angels? Not even this! And there is the crucial point.

Similiter etiam nec Adam cognitione gratiae hoc potuit.[74]

And here we see an utterly fundamental distinction.

Cognitio enim gratiae est elevatior quam cognitio naturae. [*Let us concede that supernatural knowledge is more elevated than purely and simply natural knowledge.*] Sed haec elevatio potest intelligi vel quantum ad intelligibile

73 Ibid.
74 Ibid.

> [*the object*], vel quantum ad modum intelligendi.
>
> Quantum ad intelligibile quidem per gratiam cognitio hominis elevatur etiam sine mutatione status [*In the state of union of the soul and the body, we are able to have, by revelation, a more elevated knowledge, that is, to attain to more elevated objects through faith; clearly, there will be no evidence, but there will be a very great certitude; and this without the state of man having been changed; the state of the union of a soul in the body ("status viae") is opposed to the "status patriae."*] sicut cum per gratiam fidei elevamur ad cognoscendum ea quae sunt supra rationem; et similiter etiam per gratiam prophetiae. Sed [*This is what must be noted; let us recall what was said above: "sense imposes limits, which are impossible for reason to overcome or to pass," whether it is a question of natural knowledge or of supernatural knowledge.*] quantum ad modum cognoscendi non elevatur humana cognitio, nisi status mutetur.[75]

In the state of separation, yes; but not in the state of union.

> Modus autem quo naturaliter cognoscit intellectus est ut **a phantasmatibus accipiat**, ut dictum est, in isto art. Unde nisi homo in alium statum mutetur, oportet quod etiam in cognitione gratiae, quae est per revelationem divinam, **semper intellectus inspiciat ad phantasmata**.[76]

To know reason well is to know and respect these limits.

This teaching, this knowledge of reason, and particularly of its mode, has consequences as much for the way of discovery as for the way of teaching. When intellect is exercised and advances in its course, it can never do this completely independently of sense. One could sum this up here in the expression

75 Ibid.
76 Ibid.

of Dionysius, in the *Divine Names*: "Ratio quae nutritur sensibus."[77] This is a marvelous expression. Given its nature, its natural mode, our intellect must be nourished by the senses. But, it must be repeated, this is true both of discovery and of teaching. And it is necessary to attach to this everything that concerns "manuductio."

To finish this up, let us cite a precept of St. Thomas that manifests this. It is in an opulsculum entitled, *Epistola de modo studiendi*.

> Quia quaesisti a me, in Christo mihi carissime ioannes, qualiter te studere oporteat in thesauro scientiae acquirendo, tale a me tibi traditur consilium ["*Consilium*" *concerns a precept.*], ut per rivulos, **non statim in mare**, eligas introire. [*One must not on the first try attempt to attain the high seas; it is necessary first and for a long time to exercise in small rivers.*] Quia per faciliora ad difficiliora oportet devenire. [*Some people despise little rivers, simple notions, and wish to attain the high seas right away.*][78]

2) Aristotle, the Model of a Well-Measured Knowledge of Reason

Again, Aristotle is a model here. Everything which we have said is exactly the procedure which Aristotle constantly follows. Let's look at two examples. The first will also be the example which we spoke about with regard to a good commentary, that which diminishes the distance between the great written word and the oral word.[79] St. Thomas is speaking. St. Thomas indicates why Aristotle has rejected the position of Plato concerning the separated ideas. Still, we must be warned right away that despite what we are going to say, Plato says some magnificent things

77 *In Div. Nom.*, ch. 7, lect. 1, n. 704.
78 St. Thomas, *Epistola de modo studendi*.
79 See the texts from Fabre, above.

and must not be classed with the Hegels and the Descartes. But he did commit certain faults. For example, Aristotle reproaches Plato for the use that he makes of metaphors. And for this St. Thomas says about Plato that, from this point of view, "habuit malum modum docendi," because indeed these metaphors are hidden from us, and we do not see too well what he wishes to say in using them. Now, to teach but not make oneself understood is a serious enough fault. But Plato sins much more gravely in asking about the separated ideas. And here is how St. Thomas comments on the idea of Aristotle about the subject. First of all, St. Thomas divides the words of Aristotle.

> Primo enim disputat contra ipsam positionem Platonis. Secundo contra rationem ipsius.[80]

So in what follows, he is going to show that Plato had reasons for positing the separated ideas, for example, with a view to approaching certain knowledge of sensible things, etc. But what interests us is what is said against the position itself. Aristotle is extremely brief. Right away he gives a similitude drawn from numbers in order to show that Plato has proceeded badly. But St. Thomas has a very happy expression, which amounts to this: he says that Plato, in positing the separate ideas, has imagined ("invenit") *new beings* ("nova entia").

Fabre said: a simple word more, which would have thrown light for us, and which the oral word could add, the book does not speak. But an excellent commentary can clarify a primary text for us, a text which is from a great master, and so very concise, too concise for us.

> Dicit ergo primo, quod Platonici ponentes ideas esse quasdam substantias separatas, in hoc videntur deliquisse, quia cum ipsi quaerentes causas horum sensibilium

80 *In I Metaph.*, lect. 14, n. 208.

entium, **praetermissis sensibilibus** [*Here is the fault!*] adinvenerunt quaedam alia nova entia aequalia numeris sensibilibus. [*The separated ideas would be equal in number to the sensible things.*] Et hoc videtur inconveniens [*this abandonment ("praetermissis"). We are looking for knowledge of sensible things, but we are going off to look for a principle which we have imagined in place of considering the sensible things in their reality*]: quia qui quaerit causas aliquarum rerum, debet ipsas certificare, non alias res addere, ex quarum positione accrescat necessitas inquisitionis. [*It is already not easy; if we imagine and add other new beings, we increase the difficulty uselessly; for knowing sensible things is accomplished through principles which are in them.*] Hoc enim simile est ac si aliquis vellet numerare res aliquas, quas non putet se posse numerare sicut pauciores, sed vult eas numerare multiplicando eas per additionem aliquarum rerum. Constat enim quod talis stulte movetur, quia in paucioribus est via magis plana, quia melius et facilius certificantur pauca quam multa. Et numerus tanto est certior [*Since we are speaking about number, the number is more certain in proportion as it is smaller.*] quanto est minor, sicut propinquior unitati, quae est mensura certissima. [*For unity is the principle of certitude in number; so, the better it is reduced to unity, the more sure it is.*] Sicut autem numeratio est quaedam rerum certificatio quantum ad numerum, ita inquisitio de causis rerum est quaedam certa mensura ad certificationem naturae rerum. Unde sicut numeratae pauciores res facilius certificantur quantum ad earum numerum, ita pauciores res facilius certificantur quantum ad earum naturam [*and not by having recourse to separate substances*]. Unde cum Plato ad notificandum res sensibiles tantum, multiplicaverit rerum genera, adiunxit difficultates, **accipiens quod est difficilius ad manifestationem**

facilioris, quod est inconveniens.[81]

Plato takes as a principle something that is more difficult than that which he has to explain. This is the reverse of what must be done. This procedure of Plato is not, to summarize, in confomity with a "ratio quae connutritur sensibus." Aristotle would never proceed in such a fashion.

Here is another example, which is perhaps the best one to give. Aristotle, at the end of his *Metaphysics*, asks a question about the number of the separated substances (though we will limit ourselves on this question with some expressions drawn from an opusculum of St. Thomas). He has attained knowledge of separated substance with regard to whether it is; now he tries to pose the problem of their number. But one ought to say right away that this is a problem that is absolutely insoluble by natural roads. One might say about this problem what Aristotle himself said about the problem of the eternity of the world, in the *Topics*: it is one of the problems for which there is no argument. One cannot resolve it. But we can nevertheless try to say something about it. From this point of view, Plato and Aristotle proceed again by two clearly opposed roads.[82]

St. Thomas wrote an opusculum entitled *On Separated Substances*. It is mostly in the second chapter that he speaks of the opinion of Aristotle; concerning Plato, mostly in the first chapter.

> Cum enim apud antiquos naturales poneretur ab hominibus certam rerum veritatem sciri non posse, tum propter rerum corporalium continuum fluxum, tum propter deceptionem sensuum, quibus corpora cognoscuntur, [Plato] posuit naturas quasdam a materia fluxibilium rerum separatas, in quibus esset veritas fixa; et sic eis

81 Ibid.

82 [Here ends the lecture given on January 22, 1975.]

> inhaerendo anima nostra veritatem cognosceret.[83]

But here is an expression that, at first sight, is surprising enough. St. Thomas, to characterize the two opinions (for it is a question of opinions in the strict sense, due to the fact that it is a problem insoluble by our natural knowledge), says that the position of Aristotle "est certior sed minus sufficiens."[84] It is necessary to interpret this. Think a bit about the proofs which St. Thomas gives for the existence of God at the beginning of the *Summa Theologiae*: there are five ways, and the first is most certain because it is based on movement. The others are more difficult, for example, the one that relies on the "gradus essendi." The first, then, is most certain because of the principle on which it relies, which is most certain to us. This is also what St. Thomas says here about the opinion of Aristotle.

> Aristoteles manifestiori et certiori via processit ad investigandum substantias a materia separatas, scilicet per viam motus.[85]

This is why it is more certain. But why is it less sufficient? St. Thomas says in the *Summa Theologiae* that Aristotle was obliged ("coactus fuit"), given the nature of the human intellect (it is always the same reason), to proceed thus and by relying on movement. There is no other road. But meanwhile, by basing oneself on movement, one finds oneself limiting the number of separated substances to the number of celestial bodies. And this is less sufficient, one cannot do this. And so this is why St. Thomas himself will say, after having produced all this discourse about the problem:

83 *De Substantiis Separatis* (Vives edition, p. 156).

84 Ibid., p. 162.

85 Ibid., p. 159.

> Haec autem Aristotelis positio **certior** quidem videtur, **eo quod non multum recedit ab his quae sunt manifesta secundum sensum**; tamen **minus sufficiens** videtur quam Platonis positio.[86]

The thing is that Plato, in order to represent things for himself, is detached from the sensible.

Meanwhile, it is interesting that at the end of Chapter 2, St. Thomas analyzes the propositions of Aristotle: this is probable, this is not necessary, etc., and finally he says this:

> Et hoc praesentiens Aristoteles [*Here, one sees that Aristotle knew precisely that his position did not go beyond probability.*] non induxit hoc quasi necessarium, sed quasi probabiliter dictum. Sic enim dixit antequam praedictam rationem assignet, enumeratis caelestibus motibus, quare substantias et principia immobilia et sensibilia tot rationabile est suscipere: necessarium enim dimittatur fortioribus dicere [*It belongs to stronger men than me to speak about these things in a necessary way.*], non enim reputabat se sufficientem ad hoc quod in talibus aliquid ex necessitate concluderet.[87]

So there are two examples for us.

2. What It Is to Love Reason Truly

Let us now go on to the affective side of intellectual customs.

1) A Model of the True Love of Reason

And right away, let us remark that, just as Aristotle is a model with regard to intellectual customs, in the line of the way which ought to be followed by the intellect as a reason which is nursed

86 Ibid., p. 162.
87 Ibid., p. 164.

by the senses, and so which ought never to be detached from the senses as from its foundation and its principle, in the same way, Aristotle is again a model on the affective side.

Let us see, for example, what he says in the treatise *On the Soul*, after having examined the opinions of his predecessors and on taking up a new problem.

> Oportet iterum quasi redeundo a principio determinare veritatem.[88]

Now, this is something. Because of the difficulty of the subject, for the "what" of the soul is very difficult, it is necessary rather *to try* to speak of it than to sin by presumption on the subject of the truth to be discovered. Aristotle does not wish to sin by presumption and make show of of that self-assurance that is tied to presumption. In this matter one cannt proceed with self-assurance and show too much hope.

Let us go to the treatise *On the Heavens* now. It is a little curious. The subjects to be determined in the treatise are far enough from the senses: the stars. Above all, Aristotle was not in possession of adequate instruments to carry on this study (the telescope, etc.). So he proceeds with many precautions. And at a certain moment, St. Thomas reports this:

> Dicit ergo primo quod, cum circa stellas sint duae dubitationes de quibus rationabiliter quilibet potest dubitare, tentare debemus dicere circa istas dubitationes id quod nobis videtur; ita scilicet quod nos reputemus dignum esse quod promptitudo hominis considerantis huiusmodi quaestiones, magis debeat imputari verecundiae, idest honestati vel modestiae, quam audaciae, idest praesumptioni; si tamen ille qui huiusmodi dubitationes

88 *In II De Anima*, lect. 1, n. 211: St. Thomas goes on to say in the next sentence: "Quod quidem propter suam difficultatem magis oportet tentare, quam securitatem de veritate invenienda praesumere."

> considerat, diligat etiam parvas sufficientias, idest parum sufficientes rationes, ad inveniendum de illis rebus, de quibus habemus maximas dubitationes; et hoc propter desiderium quod quis habet ad philosophiam, ut scilicet eius principia stent, idest firma permaneant.[89]

And this in commenting on the following passage of Aristotle:

> There are two difficulties, which may very reasonably here be raised, of which we must now attempt to state what seems to be the case; for we regard the zeal of one whose thirst after philosophy leads him to accept even slight indications where it is very difficult to see one's way as a proof rather of modesty than of over-confidence.[90]

One should know that "verecundia" and "honestas" are the two integral parts of temperance, the proper mode of which is to restrain, to moderate. And St. Thomas, in this regard, uses the word modesty. Often times, we imagine that modesty bears only on exterior matters, but it is much more vast than that. Even "studiositas" is one of the parts of modesty. In sum, the desire to know the stars is a desire which might be great (because, after all, the stars are really something—for the ancients, this was an object of high contemplation), but which will be kept in order by modesty.

2) The Virtues That Rule the True Love of Reason

We have spoken above of "curiositas." We can add that this is the vice into which those fall who do not love reason according to truth, who despise sense, who do not wish to hang on to sense, and particularly according to the fourth mode which St. Thomas describes when he enumerates the ways in which one can sin by "curiositas" against "studiositas":

89 *In II De Caelo*, lect. 17, n. 450.
90 Aristotle, *On the Heavens* 2.12, 291b24 (Oxford translation).

> Quarto modo, inquantum aliquis studet ad cognoscendam veritatem supra proprii ingenii facultatem. [*Someone who seeks to know without being nourished on the senses is thus "supra facultatem"; it is as if one wished to go beyond the limits imposed on our intellect by its dependence on the senses.*] Quia per hoc homines de facili in errores labuntur. [*Men very easily fall into error when they pretend, like this, to broach questions which go beyond them, and, above all, in a way which is beyond them.*][91]

It is established that "studiositas" is a virtue that applies the intellect well for knowing this or that, in this way or that way. So too it is the principal virtue ruling a healthy love of reason and thus appropriate intellectual customs.

But there are also other virtues that ought to be taken into account. For instance, humility. Humility clearly consists in knowing one's own weakness, one's own deficiency. Whence, St. Thomas says:

> Ex consideratione sui defectus aliquis insufficientem se existimet ad maiora.[92]

Of course, it is necessary to pay attention to the other excess and not to fall into stupor; all the same, it represses the movement of presumption to take into account that it is not easy to know this thing or that, which [presumption], in matters of knowledge, is opposed to good intellectual customs.

In another article, we have this:

> Sicut autem mansuetudo [*Mildness also enters into the account and plays a large role in regard to appropriate intellectual customs.*] reprimit motum irae, ita etiam humilitas reprimit motum spei [*Hope is necessary, the*

91 *STh* II-II, q. 167, a. 1, c.
92 Ibid., q. 161, a. 6, c.

> *irascible is necessary, but with due moderation; the irascible ought not to be left to itself, without a governor; it ought to be governed by reason; it is because of all this that the matter of intellectual customs is so vast*.], qui est motus spiritus in magna tendentis.[93]

It is always a question, in general, of the moderation of desire itself in the matter of knowledge. One comes again, then, to "studiositas": to grasp this virtue, and all those which are connected to it by their root, it is important to be able to reduce this "studiositas" to that love of which St. Augustine speaks, but about which he speaks in an opposed way, namely, by the expression: "amor immaturus et perversus rationis."

Another remark with regard to intellectual custom on the affective level: they are situated in the line of *the application of the intellect*, for in the line of *its specification*, the intellect is at home. This is very important to note. Another thing: it is certainly not good or bad customs of the intellect that are going to impede adherence to first principles (at least interiorly; exteriorly, that is, in words, this could happen in certain cases). But these customs will have all the more influence as one goes further from what is thus assured by nature and as one advances in concretion. There are then dispositions which concern knowledge, favorable or not, and *a single affective indisposition can compromise the entire speculative life*. Above all, clearly, if it is a question of a fairly grave fault: pride, for example. Pride is an enormous obstacle; it makes one unwilling to receive anything from anyone.

There is still another thing to be drawn from another text, in the *Disputed Questions on Truth*, when St. Thomas asks himself, "utrum angelus, alium illuminando, eum purget?" It is a question of illumination between angels, which comes back to teaching, fundamentally. Must there be in this case, then, a

93 Ibid., a. 4, c.

certain purification? What is interesting to us in this article is the remark that St. Thomas makes to the effect that he who learns is sometimes in error, but sometimes, without being in error, he presents obstacles from the affective side.

> In acceptione igitur cognitionis quantum ad terminum a quo invenitur praedicta diversitas, quia quandoque in accipiente scientiam praeextitit error contrarius scientiae acquirendae; quandoque vero **dispositiones contrariae, sicut impuritas animae, aut immoderata occupatio circa res sensibiles vel aliquid aliud**; quandoque vero praeexistit solummodo cognitionis privatio vel negatio.[94]

St. Thomas only indicates two of these indispositions, but he says: "or something else."

Again, in the *Summa Contra Gentiles*, Saint Thomas shows that it was morally necessary that man receive from God by revelation certain truths which are of themselves accessible to reason, but which, for the great majority of men, are very difficult and would demand too much time and study. And there, he gives what is of a nature to indispose one, or to make one not so much favor the study of speculative things. And there are, among them, things which are not of themselves evil. He speaks, for example, of "res familiaris," that concern one who is married and still wishes to lead a speculative life. At certain moments, it is sure that virtue will demand that the "res familiaris" come before the speculative life. And if the will would still apply the intellect to studying, this would be evil. It remains, then, that "res familiaris," as such, do not favor the speculative life, above all, if there are added to them complex problems, notably about education, for example. A man will thus find himself turned away from the speculative life.

This is an example, but there are others. St. Thomas also

94 *Q. D. de Veritate*, q. 9, a. 3, c.

notes laziness.

To conclude, one is less surprised at the small number who lead a fruitful speculative life when one sees how extraordinary is the number of good dispositions which must be united to achieve it.[95]

* * * * * *

Execution of the Intention

The prooemium being finished, we now pass on to the carrying-out of the intention. First of all, here are some considerations to help us better appreciate the quality of the order of the carrying-out of the intention, the quality of the plan.

In the *Summa Theologiae*, St. Thomas devotes a question to pleasure. In this question, article 8 is, among others, very important because St. Thomas asks himself here whether wonder is a cause of pleasure. And, in fact, since wonder is proper to man, and is attached to man as such, we see in the body of the article that the word "pleasure" is replaced by "to rejoice" {gaudere}, which designates a pleasure proper to man. In Article 8, then, if we join it to the Response to the Third Objection from Article 1, we find St. Thomas presenting to us three causes of joy for the intellect. When one finds all three in a teaching, one can see in this fact a sign that the teaching is not so bad.

Let us now see, first of all, what is to be drawn out of Article 8. A first cause of joy or pleasure for the intellect is found in wonder. That which causes wonder is pleasurable, because of the hope of knowing which is joined to the desire, which the wonder implies.

> Est autem admiratio desiderium quoddam sciendi, quod in homine contingit ex hoc quod videt effectum et ignorat causam, vel ex hoc quod causa talis effectus excedit

95 [Here ends the lecture given January 22, 1975.]

> cognitionem aut facultatem ipsius. Et ideo **admiratio est causa delectationis** inquantum habet adiunctam spem consequendi cognitionem eius quod scire desiderat. Et propter hoc omnia mirabilia sunt delectabilia.[96]

Within the same article, one finds another text, touching another cause of joy for the intellect.

> Gaudet enim anima in collatione unius ad alterum. [*Intelligence finds its joy in comparing one thing to another.*][97]

And here, it is a question of something much larger. It is a question in general of order. *The intellect finds its joy in order.*

Looking to Article 1, where it is asked whether operations are the cause of pleasure, St. Thomas affirms, in responding to an objection, that *proportional operations are pleasurable*.

> Operationes sunt delectabiles, inquantum sunt proportionatae et connaturales operanti.[98]

In the plan of our course, we will find these three causes of joy for the intellect. This can aid in judging the value of this plan as an order of teaching.

Very briefly, before looking at the famous text of the *Sentences* that will be our point of departure, here is an idea of this plan.

The execution of the intention will include two parts. In the first part, logic is compared to the science of nature in terms of their likeness. Let us recall two of the instruments that Aristotle enumerates at the beginning of the *Topics* in order to attribute them to the dialectician: the discovery of likenesses and the discovery of differences. Now since, as we have seen,

96 I-II, q. 32, a. 8, c.
97 Ibid.
98 Ibid., a. 1, ad 3.

inquisition (or dialectic) forms a part of investigation, one can say that in investigation, insofar as one has not yet judged why a thing is so by basing oneself on the proper cause, it is necessary to be content with the instruments of investigation, and thus likenesses and differences play an enormous role. And so, in the first part, we'll see a text (taken from the *Sentences*) which is going to bear principally on the likeness between logic and the science of nature.

And this is already a "mirum,"[99] because in all the known texts, it is rather a question of opposing these two disciplines. Aristotle and St. Thomas always oppose "physice loquendo" and "logice loquendo." For those who know the texts of St. Thomas, think for example of the *Commentary on the Treatise of Boethius on the Trinity*, where St. Thomas says that for the "physicus," corruptible and incorruptible "differunt genere," while for the "logicus," "conveniunt genere." So, then, while we are habituated to the two disciplines being presented to us as opposed, here, now, we speak of a likeness between them. This is an object of great wonder.

We have said, then, that in the first part we will see the likeness between logic and the science and nature. And this likeness—we see already a "collatio"[100] here, for there is already a "collatio" when one compares logic to the science of nature—is as it were yet better manifested by something opposed, namely, grammar. We find ourselves seeing better that logic and the science of nature are alike when we oppose them to grammar. And all this is given to us, very briefly, in the text from the *Sentences* that we are going to look at very soon.

But so that we might have a better view of the whole plan of the course right away, let us add that, as the second part, we will see the difference between logic and the science of nature, the difference between rational science and natural science. So,

99 The first cause of pleasure for the intellect.

100 The second cause of pleasure for the intellect.

broadly speaking, if we take into account the whole discourse comprehended in the execution of our intention, we are going to go from likeness to difference. And this is a very easy order to see because it is proportioned.[101]

So we have order, we have a great "mirum," principally in the first part, and the order is proportioned, manifest. So this is a plan that includes the three causes of joy for the intellect which we have mentioned above.

The plan, then, is simple enough. After having seen that in which the science of nature and logic belong together, we will see that in which they are distinguished. Let us recall that the intention is the subject of logic, that is to say, that the end of the course is to lead to the most clear understanding possible of the subject of logic. Now, we will define this subject after having seen the opposition or the distinction between logic and the science of nature. Nevertheless, the likeness is absolutely fundamental, as we will see.

First Part
The Likeness between Logic and the Science of Nature

A. The Basic Text, Taken from the Sentences

Let us see first of all this text from the *Sentences* that we have been speaking about for some time. We said that this is a little text "lost" in the *Sentences*. That is because it concerns a response to a question which in no way concerns logic. It is a question of punishment, and of the division between punishment and fault, notions, then, which are very far from logic.

Let us leave aside the objection and content ourselves with the response, which is self-contained.

Passio potest sumi dupliciter; vel [*Here is the likeness.*]

101 The third cause of pleasure for the intellect.

> **quantum ad naturam rei** prout logicus et naturalis passionem considerat [*Here is the wonder: how is it that logic considers the nature of passion?*], et hoc modo non oportet omnem poenam passionem esse [*Considered in this sense, it is not necessary that every punishment be a passion; for example, being punished and not seeing God is not a question of sensible pain.*], sed quamdam poenam, scilicet poenam sensus [*Because passion is attached to movement, from this point of view, it cannot go beyond sensible being; man is among mobile beings.*]; vel [*Now here is what is opposed.*] **quantum ad modum significandi** [*Here clearly is the opposition: "quantum ad naturam rei," on one hand, "quantum ad modum significandi," on the other; at the same time, one must note—in passing, for we do not wish to enter into this right now—"modus significandi," as we are going to read in a moment, designates well the subject of grammar when one wishes to explain that in which the subject of grammar consists; but one ought not to think for all that that the mode of signifying is exclusively considered by grammar; logic considers it, too.*], prout grammaticus considerat [*Here now is the consideration completely proper to the grammarian; the way it is said is marvelous.*], et sic illud passive dicitur quod a verbo passivo derivatur.[102]

Everything which is derived from a passive verb is called a passion; we can glimpse here right away that grammar, which certainly has its own utility, is an extremely superficial knowledge, if we consider it in relation to things: *it never tells us what things really are*; from the fact that a thing is signified by a passive verb, we can never infer what concerns the reality: so, "natura rei," on the one hand, "modus significandi," on the other.

102 *In II Sent.*, d. 35, q. 1, a. 1, ad 5.

B. This Text is a True Object of Wonder

It is considerations about this text that are going to constitute principally the first part of the execution of our intention. We said above, meanwhile, that this text contains an example of true wonder. And before that, we also said that wonder is of particular interest to the life of the intellect because it goes against stupor: wonder moves to inquiry, it excites the intellect to inquire. So before explaining directly the text in relation to our intention, the subject of logic, it will be good to examine in what way there is a true cause of wonder in this text. We can say this in a couple of words: we said recently that logic and the science of nature are always presented to us, and for good reason, as opposed. Now here they are said to be alike.

In order to better locate the source of wonder in this text, here is a very interesting little text about wonder from St. Augustine. It is taken from his treatise *On Order*. St. Augustine says:

> Unde enim solet, inquam, oboriri [*go out of, squirt out of*] admiratio, [*the response:*] nisi res insolita [*a thing which is out of the ordinary; what interests us here is precisely unusual, because Aristotle and St. Thomas have a habit of opposing logic and the science of nature. And here the two are presented as bearing an element of likeness; this is truly "res isolita"; it is the opposite of what is always presented; but it is necessary to add this, which is very important:*] praeter [*against*] manifestum causarum ordinem? [*Against the evident order of causes; we speak thus, for example, when it is a question of miracles; against the evident order of things, against the manifest order of things; and yet what is marvelous is what the other says:*] Et ille: Praeter **manifestum**, inquit, accipio [*Very well, I agree, but I will not accept the expression: "praeter ordinem causarum," because there is nothing which acts "praeter ordinem rerum"; something may be "praeter ordinem*

> *rerum" with regard to approximate, created causes, but with regard to the supreme cause, no! But what is marvelous is that he did not say "praeter ordinem causarum," but "praeter ordinem manifestum causarum"; the element* ***of knowledge is completely essential****.*]: nam praeter ordinem nihil mihi fieri videtur.[103]

This is the overarching idea that rules the whole treatise on order by St. Augustine.

To complete the conditions of wonder, there is also this little text that we are going to read from *The Disputed Questions on Ability (de Potentia)*. The doctrine is the same as that in St. Augustine, but it is more articulated. St. Augustine, for his part, has the advantage of being extremely brief and, even while being brief, of being striking: "praeter manifestum."

> Ad admirationem autem duo concurrunt [*their two elements*], …: quorum unum est, quod causa illius quod admiramur sit occulta. [*It is absolutely necessary that the cause of that which causes wonder in us escape us; this is clear, and the example which St. Thomas gives is very manifest: the magnet; we have experienced that iron falls, and when the magnet intervenes, the reverse is true; so how does it happen that iron does not fall? Here is one element of wonder; clearly, when one does not know the why; and the same thing for our course: really, we don't see very well how logic can resemble the science of nature, and it causes wonder in us that one should make such a statement; but, by analyzing a little we will give the reason that it is in fact so, and thus the wonder will cease, as when, with regard to the iron, we apprehend the power of the magnet.*]; secundum est quod [*And this too is very important.*] in eo quod miramur, appareat aliquid per quod **videatur contrarium eius debere esse** quod miramur [*It is said differently, but*

103 St. Augustine, *On Order*, I, ch. 3.

> *this is the "praeter manifestum" of Augustine; in the object of our wonder, it is necessary that something should appear as contrary to that which ought to be; namely, in our case, logic and the science of nature, two disciplines which are so distinct, ought, it seems, to be opposed; and here they are put together; it seems that the contrary ought to be, what is opposed to that which is effectively said to be.*], sicut aliquis posset mirari si videret ferrum ascendere ad calamitam, ignorans calamitae virtutem, cum videatur quod ferrum naturali motu debeat tendere deorsum.[104]

C. Some Considerations about the Text from the Sentences

Here now are some considerations and texts to manifest what we have read in the text of the *Sentences*.

a) The Importance of This Likeness

It is a question of resemblance. So, one can say that logic is like the science of nature. But Plato tells us in the *Sophist* that one has to stand guard against likenesses.

> Τόν δέ ἀσφαλῆ δεῖ μάλιστα περί τάς ὁμοιότητας ἀεί ποιεῖσθαι τήν φυλακήν, ὀλισθηρότατον γὰρ τό γένος.
>
> For our security, what is above all necessary is to mount a guard around likenesses, for this is an extremely slippery kind of thing.[105]

This is because the "simile" will always be a "secundum quid." Indeed, a "simile" exists between two things that do not have the same nature. One might easily think, then, because the "simile" bears on a "secundum quid," that it is always something

104 *Q. D. de Potentia*, q. 6, a. 2, c.
105 Plato, *Sophist*, 231a.

wholly superficial and accidental. Now, on the contrary, the "simile," the resemblance underlined here, bears on a "secundum quid" which is completely fundamental. Even though the resemblance bears on a "secundum quid," this does not prevent the common notion tying the two disciplines together from being fundamental.

One might say: but why not go immediately to the differences? The reason is that the element common to the two disciplines will help us—we may not see this right away, but certainly we will little later—to understand well the subject of logic *in its foundation*, and also—I was going to say principally, but let's be sober—its end. To understand well the subject of logic in its foundation, then—the word foundation here is very important. If we contented ourselves here with opposing the science of nature and the science of logic, we would still indicate the subject of logic, but we would not see the foundation of the subject. So, the common element in question has the double advantage of making us attend to the foundation of logic, and also its end, which has relation to the truth. This is enormous. For, someone might say, on the pretext that logic bears on beings of reason, that it abstracts from things, and from the truth. But watch out! The object of logic is not simply a chimera.

In brief, this common element is certainly not specific—that is understood. We will find the specific element in the second part of the execution of our intention, when we produce the opposition between the two disciplines. This common element is certainly not specific, but it is fundamental, and it will put us on the right road that leads to the definition.

b) Another Example of This Procedure from Resemblance to Difference

At a certain moment, in the *Summa Theologiae*, St. Thomas asks

himself whether natural law is the same for all. And in his considerations, he is led to compare speculative and practical reason.

> Ad rationem autem pertinet [*He does not say it belongs to practical reason, nor it belongs to speculative reason, though both would be true, but to reason; and one should not be surprised.It is the same faculty which knows for the sake of knowing and which knows for the sake of directing; there is nothing surprising then in the general affirmation, it is a question of fundamental mode, which one finds in both orders; even if the habits are essentially distinct, and their acts also, clearly, it remains that they proceed from one and the same faculty, reason; we ought then to consider the mode attached to reason as such, caring little whether it is a question of the speculative of or the practical.*] ex communibus ad propria procedere, ut patet ex I *Physic.* [*Although at the beginning of the* Physics*, this is especially applied to speculative reason: from the common to the proper in the science of nature.*] Aliter tamen circa hoc se habet ratio speculativa, et aliter ratio practica. [*Here is the resemblance and the difference; but the first consideration is absolutely radical and fundamental; the two ought to proceed from the common to the less common; but, because of the material, in the case of the speculative, one will go from the more common to the less common and even to the proper, and nevertheless still conserve necessity and certitude; while in the practical order, as soon as one leaves the common, one cannot go beyond the "for the most"; this is enormous as a difference.*] Quia enim ratio speculativa praecipue negotiatur circa necessaria, quae impossibile est aliter se habere, absque aliquo defectu invenitur veritas in conclusionibus propriis, sicut et in principiis communibus. Sed ratio practica negotiatur circa contingentia, in quibus sunt operationes humanae, et ideo, etsi in communibus sit aliqua necessitas, quanto magis ad

> propria descenditur, tanto magis invenitur defectus.[106]

It's a bit like this, in our plan. Logic and the science of nature have a common element but are still radically distinct. The two disciplines have this in common, that *they consider nature in a certain way*. And in this they are opposed to grammar.

c) The Opposition of these Two Disciplines to Grammar

One can further manifest his opposition to grammar by consulting certain explanations which St. Thomas gives concerning different ways of expressing certain truths, above all, when this concerns God. St. Thomas, when he has to justify certain ways of speaking, sometimes must do it through logic, and sometimes through grammar. He is thus led to make some useful remarks on the object and mode of each.

Thus, a word like "iste," formed by practical intelligence, like all words (see *Disputed Questions on Truth*, q. 4, a. 1: there St. Thomas treats the causes of the word: for example, the mental word, and also the efficient cause, which is "voluntas," that is, in fact, the practical intellect; see also a marvelous text from John of St. Thomas, which we read in the first semester, and in which he speaks of an order "descending from practical reason"), and implying a real order, *will be defined by grammar as a person. But this is a fiction*. The grammarian will say: this pronoun is not only for any person, but for anything which can be designated with a finger, which is demonstrable. The demonstrative pronoun can have a very broad sense, as the text will show us immediately. So really this is a fiction: *what is not a person is defined as if it were a person*. The "as if" clearly indicates to us that we are dealing with a fiction.

Here is the text mentioned:

106 *STh* I-II, q. 94, a. 4, c.

> Et licet hoc pronomen iste, **grammatice loquendo** [*Think of the other expression, in the* Sentences*: "that is called passive which is derived from a passive verb"; we are purely in the line of verbal construction, what is derived from a passive verb is called passion; and here, this pronoun "iste," grammatically speaking, is called a person*.], ad aliquam certam personam videatur pertinere. [*And the grammarian will speak of the first, the second, and the third person; we say this commonly, without taking note that all this signifies fictively; the grammarian speaks of person and even says "personal pronoun."*] Tamen quaelibet res demonstrabilis, grammatice loquendo, persona dici potest, licet secundum rei naturam non sit persona. [*This is the same opposition as in the* Sentences.] Dicimus enim iste lapis, et iste asinus.[107]

Well, this is interesting. The best way of opposing the two disciplines in what they have in common, namely, "with regard to the nature of the thing," was to appeal to grammar. For saying "grammatice loquendo," it is precisely in complete opposition to "secundum rei naturam."

d) Confirmations of This Resemblance

The resemblance between these two disciplines is notably confirmed by the fruitful word of Porphyry, when, at the beginning of his *Commentary on the Categories*, he announces the intention of the treatise. So it is a question of making more precise what the nature of things has to do with knowledge of logic.

> Man himself, once he has become able to designate and to signify **the things offered to his attention**, arrived at naming and designating each thing by vocal sound. The design of this treatise, then, concerns the first imposition

107 I, q. 39, a. 8, ad 1.

> of words, the one which manifests things to us; thus, it concerns simple vocal sounds endowed with sense, insofar as they are apt to signify things.[108]

In Boethius we find, on this subject, not another doctrine, but a still more striking way of expressing it:

> **Rebus praejacentibus** [*already being there*], et in propria principaliter naturae constitutione **manentibus**, humanum solum genus exsistit, quod rebus nomina posset imponere.[109]

In brief, we absolutely cannot detach logic from natures themselves.

We find yet another confirmation in the seventh book of the *Metaphysics*. It is a question of Aristotle's procedure in determining substance. We cannot have much evidence with regard to this question for the moment, but there is a point that might clarify things for us with regard to what interests us more directly.

> Hic incipit determinare de ente per se. [*He who says "determination of being," says "determination of substance," because substance is what is being primarily*.][110]

Now, there are two books thus devoted to the study of substance: the seventh and eighth. In the seventh—Aristotle is in no hurry; we are already in the seventh book of the *Metaphysics*, and he begins to make known substance, which is the principal subject of the science which he is treating!—Aristotle proceeds in a logical mode. In the eighth, he proceeds from proper things. In the seventh book, it is a question, then, of making known substance in a logical mode, that is, with a common knowledge of substance. All of book 7 manifests substance in a certain way

108 Porphyry, *In Cat*., initio.
109 Boethius, *In Cat*., Bk. I.
110 St. Thomas, *In VII Metaph*., lect. 1, n. 1245.

basing itself on logic. Now, logic could not be in this way a principle for the manifestation of substance if it had for an object nothing but chimera.

[A remark so that you understand well the plan of the course: we will use the *De Ente et Essentia* to manifest the second part of the execution of our intention, which bears on the difference between logic and the science of nature. We might have contented ourselves, for the second point, with extracting some passages from this treatise, but it is a little work so well done that it is worth the effort of seeing it at length, despite the greater difficulty which this will involve. But before beginning, we will see, to finish up the first point, that there is nothing surprising in the fact that logic considers the nature of things in a certain way.][111]

[Returning to an earlier point:]

We ought to have looked at another text, a little earlier, and we completely forgot. It was when we were speaking about the problem of order. Its interest was that it was completely opposed to what we saw at that time, in using the same term as Valery. You'll recall that we relied upon a text of Valery, a text which presented the problem well:

> The problem by which I find myself more and more driven into the corner is the problem of ordering my thoughts and of ordering them not extrinsically but organically.[112]

We made some considerations about this. But here is what Schopenhauer says in his treatise, *The World As Will and Representation*:

> One who wishes to read this book in a manner that will

111 [Here ends the lecture given on February 2, 1975.]
112 Valery, loc. cit.

make the understanding of it as easy as possible ought to follow the following indications.

What is proposed to the reader here is a single thought. [*This is very important in the spirit of Schopenhauer.*] Nevertheless, whatever my efforts, it was impossible for me to make it accessible by a shorter road than this large work. [*1400 pages! A single thought! He couldn't be briefer?!?*] This thought, in my opinion, is that which has been sought for such a long time, and the seeking for which is called philosophy; it is that which is considered, among those who know history, to be as unfindable as the Philosophers' Stone, as if Pliny had not said so sagely: "how many things are there, which one thinks impossible until the day when they are done." This thought, which I have to communicate here, will appear successively, according to the point of view from which one considers it, as being what we name "metaphysics," what we name "ethics," what we name "aesthetics" [*For one thought, it's pretty big.*]; and, in truth, it is necessary that it be all that at once if it is what I have already affirmed that it is.

[*But here is the distinction that he makes and which is wholly opposed to what we have seen in Valery; with this we arrive at a total privation of order such that one cannot go further in this direction; and, in the distinction which he makes, it is the second member, above all, which will interest us:*] When it is a question of a "system of thoughts," [*Think of Valery who said: "the problem by which I find myself more and more driven into the corner is the problem of ordering my thoughts"; a system of thoughts signifies a multiplicity of thought and this is opposed to a single thought; but he wishes to deliver to us a single thought.*] it must necessarily be presented [*And frankly, at first sight, one would say that this seems to be in the same line as what we have already read.*] in an architectonic order [*This isn't*

so bad.]; in other words, each part of the system ought to support another, without the reciprocal being true. [*This is very fair; and he exemplifies it.*] The foundation stone supports all the rest, while the rest does not support it, and the summit is supported by the rest, but without supporting anything at all in its turn. [*Completely fair.*] On the contrary, while it is a question of "one thought" [*According to him, but this might cover a lot of things: aesthetics, metaphysics, ethics, and still more!*], however ample indeed, it ought to be offered with the most perfect unity. Without doubt, for the appropriateness of the exposition, it undergoes division into parts. [*In 1400 pages, one can permit oneself to introduce at least a division into chapters.*] But the order of these parts is an **organic** order [*He uses the same term as Valery, but we are going to see that what he takes from the same word is wholly opposed to what we have done.*], so long as each part [*This is not bad.*] contributes to the maintenance of the whole [*This makes some sense, otherwise, why present these parts, if they don't lead to the understanding of the whole?*], and is maintained in its turn, by the whole [*Ah, watch out! Here, things might become ambiguous, but he is going to clarify completely.*]; **nothing is either the first or the last** [*Come on! What is order, organic or not? The before and after is the very first notion which order implies; but here, one cannot say about the parts that this is the first and that the last, this before, or that after.*]; the thought as a whole lends its clarity to each part, and there is no part so small that it can be understood to the root if the whole has not been understood beforehand. [*As one begins a treatise, there are, for example, some preliminary notions which the order demands; but one cannot comprehend them if one has not comprehended the whole...*] Now, it is certainly necessary that a book have a beginning and an end, and it always differs in this way from an organism [*And*

> *nevertheless, he says that the contents of the book ought to resemble an organic system*...]; but, on the other hand, the content ought to resemble an organic system: whence it follows that here there is a contradiction between the form and the matter.
>
> This being given, it is evident that there is but one bit of advise to be given to those who wish to penetrate into the thought proposed here: to read the book twice [*Evidently, if the understanding of the first part depends on the last.*], the first with much patience, patience which one will find if one willingly believes that the beginning supposes the end, almost as the end supposes the beginning, and even that each part supposes each of the following ones, almost as these suppose it in their turn.[113]

It is just this that one ought to call the privation of order: there is neither a first part nor a last; one can call one first, but it supposes a last just as last supposes the first,...

[End of the return to an earlier point]

e) The Relation between Logic and Reason

[Just before continuing and finishing the first part of the execution of our intention, it is necessary to note that in January to February 1972 we saw some lessons on the theme of logic and truth. There are certain references to be drawn from there with regard to the element common to logic and the science of nature, in the sense that logic cannot be detached from things, from the nature of things, and that, thus, things enter in some way into its consideration.]

Thus, we have seen that at first sight it is a subject of wonder to see logic and the science of nature put together, two disciplines

113 Arthur Schopenhauer, *The World as Will and Representation*, preface to the first edition in 1819 (*Die Welt als Wille und Vorstellung*).

so opposed and which are ordinarily presented to us as such. "Praeter manifestum," in the words of St. Augustine. Evidently, what causes wonder, even if we see it very confusedly, is to hear it said that logic considers the real and that is not detached from the real. But if we consider attentively the relation between logic and reason, we see well that logic is truly on the side of the science of nature, because logic is an art that directs reason. And if we thus make the connection between logic and reason, we no longer wonder at the affirmation of this resemblance, since logic studies the works of reason. And this is wholly in our experience: the great masters, indeed, study what? The enunciation, the definition, the syllogism, the demonstration, etc., etc. There are also many works constituted by the very act of reason. This is the "aliquid per huiusmodi actum constitutum" of question 90. This is completely fundamental. Just as, in exterior acts, one must distinguish the operation and the operatum, the act of constructing a house, for example, and the house itself, in the same way, St. Thomas says, in the acts of reason, one must distinguish, on the one side, the act which will be, for example, to discourse and, on the other side, what is formed, constituted in and by this act, namely, the work, which will be: enunciation, syllogism, etc.

> Sicut in actibus exterioribus est considerare operationem et operatum, puta aedificationem et aedificatum; ita in operibus rationis est considerare ipsum actum rationis, qui est intelligere et ratiocinari, et aliquid per huiusmodi actum constitutum.[114]

Since, then, logic studies works constituted by reason, there follows a perfect subordination of logic to reason. And, after all, one can even say, not to complicate things: a subordination of logic to the science of nature.

114 *STh* I-II, q. 90, a. 1, ad 2.

So there follows a perfect subordination of logic to reason; otherwise, logic would not be a cooperating art. Just as medicine and teaching are "ministri naturae," logic is also a "minister naturae." "Ministrat instrumenta speculationis."[115] If logic is an art that cooperates, it is absolutely necessary to admit this subordination of logic to reason. Now, speculative reason is measured by things. One can never escape this.

This is why—another point, but one attached to the foregoing—the conception which man has of logic is like a consequence of that which he has of reason. This is very easy to verify: one has only to open, for example, the logic of Kant; for "transcendental logic" means just this: that which is abstracted from the contents of knowledge. In the same way, Hegel calls his logic the grand logic, for, according to him, everything proceeds from naked reason, not at all measured by things.

Whereas, on the contrary, in the Prooemium to his *Commentary on the Posterior Analytics*, St. Thomas is going to say: "just as in reflecting on *the act* of the hand, man has discovered the mechanical arts," he does not say: in considering the hand; in speaking of the act, he immediately refers to the object. And he adds: "in the same way, in reflecting on the act of reason, man has discovered logic."

Thus, Aristotle is situated in opposition to Kant and Hegel, because he has a completely different conception of reason. And, to finish, we can add as a complement that this first consideration of logic, namely, that it cannot be detached from things, permits us to oppose logic to symbolic logic in a radical way. It is not that one must be against symbolic or mathematical logic; but there is more difference between that logic which directs the act of reason, a logic founded on the truth, and symbolic and mathematical logic, than there is between logic and grammar. And a sign

115 *In Boethii De Trin,* q. 5, a. 1, ad 2.

of this is that, though we know the enormous, impassable difference between logic and grammar, we can easily make a mistake and sometimes confound logic and grammar. For example, you open the *On Interpretation*, and you find explained and defined words which one also meets in grammar: noun and verb.

This must be noted because some thinkers put logic and mathematical logic in the same bag. For example: "I study logic, I teach logic"—"Which? Ancient or modern?" That is a stupid remark. It is as if one should say, ancient mathematics or modern mathematics?—Come on! What is that supposed to mean? We can, for example, distinguish between scientific mathematics and calculation, that means something. But not, in the same science, between ancient and modern....

So much for the first part of our intention.

Second Part
The Difference between Logic and the Science of Nature

Now, we will enter into the second part of the execution of our intention. With the help of the treatise *De Ente et Essentia*, we are going to try to come more and more to an understanding of the subject of logic in so far as it is clearly opposed to the subject of the science of nature. Let us analyze, then, this magnificent treatise of St. Thomas.

The Prooemium

St. Thomas, like every self-respecting intelligence, first of all composes a prooemium.

A. Analysis of the Prooemium

First of all, St. Thomas renders the hearer attentive. We know that a prooemium can pursue three goals, namely: to render *benevolent, docile, and attentive*. In this one, I would say, St. Thomas

begins by rendering the hearer attentive, and this by stating a principle concerning error. Generally, it is by showing the difficulties of the problem treated that one renders attentive, but one can get there also, as is the case here, by stating a principle which denounces error and which can be applied to the problem to be considered.

Next, St. Thomas renders his reader benevolent by indicating to him the usefulness and the necessity of the considerations that will follow, namely those concerning being and essence.

Finally, he renders the reader docile by indicating three things.

First of all, by indicating *the subject*, namely, that we are going to speak about being and essence.

Next, he indicates the *division* of the book. This involves seven chapters: it is principally Chapter 4, as a whole, as well as some remarks in Chapter 3, which concern our principal intention. But one of the reasons which led us to choose this text and to present it at length is its order; for there is a very manifest order in *De Ente et Essentia*, which one can see already by certain expressions that are often repeated in the text: "et quia . . . et quia . . . et quia." Not only is there an order, then, but a manifest order: St. Thomas establishes something, "et quia." Thus, he advances progressively. The whole series of consequences that are very clearly presented is marvelous. Chapters 5, 6, and 7 are devoted to separated substances (we might touch on this but this is not sure); Chapters 2 and 3 treat of the composed essence, of natural substance; Chapter 4 studies the relationship between composed essence and simple essence; in fact, Chapters 2 and 3 study composed essence, but in its relation to logical notions; this is the very expression which St. Thomas employs here. So, then, here is the division as stated by St. Thomas, although St. Thomas does not present it by chapters, but by enumerating the three points touched upon in the treatise:

1) "quid nomine essentiae et entis significetur:" We will see in a moment what this means; it is a question, in general, of determining what one understands by the words "ens" and "essentia."

2) "quomodo in diversis inveniantur," namely, one finds essence, considered as substance, and considered as accident; both in composed substance, and in simple substance;

3) "et quomodo se habeant ad intentiones logicas, scilicet genera, species, et differentias;" since we have not had a course on the *Isagoge* of Porphyry, we will find ourselves gathering certain notions, very well explained, sufficiently proportioned, about what genus, difference, and species are; and these notions will prepare for a further study of the *Isagoge*.

Thirdly and finally, still with the end of rendering docile, St. Thomas gives the order or the mode of proceeding.

So, he renders attentive by a principle concerning error, benevolent, by seeing the utility and the necessity of such considerations (if one does not make these considerations, one risks falling into the sort of error which he signaled at the beginning), and docile in showing the intention or *scopòs*, the division, and in manifesting the mode of proceeding which he intends to follow.

B. Reading and Commentary on the Prooemium

Let us enter now into the text itself.

a) A Principle concerning Error

> Quia parvus error in principio magnus est in fine [*And, as he always does when composing a prooemium, St. Thomas bases himself on a text of Aristotle.*], secundum

Philosophum in I *Caeli et Mundi*.[116]

1. "Parvus" and "Magnus"

It might be good to note right away that this statement is made in quantitative terms: "parvus" and "magnus." Let us say something with regard to this "magnus," with the help of a little text from the Sentences. St. Thomas asks in this article that we are going to consult, if one can speak about greatness, of "magnitudo," in the case of God. One could bring together with this the text of St. Augustine *On the Quantity of the Soul*, where St. Augustine makes clearer the sense that he is giving to the word, "quantitas." But here is the text of St. Thomas:

> Magnitudo, secundum rationem generis sui, quod est quantitas [*Magnitude is quantity.*], est conditio materiae [*Magnitude always is referred to matter; if we consider magnitude, and its very genus, then, it is a question of a condition of matter.*]; et secundum hoc non praedicatur de Deo [*One must evidently remove this consideration of magnitude not only from God, but also, as one sees in the treatise of Augustine, from the soul; the text of St. Augustine comes pretty much to this: by the quantity of the soul, one must rather understand the strength and the power of the soul, the virtue of the soul.*], sed secundum rationem differentiae suae; quae consistit in ratione completionis [*"Completio" means achievement, something which is in the state of its perfection, of achievement.*], prout dicimus aliquem ex parvo fieri magnum[*We have examples of this even in mobile being: the child becomes big from being small; but when can we call him big? Here:*] quando attingit completam quantitatem.[117]

116 *De Ente et Essentia*, prooemium.

117 St. Thomas, *In I Sent.*, d. 19, q. 3, a. 1, ad 1 (Letthelieaux, p. 473).

So here is what will help us to better situate the sense of "quantitas." Another remark on the subject: normally we find the following division of quantity in the ancients: "quantitas molis" and "quantitas virtualis." The "quantitas molis" is quantity pure and simple, which is only attributed to mobile being; while "quantitas virtualis" is drawn from the difference of quantity, namely the notion of completion: so "quantitas virtualis" is the quantity of a being with regard to its power.

In his prooemium, St. Thomas uses these terms because quantitative terms are the most manifest. He says this: "Parvus error in principiis [*at the point of departure*]." But how exactly to translate "parvus"? It seems like "small error" is a little imperfect, for when an error bears on a truth which is primary, upon which all the rest depends, it is very difficult to say that such an error is small. Perhaps it would be better to say: "an error with little extent." Apropos of "ens," for example, if we go badly wrong on "ens" and "essentia," it is certain that in continuing from the point of departure toward a certain termination, the error, at the end, will have grown very much. Thus, an error of small extent at the beginning comes to be very great at the end.

Maybe we would even be able to have recourse to discrete quantity in place of holding on to continuous quantity. One could say, for example, "a single error at the point of departure is the source of multiple errors at the end." This other formulation can again help us.

2. *The Text from the Treatise* On the Heavens

But let us return to the text. St. Thomas says: "as the Philosopher says in the treatise *On the Heavens*…" This text from the treatise *On the Heavens* is a magnificent text, which we must read. The same thing is said another way and this will help us to understand. Above all, it is much less concise. Moreover, after having

stated the same principle in a less concise way, St. Thomas gives an example.

> Qui modicum transgreditur a veritate circa principium, procedens in ulteriora fit magis longe a veritate decies millies. Et hoc ideo, quia omnia subsequentia dependent ex suis principiis. [*And here is the example*:] Et hoc maxime apparet in errore viarum [*If one has a goal and one is going to such and such a place, when there is a fork in the road, and one must go to the right, if one goes wrong, and goes to the left, the first steps which one makes do not yet carry us very far from the goal, but the more one advances, the more also one is carried away from the goal to be attained.*]: quia qui parum elongatur a recta via, postmodum procedens fit multum longe. Et huius causa est, quia principium, etsi sit modicum magnitudine, est tamen magnum virtute, sicut ex modico semine producitur magna arbor [*The seed grows in multiplying.*]. Et inde est quod illud quod est modicum in principio, in fine multiplicatur, quia pertingit ad totum id ad quod se extendit virtus principii, sive hoc sit verum sive falsum.[118]

Finally, just as he who goes astray at the beginning falls into an error without much extent but in the end finds himself with a multitude of errors, so too he who seizes a principle well will be able to seize in a more or less distinct way the whole power of the principle. And this is what one calls a "magnum virtute," a notion which contains many others virtually.[119]

3. Two Texts from Chesterton

To manifest still more this first sentence from the Prooemium, here is a text from Chesterton. Chesterton was a journalist and

118 *In I De Caelo*, lect. 9, n. 97.

119 [This ends the first lecture given on February 5, 1975.]

The Man who was Orthodox is a collection of selected articles. What defines Chesterton is—more than the mode of paradox, which is fundamental to him—an absolutely extraordinary health: intellectual health, that is, judgment. Further, his word is magnificent, and very proportioned.

What we are going to read from him is attached to the "error viarum," in a sense. It is a question of the best way to behave when one is lost in the forest. Chesterton says he is addressing the modern Englishman, but from this point of view, there is quite a pile of modern Englishman. For, in fact, what he says is universal: this concerns all moderns. He says: "the thing that modern Englishmen [*We can understand ourselves here.*] cannot understand, is this":

> The one thing that the modern English will not understand is that when you have lost your way quite hopelessly, the quickest thing is to go back along the road you know. [*Thus someone who has experience in the woods will not go astray because he bases himself on general criteria: the shape of the mountains; while, in confining oneself to overly particular criteria, someone might, during the summer, know his route well enough, but lose himself in the winter; all the while, the mountains are there; but someone who has no experience in the region, and who is truly prudent, ought to make a light notch on the trees, every 25 feet; thus if he becomes lost, he can easily retrace his steps and recover the route taken before.*] to the place from which you started. You may call it reaction, you may call it repetition, you may call it tiresome theory [*"Repetition," that is "to repeat" instead of going forward, and of saying I'm lost, but I'm going to continue; "tiresome theory," "tiresome theory."*], but it is the quickest way out of the wood. [*Maybe also the only way.*] [*Here now*:] No ritual commissions [*Or commission of research, or programs, etc.*] and no other kind of commissions ever do

> the least good, because they will not step back to the first facts of the situation [*But what should one understand by first facts? Listen!*]. Now the first facts are never material facts. [*One must pay attention because one might say: he is going against* ***manuductio****, but that is not so: he wishes to manifest the order of perfection or the order of nature (there are some pages on this question in the notes for the academic year 1969 to 1970; they are pages 127 and following); the solution of a problem, for example, depends on something wholly first and that is what he is speaking about; these commissions will do no good because they do not wish to be attached, to resolve, to something first; now he says "The first facts" in question, are not things of a purely material order; let us say "inferior:" he says, "the invisible always comes before the visible."*]. The invisible always comes before the visible, the immaterial before the material, even in our everyday experience... The modern English [*and we!*] will never settle their problems until they understand that the shortest cut to the practical is through the theoretical.[120]

All these commissions, all these committees... Think, for example, of the committees which treat of the organization of teaching and of its programs: a program comes from practical intelligence, from the practical man: what must be taught? When? Etc... but, certainly not: how must one demonstrate a certain a property of a triangle?... Chesterton says: you'll never arrive at the resolution of a problem of this kind, which is practical, without going through the speculative. Because it is impossible to elaborate a fitting program of teaching if one does not know what teaching, teaching in its nature, is, and what intelligence, be it common or individual, in its nature is, etc...

120 G. K. Chesterton, *The Man Who Was Orthodox* (London: Dennis Dobson, 1963), "High or Low?" p. 101.

> And there could not possibly be a stronger instance of it [*A very powerful example of this, is the example of the Ritual Commission which, while it is not treating a problem which is false as such, is a bad way of proceeding and cannot give any hope of good results.*] than the instance of ritualism and the Ritual Commission.[121]

Here is another text from Chesterton: it doesn't go at all with this one, but we're going to read it right away because we might need it later. It's entitled, "The Little Things." Think of "manuductio," and the one who despises it, who always wishes to attack problems that are beyond him, think of he who, as in the text from St. Augustine, does not love to be taught in a way proportioned to the nature of an intellect that is not yet prepared to receive solid food.

Chesterton is speaking of a fellow called Sir Thomas Browne, whom he calls, though it is not quite clear why, the "Mystic," because of his style and of the care that he puts into it, because of its minutia. The one whom Chesterton calls the Mystic is the one who does not only respect great things, but also the one who respects little things.

> The Mystic is not a man who reverences large things so much as a man who reverences small ones [*C. S. Lewis has something like this in his* Letters to Malcolm*; he comes up with some good rules about things that are humble but to which one should still be attached.*], who reduces himself to a point, without parts or magnitude [*a little extent, small, etc.*], so that to him [*He loves little things; the fact is that he does not consider them so much insofar as they are small, but as principles of enormous effects.*] the grass is really a forest ["*Grass" means here, a plant, not grass; for him, a plant is a forest.*] and the grasshopper, a dragon.

121 Ibid., p. 165.

> [*For him, an insect is like a dragon.*] Little things please great minds.[122]

b) Utility, Intention, and Division of the Treatise

> Ens autem et essentia sunt quae primo intellectu concipiuntur [*The very first notions that we have, though very confused, are "ens" and "essentia"; these are the most common.*], ut dicit Avicenna in principio suae *Metaphysicae*; ideo ne ex eorum ignorantia errare contingat, ad horum difficultatem aperiendam dicendum est [*Here now is the utility of these considerations; and the intention (scopos) and the division will follow at the same time.*] quid nomine essentiae et entis significetur et quomodo in diversis inveniatur et quomodo se habeat ad intentiones logicas, scilicet genus, speciem et differentiam.[123]

c) The Order and the Mode of Proceeding of the Treatise

The end of the prooemium indicates the order and the mode of proceeding. St. Thomas says:

> Quia vero ex compositis simplicium cognitionem accipere debemus et ex posterioribus in priora devenire, ut, a facilioribus incipientes, convenientior fiat disciplina…[124]

With regard to the mode of teaching, one ought always to begin from what is better known to us. We find some distinctions on this subject in the fifth book of the *Metaphysics*, when it is a question of analyzing "before and after" into their different senses. This is where Aristotle distinguishes between what is

122 Ibid., "The Little Things," p. 165.
123 St. Thomas, *De Ente et Essentia*, proem.
124 Ibid.

first with regard to the intellect and what is first with regard to sense.[125] For the intellect, the order is from the more common to the less common; but for the sense, it is a particular which must come first, the composite is what offers itself first to the sense. This is why the intellect, to the extent that it shares in the senses, must first of all see the whole very confusedly, and, starting from there, analyze the parts. Now, "ens," which is "id quod habet esse," is composed from "essentia," which is "ut quo aliquid habet esse."

> Ideo ex significatione entis ad significationem essentiae procedendum est.[126]

The understanding of "essentia," therefore, depends on the understanding of "ens."

d) Some Other Remarks on the Division of the Treatise

Now, if we consider the division of the book, what comes first is "quid nomine essentiae et entis significetur." And indeed (here is where one can put one's finger on the grave error of Schopenhauer) this is the very first question that the intellect poses for itself in every problem: what the name signifies. We find a very good passage on the subject in the *Commentary on the Posterior Analytics*. The issue is that in a demonstration one cannot arrive at the conclusion without presupposing certain notions that are called the "praecognita."

Let us focus only on the general rule that interests us.

> Alia vero sunt, de quibus oportet praeintelligere **quid est quod dicitur**, idest quid significatur per nomen, scilicet de passionibus. Et non dicit **quid est** simpliciter, sed **quid est quod dicitur**, quia antequam sciatur de aliquo an

125 *In V Metaph.*, lect. 13, n. 948.
126 *De Ente et Essentia*, proem.

sit, non potest sciri proprie de eo quid est: non entium enim non sunt definitiones. [*Things which do not exist do not have definition, since they have no "what;" so the normal order of questions to be asked is: 1) what the word signifies; 2) the existence of the thing; 3) what the thing is; that is to say: 1)* ***quid est quod dicitur****; 2)* ***an sit or quod est****; 3)* ***propter quid est****.*] Unde quaestio, an est, praecedit quaestionem, quid est. Sed non potest ostendi de aliquo an sit, nisi prius intelligatur quid significatur per nomen. [*And the application is magnificent*:] Propter quod etiam Philosophus in IV *Metaphysicae*, in disputatione contra negantes principia [*In this case, one cannot respond by starting from an anterior truth, because they contradict or deny the very first things; so, one must begin from that which the word is used to signify*.] docet incipere a significatione nominum. [*Does the word signify something, yes or no? If it signifies something, let us determine that, and then we will discourse; if not, it is not possible to proceed: if someone does not admit that the name signifies something, Aristotle says he is like a plant; so, it is useless to discuss with him.*][127]

It is interesting to see that the division of the book already implies a certain order: not only is there the order from the composed to the simple, but also, before determining what "ens" or "essentia" is, we will see what these two words signify, for this is the very first question which the intellect must pose for itself.

And right away, St. Thomas enters into the signification of the words; this is in Chapter 1; the prooemium is finished.

The First Chapter

A. The Sense of the Word "Ens"

127 *In I Post. An.*, lect. 2, n. 17.

Sciendum est igitur quod, sicut in V *Metaphysicae* Philosophus dicit [*Clearly, this is in the fifth book, where Aristotle orders and divides the different senses of the words that metaphysics is going to use, namely, the words which are very common, which are the most difficult to analyze, and the different senses of which one must not confuse.*], ens per se dicitur dupliciter [*So we are going to understand two things by "ens," to speak broadly and very obviously: either* ***that which exists****, "ens extra animam."…*], uno modo quod dividitur per decem genera [*This is absolutely true, but to understand it better, one must go to the very first article of the first question in the Disputed Questions on Truth, when St. Thomas speaks of the general modes of being and of the special modes of being; and the special modes of being correspond precisely to the categories; so, the first sense of "ens"—that which exists.*], alio modo quod significat propositionum veritatem. ["*Ens" can also signify the composition which the intellect makes, or rather the truth of this composition: we will say the true is, and the false is not; "this is," when the intellect states the true, and, "this is not," when the intellect states the false.*][128]

In Book 6 of the *Metaphysics*, when it is a question of establishing the subject of metaphysics, Aristotle will throw out being *per accidens* and also the being which signifies the truth of a proposition, which he calls there "ens verum" and "ens falsum." This true being and this false being—certainly, we ought not to anticipate too much; this is rather that which we ought to come to at the end of our investigation—belong to logic.

Then St. Thomas manifests the difference between these two "beings."

Horum autem differentia est quia secundo modo [*that is,*

128 *De Ente et Essentia*, ch. 1.

being insofar as it signifies the composition of the intellect] potest dici ens omne illud, de quo affirmativa propositio formari potest [*everything which can be the subject of an affirmative proposition*], etiam si illud in re nihil ponat [*even if, in fact, nothing real in things corresponds immediately to this being*]. Per quem modum privationes et negationes entia dicuntur; dicimus enim quod affirmatio est opposita negationi et quod caecitas est in oculo. [*Nevertheless, there is nothing of blindness really in things themselves.*] Sed primo modo non potest dici ens nisi quod aliquid in re ponit. Unde primo modo caecitas et huiusmodi non sunt entia. [*So it will be necessary to leave aside the second sense, and to keep only the first.*][129]

B. The Sense of the Word "Essence"

Nomen igitur essentiae non sumitur ab ente secundo modo dicto, aliqua enim hoc modo dicuntur entia, quae essentiam non habent, ut patet in privationibus; sed sumitur essentia ab ente primo modo dicto. Unde Commentator in eodem loco dicit quod ens primo modo dictum est **quod significat substantiam rei**. [*Substance enters only into the first sense of the word "ens" and is the first analogate of it.*]

Anyway, this is easy enough: there are two senses of the word "ens," and it is the first which we keep and from which we draw the word "essence" and its sense. For that which does not exist in things does not have an essence, however much it is able to be called a being in a certain way. And so:

Et quia [*and the chain of consequences begins*], ut dictum est, ens hoc modo dictum dividitur per decem genera,

129 Ibid.

oportet quod essentia significet aliquid commune omnibus naturis, per quas diversa entia in diversis generibus et speciebus collocantur, sicut humanitas est essentia hominis, et sic de aliis. [*That by which man is man, what constitutes him as such, is humanity.*][130]

In brief: as being, understood in the first sense, can put on ten modes, can be translated into ten genera, and since the word "essence" is drawn from that sense of the word "being," it is necessary that the word "essence" be divided in the same way.

Et quia…[131]

And now we have a small idea of the manifest order of consequences about which we spoke recently. This gives us a discourse that is easy to follow, because it is articulated in a clear and distinct fashion.[132]

Let us take up again the beginning of Chapter 1.

A. The Sense of the Word "Ens"

The first question which St. Thomas poses in the execution of his intention is the very first question which the intellect can pose about a problem, namely: what does the name signify? Here, what does the name "ens" signify? And he says that this word "ens" has two senses: the first covers the notion of being insofar as it is divided into ten genera; clearly, it is a question of the "ens extra animam," with regard to which St. Thomas, in the *Disputed Questions on Truth*, calls "special modes" rather than "genera," being which is sometimes substance, sometimes quantity, sometimes quality, etc. But "ens" can also signify the truth of propositions, as when we say "to be" that which is, and "not to be" that

130 Ibid.
131 Ibid.
132 [Here ends the second lecture given on February 5, 1975.]

which is not. This is an "ens" that signifies the very composition that the intellect forms.

B. The Sense of the Word "Essence"

a) What "Essentia" Signifies

Second point, essence. Essence is going to be taken from the first sense of "ens." Now, "ens" is said according to the 10 modes of being, and so essence will be like this too. Because being is found in one or the other of these genera, so too is essence. Essence follows, if you will, being understood in the first sense.

A consequence which we will see in Chapter 2: just as "ens" is said, "per prius" and "per posterius," that is to say, just as being is not a genus and is said first and principally of substance, only then of accidents, the same thing is true about essence. Up to now, this is not hard. So it is that one can say by opposition: "non entium non sunt essentiae, non sunt definitiones."[133]

b) The Diverse Names of Essence

So much for the word essence. Now see how other consequences are going to follow.

> Et quia illud [*We will encounter this expression very often, to manifest the link between the different points that are treated.*] per quod res constituitur [*He said that essence is that by which a thing is constituted in such and such a nature, in such or such a genus, in such or such a species.*] in proprio genere vel specie, est hoc quod significatur per diffinitionem indicantem quid est res [*If essence is that by which a thing is such and has such a nature, then it is that which we designate when, by a definition, (here is a new notion) we indicate "what a thing is" (so,*

133 *In I Post. An.*, lect. 2, n. 17.

two new words: definition and "quid"); because of this...] inde est quod nomen essentiae a philosophis in nomen **quiditatis** mutatur. [*This is easy, but very important; at a given moment, in order to signify more exactly the role of essence, one chooses a certain word rather than another; thus, because in defining, that is, in designating the essence by a definition, we indicate the "quid," now essence is going to receive another name; that is, what is signified by the word "essence" is going to receive another name: the name "quidditatis"; the philosophers do not content themselves with only one word, which would be essence; rather, they will name essence "quiditatis"; this is why, in reference to the definition, which, in describing the essence, indicates and manifests "quid est res"; there is a very direct relation between definition and "quid."*] Et hoc est quod Philosophus frequenter nominat **quod quid erat esse** [*This is a literal copy from the Greek: "τό τί ἠν εἰναι," but which is explained a little here by St. Thomas; here is what "quod quid erat esse" means:*], id est hoc per quod aliquid habet esse quid [*that by which a thing is "quid"*]. [*That is not all, there is a third name: "form"; the essence is form.*] Dicitur etiam **forma** secundum quod per formam [*Well, it is always necessary that there be something else signified in order to justify a new name. (We will soon make a general remark on the question of names: in order to give another name, there must be a reason.) The name "form" comes in if we insist on the aspect of perfection and determination, for "certitudo" here means determination; this certitude is found on the side of things.*] significatur certitudo uniuscuiusque rei, ut dicit Avicenna in II *Metaphysicae* suae. [*Yet another name: essence will sometimes be named "nature."*] Hoc etiam alio nomine **natura** dicitur accipiendo naturam secundum primum modum illorum quattuor, quos Boethius in libro *De Duabus Naturis* assignat, secundum scilicet quod natura dicitur omne illud quod

intellectu quocumque modo capi potest. Non enim res est intelligibilis nisi per diffinitionem et essentiam suam. [*So it is that in Book 5 of the* Metaphysics*, Aristotle is going to say that every substance is nature; when he distinguishes and orders the different senses of nature, this is the last one he gives; he begins with* ***nativitas****, then, principle of generation, two principles of generation: matter and form, and, at the end, every substance is able to be called nature: this one includes even the separated substances; but what is important to add here is this*:] Et sic etiam Philosophus dicit in V *Metaphysicae* quod omnis substantia est natura. Tamen nomen naturae hoc modo sumptae videtur significare essentiam rei, secundum quod habet ordinem ad propriam operationem rei [*Essence as a principle and cause of operation is going to be very justly named "nature"; and we often encounter this; the nature of the soul, for example, insofar as the soul is the principle of multiple operations.*], cum nulla res propria operatione destituatur. [*Finally, St. Thomas recapitulates with regard to the two principal names of essence.*] **Quiditatis** vero nomen sumitur ex hoc, quod per diffinitionem significatur. Sed **essentia** dicitur secundum quod **per eam et in ea ens habet esse**.[134]

c) A Complementary Remark: Why Multiply Names?

Certainly, *De Ente et Essentia* is a dry enough treatise at times. So it will be necessary to temper this a little by some remarks, while remaining, of course, within the purview of the course and without making too much of a digression.

So, let's ask the question: why should we multiply the names of a single thing? One must first remark that this multiplication of names is not superfluous, that it has a foundation. Let us try to understand well why.

134 *De Ente et Essentia*, ch. 1.

It is because the intellect is able to form many concepts of one and the same thing. One and the same thing can have many concepts and many definitions. Now, words do not signify things immediately, but by the mediation of concepts. What a name signifies immediately is what is conceived about the thing. Whence the possibility of many names for one thing. In fact, there are as many names as there are concepts and definitions.

On this subject, a problem is posed in theology. St. Thomas treats it in the First Part of the *Summa Theologiae*. He asks whether all the names attributed to God are synonyms. The response is that, because the divine nature is so perfect, we are not able to represent it except in a very imperfect way and thanks to a multiplicity of concepts, to each one of which a different name will correspond. To be good, to be just, to be wise—these posit no division in God. But when one says: "God is good," this does not signify the same thing as when one says: "God is just."

In sum, *the multiplicity of names corresponds to the multiplicity of concepts*. And this latter corresponds to what one might call the "virtual multiple," and that is to say, to the diversity of the perfections of one and the same thing. These remarks are sufficient to clarify our reading.

The Second Chapter

A. Essence is "Per Prius" in Substance

Sed quia ens absolute et per prius dicitur de substantiis [*We mentioned above that being is said "per prius" et "per posterius" and not univocally, like animal, for example; we cannot say: "animal is first of all man"; the definition of animal is verified equally of the two species, man and brute; even if this is so only so far as we are speaking of logical relations, for, in reality, "ipsum esse animalitatis," clearly, is superior in man and inferior in the brute: the*

internal sense, for example, is more perfect in men than in the brute; a sign of this is precisely that it will be given a special name: we will not speak about instinct in man, but we will speak more of the "cogitative"; and we will add reminiscence to memory; this manifests that "ipsum esse animalitatis" is more perfect in man. But when one says, "quid est animal," the "ratio animalis aequaliter se habet omnibus inferioribus," this is a constant rule for the univocal word.] et per posterius et quasi secundum quid de accidentibus [*One cannot limit being to substance; both substance and accidents are going to be called "being," but in order: being is first substance, but secondarily, "per posterius," accident. The same is so for essence; this is marvelous, this always follows: this word "essence" rigorously follows the word "ens."*], inde est quod essentia proprie et vere est in substantiis, sed in accidentibus est quodammodo et secundum quid.

B. Essence Can Be Simple or Composed

So, essence is found in many ways. Furthermore, if we remain within substance, there will also be a division between simple and composite substances. The simple substances are the separated substances, which will form the object of Chapters 5, 6, and 7.

> Substantiarum vero quaedam sunt simplices et quaedam compositae, et in utrisque est essentia, sed in simplicibus veriori et nobiliori modo, secundum quod etiam esse nobilius habent. ["*Dispositio in ente, dispositio in veritate," as we find in Book 2 of the* Metaphysics*; St. Thomas says, "verius"; he could have equally said, more intelligible; for the more something is simple, the more it is intelligible, not for us, certainly, but "quoad se"; "notissimum quoad se," more intelligible, more noble, all this goes together.*] Sunt enim causa eorum quae composita sunt [*and these*

> *substances are efficient or final causes of composite substances; and St. Thomas, so as not to affirm anything but what cannot be doubted—for, that separated substances are moving causes, efficient or final, of the sublunary bodies, of the composed substances, this would demand a demonstration, and in any case, it is less manifest, less known by all—says: at least God*], ad minus substantia prima simplex, quae Deus est. [*This, clearly, is a consideration of a theological order.*]

C. The Essence of Composed Substances Is Neither Solely Matter, nor Solely Form

Now, once again, a rule of teaching or discovery concerning the mode of proceeding: which way must we go, since we are in the presence of two sorts of substance to be studied: simple substances and composed substances?

> Sed quia illarum substantiarum essentiae sunt nobis magis occultae [*namely, the essences of simple substances, clearly; already in the case of the angel, we cannot know anything but the "an est" and a certain "quid non est": but with regard to the essence as such, known positively and being able to define in the strict sense of the word, one cannot do this; this is hidden from us; one must take account of this in the order which we are going to adopt.*], ideo ab essentiis substantiarum compositarum incipiendum est [*This is an application of the necessity of going from the "notius quoad nos" to the "notius quoad se."*], ut a facilioribus convenientior fiat disciplina. [*This is the road one must follow if the teaching is going to be appropriate.*]

Now, there is a little patch where things get complicated. That is why we are going to soon take a short pause in our reading

in order to elucidate what causes the difficulty here.

a) A Reading of the Text

In substantiis igitur compositis forma et materia notae sunt, ut in homine anima et corpus [*In order to have the evidence for this, one must know distinctly the first book of the* Physics, *and we cannot presuppose it here.*] Non autem potest dici quod alterum eorum tantum essentia esse dicatur. [*That is to say, matter and form, body and soul; one cannot say that one of the components is sufficient, namely the matter alone, or the form alone; nor can one say that the form alone constitutes mobile being; both are necessary, and St. Thomas will state this separately.*][135]

1. Essence Is Not Matter Alone

Quod enim materia sola non sit essentia rei planum est, quia res per essentiam suam et cognoscibilis est [*In the measure in which there is essence, there is intelligibility; the thing is knowable by its essence; and not only is knowable, but:*] et in specie ordinatur vel genere. [*If we can class a thing under such a genus or under such a species, this is thanks to the essence; but the matter "non est cognitionis principium."*] Sed materia neque cognitionis principium est, neque secundum eam aliquid ad genus vel speciem determinatur, sed secundum id quod aliquid actu est. [*Matter, for its part, lacks the things needed for it to be truly essence: it isn't in itself intelligible, and it cannot be a principle of determination that would permit the thing to be such or such.*]

135 *De Ente et Essentia*, ch. 2.

2. Essence Is Not Form Alone

Neque etiam forma tantum essentia substantiae compositae dici potest, quamvis hoc quidam asserere conentur. Ex his enim quae dicta sunt patet quod **essentia** [*This will become very interesting, as we will see, but said like this, it is too brief for us; it is necessary to develop this a little: after what we have said, it is evident that essence is that which is signified by the definition of the thing and is the reason that we have been able to call it a "quid."*] **est illud, quod per diffinitionem rei significatur**. Diffinitio autem substantiarum naturalium non tantum formam continet, sed etiam materiam; aliter enim diffinitiones naturales et mathematicae non different. [*Because we know that sensible matter does not enter into a mathematical definition, we make abstraction from it; and so, when we leave the text behind a little, this will be a point, this will even be the principal point, which we have in mind; evidently, it will be necessary to prepare it a little, but in sum it will be this: we will clearly pose the question: what is a natural definition?*]

We must note[136] that the notion of definition comes into the argument. If we remove from the argument the word "definition," the argument fails. By taking cognizance of everything that is required for the understanding of this argument we can account for the rigor of everything that has preceeded. St. Thomas wishes to manifest that form alone cannot constitute the essence of a composite substance. And for this end, he uses the link we have made between essence and definition when examining above the different names of essence: we have seen already that essence is sometimes called "quiddity" because it is that which is signified in the definition of a thing, that is to say,

136 [This and the subsequent three paragraphs are an additional remark borrowed from the Review Course of February 18, 1975.]

in that instrument of the intellect which expresses the "quid" of a thing. The argument is founded on this.

In sum, the essence is what the definition signifies. Now, the definition of natural substances, while it signifies their essence, does not contain only their form but also their matter. It therefore follows that the essence of natural substances is not constituted only by their form, but also by their matter.

It remains to show that natural definition, that is to say, the correct and complete definition of a natural substance, truly contains the matter of the substance. And St. Thomas does this by saying that if it were not the case, it would not truly be a definition because it would not differ from a mathematical definition, which, as we know, abstracts from sensible matter.

Clearly, for us, even this must be manifested. What exactly is a natural definition? This is the most important point, which we must soon examine when we leave aside the text a little to add some complementary notions. Our business, then, is to arrive at a more and more distinct knowledge of what a natural definition is.

> Nec etiam potest dici quod materia, in diffinitione substantiae naturalis, ponatur sicut additum essentiae eius [*One might be tempted to say: Matter does not enter as a constitutive element into essence, but it is added to essence; but this is not the case because:*] vel (sicut) ens extra illam naturam vel essentiam eius, quia hic modus diffinitionis proprius est accidentibus [*Accidents can never be defined without reference to substance, even while remaining distinct from substance and being extrinsic to it; and if we conceive matter in this way, in its relation to the essence, one would confound the definition of essence with the definition of accident.*], quae perfectam essentiam non habent. Unde oportet quod in diffinitione sua subiectum

> recipiant, quod est extra genus eorum.[137]
>
> Conclusion:
>
> Patet ergo quod essentia comprehendit materiam et formam.[138]

b) Complementary Considerations to Manifest the Text

In sum, this is the problem of matter and form, and everything that it implies with reference to the concept of natural definition. We are going to make three considerations: 1. Primary matter and substantial form; 2. Primary matter and the "naturalis"; 3. The problem of natural definition. Of these three considerations, the first two will be principally ordered to manifesting the statement that the composed essence cannot be only matter; and the third will be ordered principally to manifesting the statement that composed essence cannot be only form.

1. Primary Matter and Substantial Form

1) Our Instrument of Manifestation: the History of Philosophy Presented by the Wise Man

We will not go to the treatise called the *Physics* in order to manifest all this—that would be too long. We are going to use instead the history of philosophy. While doing so, it will be necessary to avoid certain mistakes in consulting the history of philosophy. We know, indeed, that the history of philosophy is ordinarily very badly conceived. Under the pretext that, in order to study the history of philosophy, one must enumerate the opinions of Messrs. X, Y, or Z, the great danger is to fall into "curiositas," that is to say, to be attached to Messrs. X, Y, or Z, without pursuing as

137 Ibid., ch. 2.
138 Ibid.

an end: "ut veritas limpidius appareret."[139]

Now, the history of philosophy must have the truth in view. It is only if the truth might appear to us in a more limpid way by the recitation of such or such an opinion that this becomes fitting and even wonderful to do. But if, on the contrary, one does not order such a singular to something else, namely, to the truth, this cannot but be bad. Let us recall just this, that one of the cases of "curiositas" is when someone knows the singular without ordering it to something useful.

This being said, the history of what is of interest to us here, for example, could be undertaken and presented by the "physicus," since it especially belongs to him to be concerned about matter and form; this is well understood. But then we lose certain advantages, due to the fact that physics, or the science of nature, is a particular science.

But before speaking of the advantages that one can draw from a history of philosophy pursued outside of the frame of a particular science, and to help us to comprehend them, let us retrace, in broad strokes, the history of Greek philosophy—that one could moreover call simply the history of intelligence, because here we are following step by step the progress of human intelligence in its investigation of things.

This begins with the poets, then passes through the theological poets, to arrive at the "naturales," of whom the "princeps" was Thales. Next, if we wish to indicate the major steps, we must note that, among the "naturales," those who preceded Socrates fairly immediately considered natural things as being so mobile that one could not dream, in their opinion, of having a science of them in any rigorous sense. Socrates, in the face of this, took refuge in moral matters. But you must be careful, as we already said; this does not mean that Socrates was as such a moralist.

139 *In II Metaph.*, lect. 1, n. 287.

Indeed, what is very interesting in the case of Socrates is that he remained speculative; he considered operable matter, but the way he uses it in his consideration is speculative: he proceeds, St. Thomas would say in two words, "definiendo et dividendo."[140] Well, Socrates was the first to seek to define things in this way. This is why, like Thales, he too can be called "princeps." Plato, next, is going to try to return again to natural things. But he too, believing that this would not work because of this mobility, this contingency in the things of nature, will have recourse to separated ideas, that is to say, he will look outside of natural things themselves for something common by which one might define them.

Clearly, we have scraps of all this history in the *On the Soul* and in the *Physics*, but it is in the *Metaphysics* that this becomes much more interesting. Indeed, when we are able to see the *wise man* present the history of philosophy, even with regard to a particular problem, this is an immense advantage, even many advantages, which one has gained. We may attribute at least five good points to the history of philosophy in so far as it is presented by a wise man. First, the wise man attacks at the root. This is normal, because the wise man is interested in things that are first of all. *So he attacks at the root*. And then, attacking the root, he is found seeing things from much higher, even if his mode of presentation is very proportioned. So *he sees from on high*, and because he sees from on high, *his order is superior*. The fourth profit is attached to the mode. For example, one does not proceed in morals as one proceeds in the science and nature; now to distinguish which mode is fitting in every case, according to the problem approached, demands discernment. Now, *discernment* is the quality *par excellence* of the intellect and so the quality *par excellence* of the wise man. Finally, though at bottom this

140 *STh* I, q. 14, a. 16.

comes to almost the same thing, *the fundamental distinctions are also always posed by the wise man*. Sometimes, someone who has devoted himself to a particular discipline might mention certain important distinctions, but it remains that he is limited by the fact of being confined to a particular discipline. For all these reasons, is much more interesting when the history of philosophy can be presented by a wise man, for in each specific question which he treats we will find the five notes or profits which we have mentioned.

And, in fact, on this problem of matter and form as necessary to the essence of composed substances, we can find such a history written by the wise man. Our problem could be formulated as follows, if we wish to study it by means of history: how was man at any given moment able to attain to what is truly primary matter and to substantial form? In effect, this took a long time. We just said that the wise man attacks the root; but, in order to write history, the wise man also must see what is first in the order of generation.

On this historical question, we find something very interesting in the *Metaphysics*, in Book 7. The seventh book of the *Metaphysics* is, besides, a veritable mine. It is absolutely extraordinary how much one can find in it. We are going to have a little illustration of that immediately.

2) The History of Philosophy: the Discovery of Primary Matter and Substantial Form

Let us note, in passing, that this Book 7 evidently prepares the way to Book 8 of the *Metaphysics*. At the beginning of his commentary on Book 7, St. Thomas says this: here, Aristotle begins to determine about being. But being as being is the subject of the *Metaphysics*! How can it be that he has not spoken of it before? Truly, he has taken his time. Well, he had to take his time. Here

then, he says, he begins to determine being. And this being said, as we have seen above, "per prius et posterius," as being is first of all substance, to determine being is to determine first of all substance. The accidents will come later.

But another interesting point is that in Book 7 he still only deals with a common knowledge of substance. As St. Thomas comments:

> Et quia posset alicui videri, quod ex quo Philosophus ponit omnes modos quibus dicitur substantia, quod hoc sufficeret ad sciendum quid est substantia; ideo subiungit dicens, quod nunc dictum est quid sit substantia solum "typo," idest dictum est solum in universali [*It is only a question of the confused knowledge assured by logic; this is why, St. Thomas says, the proper mode of this whole book is the logical mode; but what does logic mean here? It was not for nothing that we said that we cannot base ourselves on the word "logic" in order to present the subject of logic, since this would multiply unknowns and difficulties; it suffices for the moment to know that this particular book treats substance but, as he will say later, "hoc non est sufficiens ad cognoscendum naturam rei."*], quod substantia est illud quod non dicitur de subiecto, sed de quo dicuntur alia; sed oportet non solum ita cognoscere substantiam et alias res, scilicet per definitionem universalem et logicam: hoc enim non est sufficiens ad cognoscendum naturam rei, quia hoc ipsum quod assignatur pro definitione tali est manifestum. Non enim huiusmodi definitione tanguntur principia rei [*We do not touch upon the very principles of the thing.*], ex quibus cognitio rei dependet; sed tangitur aliqua communis conditio rei per quam talis notificatio datur. [*This is extraordinary.*][141]

He had to begin with this. It would have been precipitous to

141 *In VII Metaph.*, lect. 2, n. 1280.

do in Book 7, after Book 6, everything which one finds in Book 8. In Book 8, he will throughout determine substance "ex propriis."

But let us return to the history of philosophy and try to see how human intelligence has been elevated to the notions of primary matter and substantial form.

> Decepit autem antiquos philosophos hanc rationem inducentes, ignorantia formae substantialis. [*The ancients went wrong because they did not know substantial form; what is interesting is what follows.*] Non enim adhuc tantum profecerant [*They had not progressed enough.*], ut intellectus eorum se elevaret ad aliquid quod est supra sensibilia [*Their intelligence could not at that time be elevated above sensible things.*]; et ideo illas formas tantum consideraverunt [*For them, what did form mean?…],* quae sunt sensibilia propria vel communia [*Hot, cold, figure, movement; but always something which, in itself, is grasped by the senses.*]. Huiusmodi autem manifestum est esse accidentia [*All the sensibles, proper or common, are but accidents.*], ut album et nigrum, magnum et parvum, et huiusmodi. Forma autem substantialis non est sensibilis nisi per accidens. [*This is something completely different; there is something sensible, but to which is adjoined something which can only be grasped via the intellect; animals do not grasp the accidentally sensible; for example, Socrates is accidentally sensible, because I see the color and the shape of Socrates and my intelligence discovers, in this being, humanity; animals are also not able to place the singular under the universal (see* In II Post. An., *lect. 20: "in man, the sense knows the universal in a certain way," that is what this means; among animals, no! Then, there is a paragraph which follows: in such a case, in such a case…; it is a very beautiful paragraph where we read that the sheep, in regard to its little one, does not see its lamb, but what it sees is what is able to be a principal or term of*

> *its action, namely, giving suck, etc.).*] Et ideo [*Given that the only forms which they knew were common or proper sensibles and not per accidens sensibles, they were consequently not able to distinguish these forms from matter.*] ad eius cognitionem non pervenerunt, ut scirent ipsam a materia distinguere.[142]

[Calling back to mind of some lines from *De Ente et Essentia* that we are trying to manifest:]

At the end of the last class, we were trying to make manifest that composite substance, material substance, is not composed only of matter. And St. Thomas gave two reasons: because, in fact, matter in itself is unintelligible and because pure potency does not have what it takes to become a principle of constitution and determination. This is tied to the fact of putting the nature under such a genus or such a species. And next, someone might say: but all the same, form can constitute a nature; and we might believe that material substance is constituted by form alone. Now, this is not at all the case. And what is very important here is that this will be manifested by the definition.

> Neque etiam forma tantum essentia substantiae compositae dici potest, quamvis hoc quidam asserere conentur. Ex his enim quae dicta sunt [*One must recall what he said before.*] patet quod **essentia est illud, quod** [*According to the name which the Philosopher gave to essence, "quiddity," for essence is what is signified by definition.*] **per diffinitionem rei significatur**. Diffinitio autem [*Here, the principle of manifestation is the definition; this is why, for some time our considerations have turned around definition, in order to arrive finally at considering the more manifest cases of natural definition.*] substantiarum naturalium non tantum formam continet, sed etiam materiam; aliter enim

142 Ibid., n. 1284. [Here ends the lecture given on February 11, 1975.]

> diffinitiones naturales et mathematicae non different. [*It is sufficient for the moment to know that if we were to define material substances by their form alone, there would be no difference between the mode of defining of the "naturales" and those of the mathematician; because when the mathematician defines the line, he defines it without sensible qualities; considering quality is going to be the principal consideration of the philosopher of nature.*][143]

[End of the recall]

Now we will continue the history of the problem of primary matter and of substantial form. We were examining the question in order to know how it was that the ancient philosophers knew neither substantial form nor primary matter.

> Decepit autem antiquos philosophos hanc rationem inducentes, ignorantia formae substantialis. Non enim adhuc tantum profecerant, ut intellectus eorum se elevaret ad aliquid quod est supra sensibilia [*And so what did they consider as form? The common and proper sensibles; this is not said this way at all in the* Physics.]; et ideo illas formas tantum consideraverunt, quae sunt sensibilia propria vel communia. Huiusmodi autem manifestum est esse accidentia [*These proper and common sensibles are accidents.*], ut album et nigrum, magnum et parvum, et huiusmodi. Forma autem substantialis non est sensibilis nisi per accidens. [*And the "**sensibile per accidens**" cannot be perceived except by a being which, while possessing sensation, also possesses intelligence.*] Et ideo ad eius cognitionem non pervenerunt, ut scirent ipsam [*Namely, substantial form.*] a materia distinguere. [*From the moment when one goes wrong about the nature of substantial form, one cannot distinguish this substantial*

143 *De Ente et Essentia*, ch. 2.

> *form from the matter, they are wholly ignorant of it; what follows is very interesting.*] Sed totum subiectum, quod nos ponimus ex materia et forma componi [*This whole which for us is in reality a composite of matter and form (what the manuals call second substance), was for them primary matter.*], ipsi dicebant esse primam materiam, ut aerem, aut aquam, aut aliquid huiusmodi. Formas autem dicebant esse, quae nos dicimus accidentia [*What they called matter, we call "composed from matter and form"; what they called forms, we call accidents.*], ut quantitates et qualitates, quorum subiectum proprium non est materia prima, sed substantia composita quae est substantia in actu: omne enim accidens ex hoc est, quod substantiae inest, ut habitum est.[144]

This is very well summarized. For it treats a very difficult problem. Let us take it up again. Being unable to elevate themselves above the sensibles, the ancients are naturally going to conceive matter and form on the sensible level. In such a way that what we call "composed of matter and a form" and what is able to be grasped by the sense (a material substance manifest to the senses), they wish to call "matter"; and the accidents which we also see by the senses are what they wish to call forms.

What follows is absolutely extraordinary.

> Quia ratio praedicta ostendens solam materiam esse substantiam [*The ancients tried all the same to show that matter was substance.*], videtur processisse [*Their way of arguing.*] ex ignorantia materiae [*Ignorance of form has led to ignorance of matter; so, in fact, they did not know matter.*], ut dictum est; ideo consequenter dicit, **quid sit materia est secundum rei veritatem**, prout declaratum in primo *Physicorum*. [*The metaphysician is speaking, but he assumes the definition of primary matter given by the*

144 *In VII Metaph.*, lect. 2, n. 1284.

> *"naturalis."*] Materia enim in se non potest sufficienter cognosci, nisi per motum. [*Insofar as we do not arrive at the notion of generation or of corruption, we cannot achieve a true knowledge of primary matter beginning simply from certain movements or certain accidental "mutations."*] Et eius investigatio praecipue videtur ad naturalem pertinere. [*This is marvelous; everything which cannot be known except by way of movement pertains to the proper light of natural philosophy.*][145]

And indeed, it does not belong to metaphysics as such to enter into so much distinction. There is a beautiful text at the beginning of the *Sentences* where one finds a very striking expression on the subject. It treats of the opposition between natural theology, which is metaphysics, and supernatural theology, which is based on revelation: because it is based on revelation and because revelation touches on everything down to the singular, the theologian can descend right to what is proper about anything at all, while metaphysics does not descend to the knowledge of natural or moral things.

> Aliqua cognitio quanto altior est, tanto est magis unica et ad plura se extendit: unde intellectus Dei, qui est altissimus, per lumen quod est ipse Deus, omnium rerum cognitionem habet distincte. Ita et cum ista scientia sit altissima et per ipsum lumen inspirationis divinae efficaciam habens, ipsa unica manens, non multiplicata, diversarum rerum considerationem habet, non tantum in communi, sicut metaphysica, quae considerat omnia inquantum sunt entia, **non descendens ad propriam cognitionem moralium, vel naturalium**.[146]

But here is what is said about primary matter:

145 Ibid., n. 1285.
146 *In I Sent*., prol., q. 1, a. 2, sol.

> Unde et Philosophus accipit hic de materia, quae in physicis sunt investigata, dicens: dico autem materiam esse quae secundum se, idest secundum sui essentiam [*Matter, if we consider it in its essence*] considerata, nullatenus est neque quid, idest neque substantia [*Matter, according to its essence, ought to be defined without any reference to form: it is neither substance, nor quantity, nor quality, or any of the modes of being enumerated in the* Categories*; it is none of those things.*], neque qualitas, neque aliquid aliorum generum, quibus ens dividitur, vel determinatur.[147]

> Et hoc praecipue apparet motu. Oportet enim subiectum mutationis et motus alterum esse, per se loquendo, ab utroque terminorum motus, ut probatum est primo *Physicorum*. Unde, cum materia sit primum subiectum substans non solum motibus, qui sunt secundum qualitatem et quantitatem et alia accidentia, sed etiam mutationibus quae sunt secundum substantiam, oportet, quod materia sit alia secundum sui essentiam ab omnibus formis substantialibus et earum privationibus, quae sunt termini generationis et corruptionis; et non solum quod sit aliud a quantitate et qualitate et aliis accidentibus.[148]

In brief, if we do not go through generation and corruption, which are certain changes, we will never arrive at the notion of primary matter. This is because primary matter is the principle of generation and substantial form is its term.

Book 7 is devoted to the study of substance. But in a special way, as we will see soon enough. It was fully necessary that Aristotle use the definition of primary matter given by the "naturalis." But why does the Seventh Book not always precede like this, "per viam motus"? After all, it treats of material substance,

147 *In VII Metaph*., lect. 2, n. 1285.
148 Ibid., n. 1286.

sensible substance, substance composed of matter and form.

> Attamen diversitatem materiae ab omnibus formis [*To the question of what matter is, the "naturalis" responds and the metaphysician assumes his response; that is to say, he must respond "per viam motus," which belongs to the "naturalis"; to the question: how does one distinguish matter from every form? The "naturalis" may also respond, but in this book, it is the logician who will do so, that is, the metaphysician will do it by assuming logic this time; so, just as the metaphysician assumed the philosophy of nature in his definition of primary matter, he is going to assume logic in order to manifest the diversity of matter with regard to all forms.*] non probat Philosophus per viam motus [*No, we leave this way.*], quae quidem probatio est per viam naturalis philosophiae [*So what is the way which the metaphysician will borrow? The logical way.*], sed per viam praedicationis [*They are going to manifest the problem in question thanks to predication.*], quae est propria logicae, quam in quarto huius dicit affinem esse huic scientiae. [*There is a very particular affinity between logic and metaphysics: both are universal, etc., etc.…*][149]

Let us lay aside this problem as such. Here, there is an absolutely fundamental distinction. If we do not see it, we comprehend nothing in this book. It is very beautiful (though very long) to see the discourse of Aristotle in this book that is constantly based on logic in order to manifest the real; but be careful—this is not dialectic, let us say in passing. We can indicate also something about the *Commentary on the Metaphysics* composed by St. Albert. This is not a commentary like the one composed by St. Thomas, with a division of the letter, manifestation of the order, etc.; St. Thomas is the only one, besides, who

149 Ibid., n. 1287.

divided the letter in this way. St. Albert, on the other hand, disengages certain problems—we must admit that these are problems that are worth the trouble—and he then tries to stick to the letter as much as possible. Among other things, St. Albert says (about a little text commented upon by St. Thomas, in n. 1280, cited above): one must not be content with what he says here about substance, according to the logical mode; it is a clearly insufficient knowledge; but it was necessary.

> Oportet autem nos non solum ita typice de substantia determinare… Non enim sufficiens est secundum facultatem primae philosophiae modo typico de substantia determinare.[150]

At bottom, what is manifested? What is made known? St. Thomas speaks of a knowledge which is common only because the principles of substance themselves are not touched upon.

> Non enim huiusmodi definitiones tanguntur principia rei, ex quibus cognitio rei dependet; sed tangitur aliqua communis conditio rei per quam talis notificatio datur.[151]

This "communis conditio" belongs to logic.

But here is how St. Albert interprets this passage and, in fact, the whole book, for we must trace out the ultimate consequences. The word "τύπῳ" (*tupo*), which can mean "summarily," St. Albert translates clearly and explicitly by the idea of dialectic, namely, the probable.

> Oportet autem nos non solum ita typice de substantia determinare, sed etiam per magis essentialia et per modum demonstrationis. Non enim sufficiens est secundum facultatem primae philosophiae modo typico de

150 St. Albert, *In VII Metaph.*, tr. 1, ch. 5.
151 St. Thomas, *In VII Metaph.*, lec. 2, n. 1280.

> substantia determinare, eo quod iste modus communis est **et ex probabilibus** et ideo non manifestus, eo quod non est per essentialia immediata determinans quid est et propter quid.[152]

This interpretation is absolutely false. Book 7 is not a book of dialectic, however much logic plays the principal role of manifestation in it. Maybe one day we will be up to seeing this a little more carefully. There are two beautiful texts in particular which might help us here.

It is in such circumstances that one sees that St. Thomas has it over the others as a commentator on Aristotle.

2. *Primary Matter and the "Naturalis"*

We have, a little further on, in number 1296, a consideration which we might entitle *Primary Matter and the "Naturalis."*

1) *The Equivalent in the* Physics

We can also find this consideration in the *Physics*, at the very end of the first book, but Aristotle does not speak of it in the same way as here in the *Metaphysics*. It is in this passage that Aristotle, in order to manifest that matter desires form by nature, compares matter to the "turpe" and to woman. Just as, he says, female naturally desires the male, and the ugly naturally desires the beautiful, in the same way matter naturally desires form.

> Sed tamen et materia est **hoc**, idest privationem habens, sicut si femina appetat masculum et turpe appetat bonum, non quod ipsa turpitudo appetat bonum sibi contrarium, sed secundum accidens, quia id cui accidit esse turpe, appetit esse bonum: et similiter femineitas non appetit masculinum, sed id cui accidit esse feminam.

152 St. Albert, loc. cit.

> Et similiter privatio non appetit esse formam, sed id cui accidit privatio, scilicet materia.[153]

Well, St. Thomas reports an objection of Avicenna: how is it that Aristotle, who reproaches Plato over having taught badly by using metaphors, falls into the same error?

> Obiicit per hoc, quia dicere quod materia appetat formam sicut femina masculum, est figurate loquentium, scilicet poetarum, et non philosophorum.[154]

St. Thomas responds that it is not a question of metaphors here. What Aristotle uses ought rather to be called an expression by way of example {"locutio exemplaris"}.

> **Nec etiam utitur hic figurata locutione, sed exemplari.** Dictum est enim supra quod materia prima scibilis est **secundum proportionem**, inquantum sic se habet ad formas substantiales, sicut materiae sensibiles ad formas accidentales; et ideo ad manifestandum materiam primam, oportet uti exemplo sensibilium substantiarum. Sicut igitur usus est exemplo aeris infigurati et hominis non musici ad manifestandam materiam, ita nunc ad eius manifestationem utitur exemplo feminae virum appetentis, et turpis appetentis bonum: hoc enim accidit eis inquantum habent aliquid de ratione materiae.[155]

An expression by example is like an example in brief, just as metaphor can be an "εἰκών" (comparison) in brief. Instead of saying: he hurls himself like a lion, one might say: this lion hurls himself. Aristotle remarks in Chapter 3 of the *Poetics* that metaphor is more delightful than the "εἰκών" (*eikon*), because it is shorter and because it is addressed directly to what things

153 St. Thomas, *In I Phys*., lect. 15, n. 136.
154 Ibid., n. 137.
155 Ibid., n. 138.

are. The same thing goes for the expression by way of example: it is more delightful for the intellect than example because it is shorter and leaves something of the delight of discovery to the intellect. In effect, the example normally ought to involve four terms; but here we abridge all this and so there comes to be an expression by way of example. In order to better manifest this, we can recall an expression by way of example that we have formed in another course in order to manifest the first sentence of the *Rhetoric* of Aristotle. This expression by way of example remains wholly true, moreover, even though one must not take it as a literal translation of the very text of Aristotle. Here, first of all, is the sentence from Aristotle:

> Ἡ ῥητορική ἐστιν ἀντίστροφος τῇ διαλεκτικῇ.[156]

In this first sentence from the *Rhetoric*, Aristotle establishes the relation between dialectic and rhetoric (always to be understood in the sense of "utens"). To this end, he uses the word "ἀντίστροφος" (*antistrophos*). But if, in place of reading "ἀντίστροφος," which is an adjective, we take the noun "ἀντίστροφή" (*antistrophe*), the sentence becomes an expression by way of example, because antistrophe has a very precise sense: the antistrophe corresponds to the strophe in chants. So, the sentence becomes *rhetoric is the antistrophe of dialectic*, while if we keep the adjective "antistrophos," the translation may even use a verb: in English, for example one will say: rhetoric "is the counterpart" of dialectic; whereas in French, one will say: rhetoric "corresponds to," "is similar to" dialectic.

We have wandered a little from our subject; we must simply note that in this place, that is to say on the last page of the first book of the *Physics*, Aristotle, and St. Thomas as commentator, say pretty much what is said in the text of the *Metaphysics*

156 Aristotle, *Rhetoric* 1.1, 1354a1.

which we are going to read now.

2) Return to Book 7 of the Metaphysics

We read, in number 1285, that primary matter is "neque quid [*neither substance*], idest neque substantia, neque qualitas, neque aliquid aliorum generum, quibus entis dividitur." The problem is that if this is so, it is in itself unintelligible. So how can we know it? "Per analogiam," Aristotle will answer. Be careful! "Analogia," here, has nothing to do with the analogical word. Here "analogia" means simply "by comparison."

> Materia autem, licet non sit posterior sed quodammodo prior, tamen [*For Aristotle wishes to show that one of the most difficult things concerning the knowledge of substance is what concerns form; this is why he speaks a little bit about matter first, because it is "in a certain way" more manifest; only later will he speak about form; he therefore says: matter (primary, clearly) is manifest "aliqualiter," in some way.*] aliqualiter est manifesta. Dicit autem aliqualiter quia secundum essentiam suam non habet unde cognoscatur [*If we consider its essence simply, we cannot know it; because the principle of knowledge is always form; but then, how is matter known?*], cum cognitionis principium sit forma. Cognoscitur autem **per quamdam similitudinem proportionis.** [*Thanks to a similitude of relation; think of little bit about mathematics: 8 is to 4 what 16 is to 8; there are 4 terms; because 16 is double 8 and 8 is double 4, one of these relations can make known the other.*] Nam sicut huiusmodi substantiae sensibiles se habent ad formas artificiales [*Here is the first member; for example, in order to manifest the relation between 16 and 8, we rely on the more manifest relation between 4 and 2; here, with a view to manifesting the relation between primary matter and substantial form, we can base them on*

> *a first similar relation between two more manifest terms: sensible substance and artificial form, for example, the wood and the form of the table, copper and the figure of the statue, and, in general, the matter, whatever it be (wood, marble, iron, etc.) and what we will call the composition, which composition proceeds from the practical intellect of the artist; the artist presupposes the matter and wishes that it be a table or something else*.] ut lignum ad formam scamni, ita prima materia se habet ad formas sensibiles. Propter quod dicitur primo *Physicorum*, quod materia prima est **scibilis secundum analogiam**. Et ideo restat de tertia perscrutandum [*For Aristotle divided material substance into matter, form, and composite; the composite is manifest; the matter is manifest in a certain way, namely, "secundum analogiam"; there remains the form*.], scilicet de forma, quia ista est maxime dubitabilis. [*But this is another story.*][157]

3. *The Problem of Natural Definition*

Now, we are going to progress toward the notion of natural definition. But we must take some detours and make some preparatory considerations. The first thing that we are going to read is the last lesson of the seventh book of the *Metaphysics*; it forms a kind of transition between this book and Book 8. Book 7 proceeds "logice," "ex communibus"; Book 8 will proceed "ex propriis."

> Philosophus in principio huius septimi promiserat se tractaturum de substantia rerum sensibilium quae est quod quid erat esse [*One must put together "quod quid erat esse" and "quid"; let us treat it as a synonym*.], quam logice notificavit ostendens, quod ea quae per se praedicantur, pertinent ad quod quid est [*Here is an example:*

157 *In VII Metaph*., lect. 2, n. 1296.

> *we say "homo est animal"; this is an essential attribution: animal enters into the definition of man; Aristotle shows that in order to be truly a substance, it is necessary that this respond to an essential attribution; he promised this*.], ex quo nondum erat manifestum quid sit substantia [*What substance is in reality, in itself, we still do not know, because the principle which has given us light up to now, however valid it be, was simply logical; now the principles are going to be drawn from the reality itself; but with regard to these principles, the Platonists said: these are separated forms*.], quae est quod quid erat esse. Hanc autem substantiam Platonici dicebant esse universalia, quae sunt species separatae: quod Aristoteles supra immediate reprobavit. Unde relinquebatur, quod ipse Philosophus ostenderet quid secundum rem sit substantia, quae est quod quid erat esse. Et ad hoc etiam ostendendum praemittit, quod **substantia, quae est quod quid erat esse, se habet ut principium et causa** quae est intentio huius capituli.[158]

Then, after having spoken again about the Platonists, he says:

> …quasi aliud principium ab eo principio logico, per quod ingressi sumus in principio septimi ad inquisitionem praedictae substantiae.[159]

It is now necessary for us to use another principle than that which we used from the beginning and thanks to which we have *entered into* ("ingressi sumus") the investigation of substance. We can see that the "*manuductio*" brings us quite a way. Evidently, we must always understand it first of all as being about those things of which St. Thomas speaks in the *Summa Theologiae* (I, q. 117): about sensible examples, likenesses, opposed things, etc. But in the end, we can understand by *manuductio* everything

158 Ibid., lect. 17, n. 1648.
159 Ibid.

able to lead to the "quid." Thus, Book 7, compared to Book 8, is a *manuductio*, which is without doubt not necessarily grasped by all, but which is *manuductio* all the same.

A little later, he says:

> Subiungit autem quid sit illud principium aliud per quod ad propositam quaestionem ingrediendum est, dicens quod hinc procedendum est ad ostendendum quid sit praedicta substantia, quod sciamus quod in ipsa substantia est principium quoddam, et causa quaedam.[160]

Substance is the principle and cause now. We will not show this from logic.

There is a little remark that it may be worth our trouble to note, in no. 1651.

> Et statim reprobat primum modum intelligendi; dicens [*The issue is about questions; how ought we to pose questions?*], quod quaerere propter quid ipsum est ipsum, sicut propter quid homo sit homo, nihil est quaerere. In omni enim quaestione, qua quaeritur propter quid, oportet aliquid esse manifestum, et aliquid esse quaesitum, quod non est manifestum.[161]

Now, we are going to go on to the subject that directly interests us.[162]

We have titled this point: the problem of natural definition. And in fact, to manifest natural definition is the intention of this third point. Nevertheless, we are not going to arrive at this immediately. But in any case, it is going to be centered on problems of definition. In fact, we are going to try to respect the initial mode of the intellect by first considering the definition of

160 Ibid.

161 Ibid., n. 1651.

162 [Here ends the first lecture given on February 12, 1975.]

an artificial work for Aristotle. Though we are going to define something artificial, we are going to find present already the elements of a natural definition.

[But along the way,[163] we are going to gather up an important distinction between logic and philosophy (that is, science of nature and metaphysics). Certainly, if the class were addressed only to very young people, it would be necessary to content ourselves with saying: here is a natural definition and here is one that isn't. But Aristotle goes much further. He's going to distinguish between a logical "quod quid erat esse" and a real "quod quid erat esse." And this, always, with regard to a house, that is to say, with regard to an artificial thing.

We also find this definition of a house in the *Posterior Analytics*, but less well articulated than here. And it is in a completely different context, where it is a question of manifesting that one can demonstrate one definition by another, for example, that one can demonstrate a definition through matter with the aid of the definition through form, and a definition through the agent with the aid of a definition through the end. But here we find something else.]

1) The Opposition between a Natural and Logical Definition, Occasioned by the Definition of an Artifact: the House

Here we have a question. But we respond to a question by a definition.

> In quaerendo autem propter quid de aliquo [*Because we cannot ask ourselves, in every question, "propter quid homo est homo?" There must be something manifest and also something not manifest, and it is this latter that we seek; so there are two points.*], aliquando quaeritur causa,

163 [The bracketed section is an additional remark borrowed from the Summary Course of February 18, 1975; the question is how to define a house.]

quae est forma in materia. [*We are not so far from* De Ente et Essentia*; even if we are in the order of the artificial, the cause is form and matter*.] Unde cum quaeritur, propter quid tonat? respondetur, quia sonitus fit in nubibus: hic enim constat quod aliud de alio est quod quaeritur. Est enim sonitus in nubibus, vel tonitruum in aere.

Aliquando autem quaeritur causa ipsius formae in materia [*Always "in materia"; so at that moment, what is one seeking? The agent or the end*.] quae est efficiens vel finis [*Two extrinsic causes*]; ut cum quaerimus propter quid haec, scilicet lapides et lateres, sunt domus? in ista enim quaestione est aliquid de aliquo quod quaeritur, scilicet domus de lapidibus et lignis. Et ideo Philosophus non dixit simpliciter, quod quaeratur quid est domus, sed propter quid huiusmodi sunt domus. Palam igitur est quod ista quaestio quaerit de causa.

[*Here, things get extremely serious:*] Quae quidem causa quaesita, est quod quid erat esse [*This is a "quid"; this is curious, it is a "quid"; supposing that it is a question of the efficient or the final cause, and these are extrinsic causes, how can we say that we respond by giving a "quid"?*], **logice loquendo** [*Here again a "logice loquendo"; "logice" here does not have the same sense at it had a moment ago; but what does it mean, precisely? That is another question… Here now is the principle:*] **Logicus enim considerat modum praedicandi** [*We have seen this above at the beginning of Book 7, in opposing "per viam motus" and "per viam praedicandi"; it is proper to the logician to consider the mode of attribution; the word "attribution" is better than the word "predication" (which seems strange in French); attribution consists in attributing a predicate to a subject; the word "predicate" can always work, though*.], **et non existentiam rei**. [*This is clearly opposed; but here we are touching upon something of the intention*

of our semester; it is one of the things which we are going to have to show: in the end, we will be able to see that the mode of attribution—among other thing, because this is a problem of logic, but not all of logic—that the mode of attribution, then, and the existence of the things are two problems which are clearly opposed. The "naturalis" considers "ipsam existentiam rei," the metaphysician, too, but not the logician. But let us get back to our text: so the "quid," in its very first sense, since we call the essence "quid," seems to be something which is of the order of reality; but be careful! We call it "quid," but by reference to the definition; ***if the definition is incomplete, maybe we could talk in a certain way of the "quod quid erat esse," but "logice loquendo"*** *and now, this distinction having been laid down:*] Unde quicquid respondetur ad quid est [*We ask the question "quid est" every time that we answer:*], dicit pertinere ad quod quid est; sive illud sit intrinsecum, ut materia et forma; sive sit extrinsecum, ut agens et finis. Sed philosophus qui existentiam quaerit rerum, finem vel agentem, cum sint extrinseca, non comprehendit sub quod quid erat esse. [*For the metaphysician, and also for the "naturalis," if we respond with an extrinsic cause, even with the cause of causes, the end, this is not a "quod quid erat esse."*] Unde [*Here now we are going to apply this to the definition of a house; that is why we said that we would see a definition of an artifact*.] si dicamus, domus est aliquid prohibens a frigore et caumate [*It is something which protects us from cold and heat*.], logice loquendo significatur quod quid erat esse, non autem secundum considerationem philosophi. [*It is true that a house is a shelter which protects us from cold and heat; and we answer the question: why is the house thus made, of stones and wood? So that it might protect us from cold and heat; this is true, but this is not a "quid" of the "naturalis" or metaphysician*.] Et ideo dicit quod hoc quod quaeritur ut causa formae

> in materia, est quod quid erat esse, ut est dicere logice: quod tamen secundum rei veritatem [*This is interesting: this is a "quod quid erat esse," logically speaking, but not according to the truth of things; but this does not mean that the former is false*…] et physicam considerationem in quibusdam est cuius causa, idest finis, ut in domo, aut in lecto.[164]

[Here[165] one finds inserted a fundamental distinction between logic and philosophy.

And by philosophy, he is going to understand the science of nature and metaphysics. "Quod quid erat logice," he says. But what must we understand by this? Everything that answers to the question "quid?" Now, to the question "quid?" one can answer with a definition. But one can also answer with a predication. One can say that what one answers is a "quid." But be careful! It may be only logical. And this leads Aristotle to a fundamental distinction between logic, which sees a "quod quid erat esse" in every response obtained to the question "quid?," because of the attribution, and the philosopher, who considers the very being of things: secundum rei veritatem et physicam considerationem." "Quod quid est" truly is opposed to logic, to the logical "quod quid est."

But what is going to cause a definition to have a true "quod quid erat esse"? And it is here that he will justify the same thing. What does the logician consider? "Viam predicationis," the same thing which we have just seen. But the philosopher, whether of nature or a metaphysician, considers the very existence of things. Well, we would not be content to say in a definition—let us say "real" now; let us leave aside the word natural because it is a question of defining an artifact—"this is a shelter,"

164 St. Thomas *In VII Metaph.*, lect. 17, nn. 1656-58.

165 [The bracketed section is an additional remark borrowed from the Review Course of February 18, 1975.]

"cooperamentum"; no! It would be necessary to add either the agent or the end. But the agent and the end, as such, belong to philosophy. But not as "quod quid erat esse." The agent and the end are in fact extrinsic causes. From this point of view, for the philosopher, this diminishes and declines from the "quod quid erat esse," which ought to be something intrinsic.]

Continuing, in number 1659, St. Thomas says:

> Exemplificat autem de artificialibus [*In fact, Aristotle will use, though he is manifesting the natural definition, examples drawn from art: the art of constructing a house.*] quia in eis est maxime manifestum quod sunt propter finem. [*No one can deny, in speaking about art, and above all about useful arts, that they look to an end; for example, no one would say that a house is not made to be inhabited; well then, that "artificialia" are ordered to an end is wholly manifest on the level of art.*] Quamvis enim naturalia sint propter finem [*Which is shown in Book 2 of the* Physics] fuit tamen hoc a quibusdam negatum. [*And today too, among biologists for example, one must never pronounce the word finality or end; rather, one must speak about the good, they can digest the good easily enough, the notion being so common; but they immediately deny this purely and simply with the word finality, because of their prejudices arising from other sources.*] Potest igitur, cum quaeritur propter quid lapides et ligna sunt domus, responderi per causam finalem; scilicet ut defendamur a frigore et caumate. In quibusdam vero id quod quaeritur, ut causa formae in materia, est quod movit primum, idest agens. Nam hoc etiam est causa. Ut si quaeritur propter quid lapides et ligna sunt domus? potest responderi: propter artem aedificativam.[166]

166 Ibid., n. 1659.

2) The Opposition of a Natural and Logical Definition, on the Occasion of the Definition of a Natural Thing: the Passions

Let us go on to the natural now. And here we will take the most manifest natural case: that of the passions. The same problem of definition is going to be posed at the beginning of the *On the Soul*. On this question, we will first of all read some passages from Aristotle and St. Thomas and will end these considerations with a very nice text from the Greek commentator, Themistius, who wrote a commentary on the treatise *On the Soul*. Normally, we would look at the text of Themistius earlier, at least before that of St. Thomas, for the comprehension of which it might very well help. But we are going to keep it for the end because, at that time, one of his fairly extraordinary expressions will be more striking and this order will better manifest the very particular utility of these master commentators who have divided the letter of Aristotle and who apply this division to help us better understand it.

a) Aristotle, On the Soul

1. Introduction to the Problem of the Passions: Another Difficulty with the Study of the Soul

With regard to the soul, it is not only its own definition which causes difficulty, but also that of its properties and its operations. Among other difficulties, there is that of knowing whether the operations of the soul are all common to it and the body, or whether certain ones are proper to the soul itself.

> Postquam Philosophus ostendit difficultatem [*He renders one attentive.*], quae est in scientia de anima ex parte substantiae, et quod quid est animae [*It is already very difficult to define what the soul is.*]: hic consequenter ostendit difficultatem, quae est ex parte passionum et accidentium

> animae. [*Let us take this (passions of the soul, properties of the soul, accidents of the soul) in a very broad sense.*][167]

And further on he says that among others there is this:

> Dicit ergo primo, quod accipere hoc, scilicet utrum passiones et operationes animae sint communes vel propriae [*Are the passions or operations of the soul, common to the body and the soul or proper to the soul?*], est necessarium, et non est leve, sed valde difficile. [*It is a problem which must necessarily be raised, but it is not easy to resolve.*] Et quod sit difficile, ostendit dicens: quod causa difficultatis est, quia in apparenti videtur, quod multae passiones sint communes [*Many among them are common, which passions necessarily imply the body.*], et non sit pati sine corpore [*For example, we easily see that one cannot concede that the acts of the sense, of the external sense, do not participate in the body, that the body does not participate in them at all; the same thing is true for the acts of the sensible appetite: it certainly seems that "nihil patitur anima sine corpore"; the soul is always the principle of all this, but it cannot be so without the body.*], ut puta irasci et sentire et huiusmodi, quorum nihil patitur anima sine corpore. Sed si aliqua operatio esset propria animae [*But if there is an act which is proper to the soul, and so able to be performed independently of the body, without the help of the body, this would be the operation of the intellect.*], appareret hoc de operatione intellectus. Intelligere enim, quae est operatio intellectus, maxime videtur proprium esse animae. [*On the one side, it is manifest that there are operations or passions of the soul that necessarily involve the body, operations that cannot be performed without the body; but moreover, there is also the intellect and it seems that the intellect can act, can operate, without the*

167 *In I De Anima*, lect. 2, n. 16.

concourse of the body.]

Si quis tamen recte consideret, non videtur proprium animae intelligere. [*If we look a little closer, if we consider this act well, we will note that even this act is not proper to the soul purely and simply; this might seem a little bizarre*.][168]

Here we will skip over a little.

Quamvis autem hoc Aristoteles scilicet aperte [*In a clear, evident way*] manifestet in tertio huius [*Aristotle is going to resolve this problem in Book 3 of the treatise* On the Soul*; but St. Thomas senses the need to give here in the prooemium at least the broad outline of this solution*.], nihilominus tamen quantum ad hoc aliquid exponemus. [*We're going to say something anyway*.] Nam intelligere quodammodo est proprium animae, quodammodo est coniuncti. [*In a certain way, "intelligere" is an operation of the soul alone, but also, in another way, the operation remains the act of the composite: even if this operation proceeds from a power that is purely and simply spiritual; here now is a distinction which is absolutely fundamental for this problem*:] Sciendum est igitur, quod aliqua operatio animae aut passio est, quae indiget corpore [*But in what way might the soul depend on the body? Here is the problem; it might depend on it either as on an instrument, or as on an object*.] sicut instrumento et sicut obiecto. Sicut videre [*the sense of sight, the act of seeing*] indiget corpore, sicut obiecto, quia color, qui est obiectum visus, est in corpore. [*The object of sight, the color, in an accident, a quality of body; so the act of sight depends on the body with regard to its object; but not only with regard to that*.] Item sicut instrumento [*Not only is the object bodily, but there is also, on the side of the faculty itself, a necessity, a weakness, and need: in order to see, there must be an organ*

168 Ibid., nn. 17-18.

apt to see, which organ is evidently a bodily organ.]; quia visio, etsi sit ab anima, non est tamen nisi per organum visus, scilicet pupillam, quae est ut instrumentum; et sic videre non est animae tantum, sed est organi. Aliqua autem operatio est quae indiget corpore, non tamen sicut instrumento, sed sicut obiecto tantum. [*That is the intellect, the act of the intellect*.] Intelligere enim non est per organum corporale, sed indiget obiecto corporali. [*As the sense is for the intellect and the organ is necessary for the sense, so the organ is found also to be necessary in a certain way for intellect, from the fact alone that the sense is always the principle of the intellect; but if we consider the very act of the intellect, this act itself is not performed by a corporeal organ; but it has need of a bodily object*.] Sicut enim Philosophus dicit in tertio huius, hoc modo phantasmata se habent ad intellectum, sicut colores ad visum. [*The phantasm comes as it were to name the object of the intellect, which means, in sum, that that which is grasped by the intellect cannot be so grasped unless the universal that is its object is abstracted by the agent intellect that will illumine the phantasms*.] Colores autem se habent ad visum, sicut obiecta: phantasmata ergo se habent ad intellectum sicut obiecta. Cum autem phantasmata non sint sine corpore, videtur quod intelligere non est sine corpore: ita tamen quod sit sicut obiectum et non sicut instrumentum.[169]

Here we are going to skip again.

Manifestat illud quod supra supposuerat, quod scilicet quaedam passiones animae sunt coniuncti, et non animae tantum. [*There are passions of the soul which are truly of the composite and not of the soul only.*] Manifestat autem hoc ex uno, quod consistit ex duobus. Cuius ratio talis est.

169 Ibid., n. 19.

Omne ad quod operatur complexio corporis non est animae tantum, sed etiam corporis [*All that forms the bodily complexion... if what is done is due to bodily complexion, then the act which follows is the act of the composite and not of the soul only*.]: sed complexio corporis operatur ad omnes passiones animae [*Here, passion means the movement of the sensible appetite*.], ut puta ad iram, mansuetudinem, timorem, confidentiam, misericordiam et huiusmodi: videntur ergo animae passiones omnes esse cum corpore. [*And next, he shows that in these passions bodily complexion truly has a role*.] Et quod ad huiusmodi passiones operetur complexio corporis, probat dupliciter. Primo sic. Quia nos videmus quod aliquando superveniunt durae et manifestae passiones [*Sometimes there are objects in nature such as normally would engender anger or fear, and nevertheless in certain individuals engender nothing at all*.], et homo non provocatur, neque timet [*Sometimes a man remains completely calm in front of a real danger*.]; sed si accendatur ex furore, seu ex complexione, corpus a valde parvis et debilibus movetur, et sic se habet sicut cum irascitur. [*On the other hand, there is a different complexion: a small, weak object, might suffice to cause great and strong passion; and this is due to the bodily complexion; if the soul alone were the principal, the behavior would be the same for everybody*.] Secundo probat dicens adhuc fit magis manifestum quod ad huiusmodi passiones operetur complexio corporis. Videmus enim quod etiam si nullum immineat periculum [*There is in fact no danger and nevertheless…*], fiunt in aliquibus passiones similes his passionibus quae sunt circa animam, ut puta melancholicis frequenter, si nullum periculum immineat, ex ipsa complexione inordinata fiunt timentes. [*Their bodily complexion being disordered, fear follows*.] Ergo, quia sic se habet, scilicet quod complexio operetur ad passiones huiusmodi [*This is manifest again; some people are more fearful than others, their complexion being given; some more choleric than others, given their complexion; the entire difference comes from complexion*.], manifestum est quod huiusmodi passiones sunt rationes in materia, idest habentes esse in materia [*all the evidence points to these passions being operations of the composite; they do not proceed only from the soul, but have something in the matter, in the body*]. Et propter hoc [***And because of this, if truly these are "rationes habentes esse in materia," since speculative intellect is measured by that which is, where the issue is to define these passions, it will be necessary to take account of the matter***.] termini tales, idest definitiones harum passionum, non assignantur sine materia [*He gives an example*.]: sicut si definiatur ira, dicetur quod est motus talis corporis sive cordis, aut partis, aut potentiae: et hoc dicit quantum ad substantiam [*So "in," namely the matter, "ab," namely the agent, and "gratia," namely the end*.] seu causam materialem: ab hoc quantum ad causam efficientem: gratia huius quantum ad causam finalem.[170]

This was a perfectly necessary consideration so that Aristotle could arrive next at this: the consideration of the soul belongs to the "naturalis." For the operations of the soul or the operations proper to a spiritual substance would not be a question for the "naturalis," but for the metaphysician. But what follows is also interesting.

> Concludit ex his quae dicta sunt quod consideratio de anima pertinet ad naturalem. Et hoc ex modo definiendi concludit. [*Here it is again; in the* De Ente et Essentia*, this is what he said: material substance cannot be composed only of form, because otherwise the definition which one would give of it would not be natural; here he is going to*

170 Ibid., n. 22.

conclude that it belongs to the science of nature to treat of the soul, "ex modo definiendi," from the way in which it defines.] Et ideo hic duo facit. Primo probat propositum. Secundo insistit circa definitions. [*Here is precisely why the problem of definition is wholly central; well, this is very easy; the passions are operations of the soul, and operations in the body*.] . . . Probat autem propositum hoc modo. Operationes animae et passiones sunt operationes corporis et passiones, ut ostensum est. Omnis autem passio, cum definitur, **oportet quod habeat in sui definitione illud cuius est passio** [*The subject always enters into the definition of the passion, of the accident; in order to define an accident, one must refer to the substance; and so, one cannot define passions and their principle without reference to the body*.]; nam subiectum semper cadit in definitione passionis. Si ergo passiones huiusmodi non sunt tantum animae, sed etiam corporis, de necessitate oportet quod in definitione ipsarum ponatur corpus: sed omne, in quo est corpus, seu materia, pertinet ad naturalem: ergo et passiones huiusmodi pertinent ad naturalem. [*We know already that what concerns matter belongs to the philosophy of nature; "ubi est motus, ibi est materia"; it is for this reason that "mobile being" expresses well the subject of the science of nature*.] Sed cuius est considerare passiones, eius est considerare subiectum ipsarum. Et ideo iam physici est considerare de anima aut omni simpliciter aut huiusmodi scilicet de ea quae est affixa corpori. Et hoc dicit, quia reliquerat sub dubio utrum intellectus sit potentia affixa corpori. [*But here, there is another problem: must the intellect be tied to the body or not?*][171]

So now he is going to insist on the definition. Here we

171 Ibid., n. 23.

enter into the natural definition of something natural.[172]

[Review Class:

In the last class we touched on a lot of things, to the point that the questions raised might seem unrelated and the class might seem to lack unity. It would be interesting today to stop and ask ourselves some questions about the order of the course.

First of all, we must say this, that the sort of analysis which we made of composed substance was not necessary for our intention, namely, the most distinct possible understanding of the subject of logic. But the intellect ought not to confine itself to a particular field. This would be contrary to its proper good. And this is what has provoked us to study the treatise *De Ente et Essentia* "in extenso." It was necessary while doing this to comment on this text and we arrived at this statement: that composite substance is constituted neither by matter alone nor by form alone. So we had to say some words about the matter.
The questioning begins:

Monsignor:	Whence have we drawn these few pieces of knowledge concerning primary matter? It was necessary to speak about primary matter. We based ourselves on certain texts. We were drawing from some source. Where?
Richard Lussier:	The *Metaphysics*.
Monsignor:	So, in Book 7 of the *Metaphysics*. And what did we learn about primary

172 [Here ends the second lecture given on February 12, 1975.]

matter in this seventh book of the *Metaphysics*?

Richard Lussier: That it is the naturalist who has the job of speaking of it.

Monsignor: So the first thing: it belongs exclusively to the philosophy of nature to define primary matter. Yes, but is that all we saw? With regard precisely to this, that the definition of matter belongs exclusively to the science of nature—are these expressions synonymous: "the definition of primary matter belongs exclusively to the philosophy of nature" and "every consideration of matter belongs to the science of nature"? Is this one and the same statement? Can we say after the first statement: therefore the second?

Lucien Berube: It's not the same thing because primary matter as a potency can be considered by metaphysics.

Monsignor: And as potency, it is not considered by the science of nature? To say: "as potency," seems to already enter into the definition itself of primary matter. Primary matter is pure potency vis-à-vis natural forms. To say it is potency, therefore, belongs to the science of nature.

Louis Brunet: But didn't we learn that the metaphysician is going to borrow from the other sciences their proper considerations?

Monsignor: Very good! The metaphysician borrows from the "naturalis" the definition of primary matter. Well, in giving the definition, he finds himself getting the definition that, of itself, belongs exclusively to the science of nature.][173]

2. For a Natural Definition of the Passions

In number 24 of the *Commentary on the Treatise On the Soul*, we enter into the very definition of the passions. "Insistit circa definitione."[174] This is above all the point that we wish to manifest.

> Quia enim ostendit, quod in definitionibus passionum animae, aliquae sunt in quibus ponitur materia et corpus, aliquae vero in quibus non ponitur materia, sed forma tantum [*but always in natural matter; in natural matter, there are those who wish to define an object by form alone; others by form and matter. Aristotle shows that the definitions which are content to indicate the form are insufficient.*], ostendit quod huiusmodi definitiones sunt insufficientes. Et circa hoc investigat differentiam [*But in what way do they differ?*], quae invenitur in istis definitionibus. Aliquando enim datur aliqua definitio, in qua

173 [This Review class was given on February 18, 1975. The rest of the considerations of this class which were not simply the repetition of the previous classes have been integrated into this course with the note: "Additional Remarks Borrowed from the Summary Course of February 18, 1975."]
174 *In I De Anima*, lect. 2, n. 24.

nihil est ex parte corporis [*It is a question, for example, of the actions of the soul, and there is nothing indicated, nothing expressed, there on the side of matter.*], sicut quod ira est appetitus vindictae [*the appetite for vengeance: there is no matter in this definition*]; aliquando assignatur aliqua definitio, in qua est aliquid ex parte corporis seu materiae [*While in other definitions, we have something of matter which enters into the definition.*], sicut quod ira est accensio sanguinis circa cor [*the movement of blood toward the heart*]. [*Here again, we will find a use of the word "logic": obviously, we are not going to explain this for the moment, but it is good that this be at least noted, like the "quod quid erat esse logice loquendo"; and as also, in Book 7 of the* Metaphysics*, Aristotle proceeds "logice."*] Prima est dialectica [*a definition of a natural thing which does not take account of the matter at all; one which only takes account of form is a dialectical definition*]. Secunda vero est physica. [*Clearly, there are relations between these uses of the word "logical"; just now, "quod quid erat esse logice" was opposed to "secundum rei veritatem et physicam considerationem"; here dialectical definition (and he will say a little later "logical definition") is opposed again to a physical definition.*], cum ponatur ibi aliquid ex parte materiae; et ideo pertinet ad naturalem. [*This is a natural definition.*] Hic enim, scilicet physicus, assignat materiam, cum dicit, quod est accensio sanguinis circa cor. Alius vero, scilicet dialecticus, ponit speciem et rationem. [*For the moment, let us say that "species," "ratio," "forma," are synonyms.*] Hoc enim, scilicet appetitus vindictae, est ratio irae.

Quod autem definitio prima sit insufficiens [*But the definition which is called dialectical is insufficient…*] manifeste apparet. Nam omnis forma [*This is a very universal statement.*], quae est in materia determinata, nisi in sua definitione ponatur materia, illa definitio est insufficiens. [*If we are content with the form, this will not work; the*

little text from the De Ente et Essentia *from which we began says this: composite substance is not constituted by the form alone; if it were constituted by form alone, its definition would not be natural; this is the same teaching; this doctrine was recently applied to substance, here the same doctrine is found but it is applied to the operations of the soul, to the passions.*] Sed haec forma, scilicet appetitus vindictae est forma in materia determinata [*We will see this shortly.*]: unde cum non ponatur in eius definitione materia, constat quod ipsa definitio est insufficiens. Et ideo necesse est ad definitionem, quod in definitione ponatur hoc, scilicet forma, esse in materia huiusmodi, scilicet determinate. [*That the definition be natural, it is necessary that the definition be composed at the same time from the form and from the proper matter, that is, from the material in which it must exist.*]

Et sic [*We are going to return to show this by distinguishing three ways of defining illustrated by their application to an artificial work; we wish to speak about the natural here, but the artificial is always more manifest; every time Aristotle can base himself on it, he does.*] habemus tres definitiones, quia una assignat speciem et speciei rationem, et est formalis tantum, sicut si definiatur domus quod sit operimentum [*Here is the form.*] prohibens a ventis et imbribus et caumatibus. [*Here is the "ratio speciei," the why of the form: to protect from the wind and the rain and the heat.*] Alia autem assignat materiam, sicut si dicatur quod domus est operimentum quoddam ex lapidibus, lateribus et lignis. [*It is made of stone, bricks and wood marble, etc.; this is another definition.*] Alia vero assignat idest in definitione ponit utrumque, materiam scilicet et formam [*We can unite the two.*], dicens quod domus est operimentum tale constans ex talibus, et propter talia, scilicet ut prohibeat ventos etc. Et ideo dicit quod alia definitio scilicet, tria ponit in his scilicet

> lignis lapidibus quae sunt ex parte materiae speciem idest formam propter ista scilicet ut prohibeat ventos. Et sic complectitur materiam cum dicit in his et formam cum dicit speciem et causam finalem cum dicit propter ista: quae tria requiruntur ad perfectam definitionem.[175]

But that which limits itself to indicating the form is clearly insufficient.

> Sed si quaeratur quae istarum definitionum sit naturalis, et quae non: dicendum, quod illa, quae considerat formam tantum, **non est naturalis, sed logica**. [*He just said "dialectica," and here he says "logica"; we must be careful because sometimes the two terms do not match; here they match.*] Illa autem quae est circa materiam ignorat autem formam, nullius est nisi naturalis. Nullus enim habet considerare materiam nisi naturalis. Nihilominus tamen illa quae ex utrisque est, scilicet ex materia et forma, est magis naturalis. Et duae harum definitionum pertinent ad naturalem [*The second and the third; there are two of these which belong to the "naturalis," but one is imperfect, that which only posits the matter, the other is perfect because it is composed from the two.*]: sed una est imperfecta, scilicet illa quae ponit materiam tantum: alia vero perfecta, scilicet illa quae est ex utrisque. Non enim est aliquis qui consideret passiones materiae non separabiles, nisi physicus.[176]

But "ad bonitatem doctrinae," Aristotle is going to say to us: meanwhile, the consideration of matter does not belong exclusively to the "naturalis." Someone might be tempted to say: such a one considers the matter, therefore, he is a "naturalis." No! One cannot say that. The definition that involves matter

175 Ibid., nn. 24-26.
176 Ibid., n. 27.

may be called natural. But there are others who consider matter. The consideration of matter does not belong uniquely to the "naturalis." "Well then, who are these others, we would like to know?" Other than the "naturalis," who considers the matter? "Et qualiter?" Who are the others who consider matter and how do they consider it?

> Sed quia sunt aliqui qui aliter considerant passiones materiae, ideo ostendit qui sint, et qualiter considerent: et dicit quod sunt tres. Unum genus est quod differt a naturali quantum ad principium, licet consideret passiones prout sunt in materia [*But both consider matter, that is understood; the artisan who has the exemplar, who forms the plan of the house, which is like a form to be introduced into the matter, must consider that the house will be constructed in such and such materials; he must go that far.*]; sicut artifex, qui considerat formam in materia, sed differunt, quia huiusmodi principium est ars, physici vero principium est natura. Aliud genus est quod quidem considerat ea quae habent esse in materia sensibili, sed non recipit in definitione materiam sensibilem [*And this is interesting; ordinarily, one insists only on the mathematical definition, namely, that which does not consider anything but the form without the sensible matter; this is true but this could be dangerous, because the line and the circle that the geometer knows first, before defining a line or defining a circle, are the things which are in sensible matter; but certainly we understand that there is no truly straight line in this sensible matter, nor a perfect circle in material nature; yet it remains all the same that their material subject belongs to sensible matter; if we remove this, we fall into calculation; in order to distinguish properly geometry as a science from algebra and from calculation in general, this consideration is very important. The line does not exist except in sensible matter and it is another problem that its*

> *definition makes an abstraction from this sensible matter; but before abstracting from sensible matter, it is necessary to consider it*.]; sicut curvum, rectum et huiusmodi, licet habeant esse in materia, et sint de numero non separabilium, quantum ad esse [*It is arranged with all that which is not separable from matter with regard to "esse."*], tamen mathematicus non determinat sibi materiam sensibilem. Cuius ratio est, quia res aliquae sunt sensibiles per qualitatem, quantitates autem praeexistunt qualitatibus, unde mathematicus concernit solum id quod quantitatis est absolute, non determinans hanc vel illam materiam. [*Mathematical definitions will be wholly abstract—one might say from sensible matter—from sensible qualities; as quantity precedes quality and so does not depend on quality, the mathematician can consider it absolutely*.] Aliud genus est quod quidem considerat illa quorum esse vel non est in materia omnino [*things which are not at all in matter*], vel quorum esse potest esse sine materia [*They are in matter, but it is possible that they not be in it; for example, potency is in matter; primary matter is what? Pure potency; but potency is also found among the separated substances*.]; et hic est philosophus primus.[177]

And now, a last text. This is where we see that this is a fundamental doctrine, the principle of the division of philosophy into its principal parts (because logic is not a principal part). It is a doctrine that Aristotle is to take up again in part in Book 6 of the *Metaphysics*, when he distinguishes the difference sciences.

> Et notandum quod tota ratio divisionis philosophiae sumitur secundum definitionem et modum definiendi. [*Such a definition, that is, such a way of defining: such a part of philosophy; thus, one definition is with sensible matter: the science of nature; without sensible matter:*

177 Ibid., n. 28.

> *mathematics; without matter at all: metaphysics. But why so? Why does his doctrine of definition play a role that is so fundamental and thus so universal?*] Cuius ratio est, quia definitio est principium demonstrationis rerum [*This is completely peculiar to definition, that not only is it the term of the first act of reason, it is also the beginning of the third; and it is insofar as it is the principle of the third act that its varieties permit us to distinguish the different sciences*.], res autem definiuntur per essentialia. Unde diversae definitiones rerum diversa principia essentialia demonstrant, ex quibus una scientia differt ab alia.[178]

All this is enormous. Next, Aristotle comes back to the subject which is not so far from the subject he is talking with us about: the natural definition with regard to the operations of the soul. Finally, he announces that he is going to gather all the opinions of the ancients in his first book.

> De qua, scilicet anima, intendentes ad praesens necesse est accipere opiniones antiquorum, quicumque sint qui aliquid enunciaverunt de ipsa. Et hoc quidem ad duo erit utile. [*And this is true about the whole history of philosophy*.] Primo, quia illud quod bene dictum est ab eis, accipiemus in adiutorium nostrum. Secundo quia illud, quod male enunciatum est, cavebimus.[179]

b) St. Thomas, Summa Theologiae

Now, still on natural definition and concerning passion in the strict sense, we are going to see some texts from St. Thomas taken from the *Summa Theologiae*, at the very beginning of the treatise on the passions.

First, let's look briefly at the very first article.

178 Ibid., n. 29.
179 Ibid., n. 30.

Pati dicitur tripliciter. Uno modo, communiter [*Sometimes, in analyzing an analogical word, St. Thomas will thus invert the order of the senses: ordinarily, in effect, one reserves the "communiter" for the end, whereas here St. Thomas gives the "communiter" first.*], secundum quod omne recipere est pati, etiam si nihil abiiciatur a re [*It makes no difference: the simple fact of receiving; in sum, this is agent and patient.*], sicut si dicatur aerem pati, quando illuminatur. Hoc autem magis proprie est perfici, quam pati. Alio modo dicitur pati proprie, quando aliquid recipitur cum alterius abiectione. [*There is a transformation here; in receiving something, it loses something that it had before.*] Sed hoc contingit dupliciter. Quandoque enim abiicitur id quod non est conveniens rei, sicut cum corpus animalis sanatur, dicitur pati, quia recipit sanitatem, aegritudine abiecta [*and there is a change in the very complexion of the sick one who is healed*]. Alio modo, quando e converso contingit, sicut aegrotare dicitur pati, quia recipitur infirmitas, sanitate abiecta. Et hic est propriissimus modus passionis. [*We will have no need of this "propriissimus modus"; "proprie" will suffice for us.*] Nam pati dicitur ex eo quod aliquid trahitur ad agentem [*This is important.*], quod autem recedit ab eo quod est sibi conveniens, maxime videtur ad aliud trahi. Et similiter in *I De Generat*. dicitur quod, quando ex ignobiliori generatur nobilius, est generatio simpliciter, et corruptio secundum quid, e converso autem quando ex nobiliori ignobilius generatur.

Et his tribus modis contingit esse in anima passionem. Nam secundum receptionem tantum dicitur quod sentire et intelligere est quoddam pati. [*Evidently, there is not at all the same passion in the case of the act of understanding as there is in the case of the senses, because the intellect has no need for a corporeal instrument to know.*] Passio autem cum abiectione non est nisi **secundum transmutationem**

> **corporalem** [*This is what we must retain: it makes no difference whether what is removed be better or worse, there is a corporeal change.*], unde passio proprie dicta non potest competere animae nisi per accidens, inquantum scilicet compositum patitur. [*Ah! "compositum patitur." Here there will be corporeal transmutation.*] Sed et in hoc est diversitas, nam quando huiusmodi transmutatio fit in deterius, magis proprie habet rationem passionis, quam quando fit in melius. Unde tristitia magis proprie est passio quam laetitia. [*Sadness is like a completely principal passion.*][180]

And so, in response to the first objection, since we are there, St. Thomas says that:

> Pati, secundum quod est cum abiectione et transmutatione, proprium est materiae [*proper to matter: so we see that we are not so far from what we were considering in* De Ente et Essentia], unde non invenitur nisi in compositis ex materia et forma. [*But that the "pati" which is said "communiter" is not at all necessarily something material is of no consequence.*] Sed pati prout importat receptionem solam, non est necessarium quod sit materiae, sed potest esse cuiuscumque existentis in potentia. Anima autem, etsi non sit composita ex materia et forma, habet tamen aliquid potentialitatis, secundum quam convenit sibi recipere et pati, secundum quod intelligere pati est, ut dicitur in III *De Anima*.[181]

In the second article, Thomas asks: is there more passion in the appetitive part than in the apprehensive part? ("Apprehensive part" means that of the faculties of knowledge, while "appetitive part" means that of the faculties of appetite.) Is

180 *STh* I-II, q. 22, a. 1, c.
181 Ibid., ad 1.

there, for example, more passion in the sensible appetite than in the sense? This is what the question means. Well, here is the third difficulty of the article.

> Sicut appetitus sensitivus est virtus in organo corporali, ita et vis apprehensiva sensitiva. Sed passio animae fit, proprie loquendo, secundum transmutationem corporalem. Ergo non magis est passio in parte appetitiva sensitiva quam in apprehensiva sensitiva.[182]

Both imply a corporeal organ. So, in both cases there is corporeal transmutation. So passion is equally in both. The response of Thomas is absolutely extraordinary. This is where it seems that the text of Themistius would be easier. But let us keep it for the end anyway; it will be more striking.

> Dicendum quod, sicut in primo dictum est [*It is also necessary to read I, q. 78, a. 3; but this would be too long here; it too is a very beautiful article.*], dupliciter organum animae potest transmutari. [*Here, then, is a distinction: there are two ways for a corporeal organ to be transformed.*] Uno modo, transmutatione spirituali [*It is necessary that we understand this well; when we look at a stone, it doesn't enter into us; it is not at all the same thing as when the stone hits us.*], secundum quod recipit intentionem rei [*because a sense also receives "immaterialiter," not in the same way as the intellect but…*]. Et hoc per se invenitur in actu apprehensivae virtutis sensitivae, sicut oculus immutatur a visibili [*But be careful! He said according to a spiritual transmutation.*], non ita quod coloretur [*In seeing red, the eye does not become red; the eye does not become red from being blue.*], sed ita quod recipiat intentionem coloris. [*The color acts on the organ; in this sense there is a certain corporeal transmutation; but not to the point that the organ becomes colored.*] Est autem alia naturalis transmutatio organi, prout organum transmutatur quantum ad suam naturalem dispositionem [*There is another transmutation of the organ which ought to be called natural: for example, with regard to its natural disposition, it is cold and it becomes hot; here it is physically altered.*], puta quod calefit aut infrigidatur, vel alio simili modo transmutatur. Et huiusmodi transmutatio [*the fact of passing from cold to hot, or of passing from the quality white to the quality red*] per accidens se habet ad actum apprehensivae virtutis sensitive [*The natural mutation is per accidens in the case of the senses.*], puta cum oculus fatigatur ex forti intuitu, vel dissolvitur ex vehementia visibilis. [*The object can in fact cause the organ to be naturally indisposed; but we cannot define the very act of vision by this natural mutation; this is why he is going to say per accidens, this coincides, this sometimes happens with the act of seeing, but that is all.*] Sed ad actum appetitus sensitivi per se ordinatur huiusmodi transmutatio [*Here we see the precision of the word of St. Thomas: what is per accidens in the case of the sensible faculty, of the sense, is not among the per accidens with regard to the movement of the appetite, but is among the per se, that is, the essential; for example, "Homo est per se animal," animal enters into the definition of man.*]: unde in definitione motuum appetitivae partis, materialiter ponitur aliqua naturalis transmutatio organi [*to the point that this ought to enter into the natural definition of every movement of the inferior appetite*]; sicut dicitur quod ira est accensio sanguinis circa cor. Unde patet quod ratio passionis magis invenitur in actu sensitivae virtutis appetitivae, quam in actu sensitivae virtutis apprehensivae, licet utraque sit actus organi corporalis.[183]

182 Ibid., a. 2, obj. 3.

183 Ibid., ad 3.

Both are acts of a corporeal organ: the big difference is that is with regard to corporeal mutation and physical change: in the case of vision, this is *per accidens*, but in the case of every movement of the sensible appetite, and so all passion, this is essential.

Question (Louis Brunet): Is it necessary that we put matter in the definition of a sensitive faculty in order that the definition be complete?

Answer (Monsignor): This is to say that one must posit matter in the sense of an object. It is necessary to posit the object. At least, for a more complete knowledge, one arrives also at examining the very organ of sight, of the ear, etc…. this will be said in I, q. 78, a. 3.

Question (Louis Brunet): As the biologist must do?

Answer (Monsignor): That's it, in a more developed way than the philosopher of nature.

There is another passage to look at before reading the text from Themistius, and it is a marvelous one. That there should be—and this is manifest—mutation or change on the part of the body when there is a movement of a sensible appetite is something that no one denies, at bottom. But when we go a little further, we see also that anger will have its own proper movement, its own proper corporeal mutation, and sadness, in the same way, its only proper movement, etc. Not only is the corporeal movement material with regard to the act which is form—we can speak here of matter in the form—but *there is also a proportion between the two movements*. This is marvelous.

> Est autem attendendum in omnibus animae passionibus [*This is universal.*] quod transmutatio corporalis, quae est in eis materialis [*If we should wish to compare art and nature, we could say: the role which wood plays in the house, corporeal mutation is going to play in the inferior part of the appetite.*], est conformis et proportionata motui appetitus, qui est formalis [*There is a correspondence between the two, namely, between the corporeal mutation in the movement itself, the act itself of the appetite; when a man becomes angry, there is a movement, a mutation which corresponds to this act of anger; a man is sad, there is, again, a movement which corresponds to this act of sadness, and so on.*], sicut in omnibus materia proportionatur formae.[184]

And, clearly, it will belong to the "naturalis" to make this more precise in the details. We can remark, in passing, that one must value this word: "naturalis," because it indicates that there is but one science of nature; in effect, he whom one calls a philosopher of nature will not be able to enter into all the details about which one might speak; this demands a whole study and a whole set of instruments. Well then, the biologist will be able to complete the knowledge of natural things. But it remains that he is always treating the same discipline: one must hold onto this tightly. For every unity concerning the disciplines that is broken is extremely grave; just as, moreover, every irrational multiplication of faculties in a university is fatal. This is why one must hold tightly to his word "naturalis," which renders the idea of unity in the science of nature. Certainly, we cannot easily write it today; there is a wholly different sense in current usage. But it's good for us to know. For want of terms or other means to indicate the unity of the science of nature well, it will occur that those who study the details more will be tempted to cut themselves

184 I-II, q. 37, a. 4, c.

off from more universal notions and to say, for example: "he is a philosopher, we don't have to busy ourselves with him, we are biologists"… etc. This is very bad.

So, we find in passion an example of a proportioned application between matter and form. Matter is always proportioned to form, not just any matter can receive just any form. If the form that is to be received is superior, the matter must also be well disposed. But why so? Why this correspondence, this relation between material mutation and the movement itself of the act of the soul? It is with regard to this subject that the little text of Themistius is going to make things clear for us. And then, we will go on to something else. This text of Themistius will mark the end of our considerations on the natural definition.[185]

c. Themistius, Commentary on the Treatise On the Soul

All this doctrine that we have been exposing now for some time is ordered to natural definitions. It is a question of knowing what a natural definition is, because this is opposed to the non-natural. And the non-natural, in fact, is called logical. One day, certainly, we are going to be called upon to explain all this more…

Today we are going to look at a last text on this subject, this time taken from the Greek commentator, Themistius, who lived in the fourth century. If we recall, when St. Thomas wishes to show that passion—passion in the strict sense—is found in the appetite and not knowledge, he used a perfect word. His explanation came just about to this: in the case of knowledge, if a change is produced, a possible material mutation on the side of the sense, this is accidental. But in the case of the passion, of the movement of the appetite, there is a *per se* in such a change, that is to say, something essential. One can call this a perfect word. And he who says "perfect word," says brief, rigorous, very

185 [Here ends the lecture for the first class given on February 19, 1975.]

precise, and so necessarily abstract. *Per accidens* and *per se* are very abstract, but they say exactly what is to be said.

Clearly, because this word is the most perfect, one must preserve it with care and the intellect will most certainly have need of it. But there is also another word, still expressing the truth, which is more developed and uses more familiar terms and is often expressed somewhat in terms of images. We need both. At bottom, the second prepares for the first. But here, we have adopted an inverse order in order to draw more attention to the advantage that one can take from the second. One could say that the commentary is perhaps the best example of this second word. Commentary divides the word, it explains the word, the first word which is very concise. If we compare the word of the great master, like Aristotle, to that of his best commentator, St. Thomas, for example, we find an enormous difference. By ourselves, we would not be able to understand the text of Aristotle. And even the commentators differ among themselves in this way. There are those whose word will be briefer, others whose word will be more developed. There are varied styles. Etc….

Now, we are going to see how Themistius expresses himself. He wrote a commentary on the treatise *On the Soul* in which he follows fairly closely the text of Aristotle. At the moment of seeing whether the passions are common to the soul and the body, he says, clearly, yes, and he gives the same example as Aristotle does.

> Sic autem et animae passiones omnes videntur esse communes cum corpore, scilicet irasci et mitescere et timere et audere et gaudere, similiter autem et amare et odire [*All those acts which are clearly movements of the inferior appetite—however much we may stretch them to the will; so love, that is, that which one calls (and it is very good as an expression) the "motus simplex voluntatis"; the greater part of these names of the sensible passions can also signify*

> *a simple movement of the will; but ordinarily, by their current sense, they designate a sensible passion.*]: **nullum enim horum potest facere anima non assumens corpus**, in quod [*namely, the body*] et operationes sui ipsius [*namely, the operations of the soul*] signanter imprimit. [*This is well said: for example, the "appetitus vindictae" is such that it is going to impress its proper operations on the body; and in a general way, every similar act of the soul is going to impress "signanter" (clearly) its operations on the body, for example, in making the blood arise around the heart, etc.*] Erubascunt enim et palescunt et tremunt et neque poetis haec immanifesta: "oportebit te igni fulgent esse similem" et "pallor obtinebit genas" et "arabs autem factus est per os dentium."[186]

Themistius takes up again the two examples by which Aristotle had shown the passions as influenced by bodily complexion.

> Significat autem maxime evidenter quod haec sunt passiones communes animae et corporis, hoc quod aliquando quidem forti occurrente animalibus causa et suffienti avocare iram aut timorem efficere, nihil exacerbantur aut timent, aliquando autem parvis factis et debilibus causis moveri valde, cum fuerit animal indigens alimento vel si ab humoribus aliquibus molestetur, quod maxime in melancholicis fit manifestum, puta saepe nullo terribili imminente in passionibus fiunt timentium propter complexionem corporis et timent non timenda.[187]

St. Thomas had called—and he had reason to do so—both sense and the sensible appetite organs of the soul. Themistius does not do so; he has a different way of speaking. But they are

186 Themistius, *In De Anima*, I, 403a15 (Ed. Verbeke, p. 17).
187 Ibid.

expressing the same truth, as we shall see. In outline, he is going to say that we can speak of organs in the case of sensation, but it is better to employ a different word for the passions.

> Et videntur omnes tales passiones sequi complexiones corporis et intendi et remitti tali aut tali ipsa existente, **et non subservit corpus his passionibus velut organum** [*St. Thomas said the contrary; and besides, for a very brief and perfect word, he had to retain the word "organum"; but if we wish now to note the difference, even the opposition, between the two organs, we will keep the word organ for only one of them and this is a wholly just; but why*?], sicut sensitivae virtuti sensiteria, sed et amplior est **cognatio** corpori [*This is marvelous; "cognatio" means "bloodline," "parentage," "affinity"; in the case of the body and of the passions, there is more affinity than between the body and sensation.*] ad passiones quam organis sensus ad sensum [*and he proves it*:]; haec quidem enim praeter naturam disposita [*Supposing that there were an indisposition of nature, an indisposition of the bodily complexion with regard to sensible knowledge, this would be very grave; what would it have for an effect? "Impedimentum sensus"; in the case of sensation, an indisposition can be an obstacle to the point of impeding the act.*] impedimentum fit solum operationibus sensus, **corporis autem mala complexio non impedit passiones**. [*This is a marvelous idea; while in the case of the appetite, far from it impeding operation, this excites it.*] Sed excitat magis ipsas et intendit, tanquam naturae huius proximius adnexas [*as being tied to the body in a closer way*].[188]

With these remarks, we can better see the cause of the correspondence about which St. Thomas spoke (in the body of the article) between material mutation of the body and the

188 Ibid., 403a19 (Ed. Verbeke, pp. 17-18).

movement of the soul. The link of parentage is greater. So the organ is more closely, or intimately, tied to the very act of the movement of the appetite.

> Si autem haec [*He is going to show that in order to define passion well, one must with all necessity introduce the matter*.] hoc modo se habent, palam quia passiones hae et quaecumque aliae tales animae rationes materiales sunt, idest in materia esse habentes [*It is absolutely impossible to disassociate these movements of the appetite from matter.*]; quare et definientes harum unamquamque a subiecta materia non abscedent, sicut qui iram assignat fervorem eius qui circa cor sanguinis propter appetitum recontristationes [*vindictae*]. Et propter hoc igitur naturalis est considerare de tali anima in quantum ad opera ipsius vel passiones materiam coassumit [*natural definition*]. Differenter autem utique naturalis et dialecticus unamquamque ipsarum definient: hic quidem speciem, naturalis autem materiam; ratio quidem enim irae est appetites vindictae [*namely, the "logicus"*], hic autem fervorem sanguinis circa cor, dialecticus quidem speciem, naturalis autem materiam; ratio quidem enim irae est appetitus vindictae, **necesse est autem infieri speciem hanc in materia tali** [*It is not possible, if we wish to define in a complete way, to content ourselves with the form; maybe this is why this is a little closer, from the point of view of natural definition, a little more manifest for the definition of the essence composed of matter and form*.]: sicut domus hic quidem speciem et speciei rationem assignat, quia tegumentum prohibitivum corruptionis eius quae a ventis et imbibes et caumatibus [the form, everything which is not matter and form], alius autem materiam, quia lapides et lateres et ligna, alius autem ambo simul accipiens quia tegumentum tale ex tali materia. [*Exactly the doctrine of Aristotle and of St. Thomas: we*

can have three sorts of definition: one which is content with form: this is not natural; another which contents itself with matter: this is natural; but that which is composed of both is more natural; the first is clearly insufficient.]

Quis igitur horum naturalis? Utrum qui circa rationem solam? Materiam autem ignorans, aut qui materia solum curat, rationem autem negligit, aut magis qui ex ambobus? Illorum autem quis uterque? Qui quidem itaque speciem definit per se [*an interesting expression*], quae non est nata esse per se [*It is like someone who would define the movement of the soul as if it were something absolute; such a one is not measured by that which is, since he is concerned with the form that is by nature* ***in****, which must exist in matter; this is what it means to define "speciem per se" what "non est nata esse per se."*], dialecticus est, unde et accidit ei saepe vane loqui; qui vero materiam magis tractat et passiones inseparabiles a materia, nullus alius quam naturalis.

Naturalis enim est circa omnia, quaecumque sunt materia opera et passiones; assumet quidem igitur et speciem, et a materia numquam separabit ipsam, neque si ratio possit, concedet; indiget enim semper materia et non sicut mathematicus adhaerebit rationi definienti rectam sine materia: haec enim non indiget subiecta materia. Universaliter enim altius est notantum quod naturalis corporis, haec quidem sunt corporis naturalis naturales passiones et opera, haec autem extrinsecas ipsa adveniunt; naturales quidem caliditates, frigidities, sicitates, humiditates, alimentum decrementum et incrementum; extrinsecus autem adveniunt quascumque sibi artes apponunt vel ornates materiam vel corrigentes defectum ipsius et indigentiam, aeraria quidem et carpentaria ornantes materiam. Medicativa autem et agricultura auxiliantes ipsius defectibus; adhuc vero autem et altera

> species inseparabilis quidem a naturali corpore, non autem in quantum naturale corpus inexistens ipsa, sive passion sive accidens velit aliquis nominare ipsam, putat rectum, curvum, triangulare, concavum, convexum et quaecumque alia mathematica considerat, auferens quidem naturales omnes passiones, solos autem ipsius terminos et dimensiones exquirens et numqum assumens in rationibus materiam vel naturales qualitates.
>
> Rursum igitur superius resumendum, quod multae sunt speculationes de specie; species autem aut naturalis aut mathematica aut artificialis. Naturalem quidem igitur naturalis et dialecticus considerant; sed hic quidem sine materia, hic autem semper cum materia, reliquas autem scientiis dediti et artifices, hi quidem considerantes ipsas solum, hi autem et operantes in materia; propter quod et hi quidem sine materia, hi autem cum materia. His autem omnibus superior est qui circa eas quae vere sunt species negotiatur, quae omnino separatae sunt a materia et ratione et hypostasi, sicut primus philosophus.[189]

This is absolutely marvelous.

There is also another text, but it is a little too complicated. We might note it all the same. There, Themistius is speaking about parts and he distinguishes three ways of dividing a whole into parts.

> Tripliciter enim quod ex his ut inexistentibus, manifestissime quidem ut ex partibus, quando domum ex lateribus aut muris dicimus, et animal ex carnibus et ossibus. [*The first way: for example, the house is made of walls; the second is too complicated; but the third is interesting.*] Unus quidem igitur modus iste. Alius autem, quando ex aqua et melle mellicratum, et universaliter ex mixtis mixtum;

189 Ibid., 403b7 (Verbeke, pp. 17-19).

> differet autem iste a priori, quia in illo quidem et partes et totum loco separata sunt, in hoc autem separata secundum locum nondum commixta sunt. Videtur enim in eodem loco et totum esse et partes, in veritate autem hae quidem corruptae sunt, hoc autem est. Tertius autem, quando ex aere et figura statuam dicimus [*Just now, he was saying that the house is made of such and such matter; here it is very different because he is going to say: this is a statue which is made of bronze and a shape; a sculptor takes the unformed matter ("infiguratum," Aristotle will say in the* Physics*) and he'll make a statue of it.*], et ex lateribus et compositione domum [*because the composition relates to the art; manual art always implies composition*]. Quare et animal quando dicimus ex anima et corpore, siquidem secundum primum modum, non utique esset corpus animatum totum, neque utique sentiret per totum, neque utique nutriretur, sed secus iaceret anima aut tota toti corpori, aut partes partibus, quod neque intelligi possibile est: et ad quantum animali faceret anima, non ad quale, sicut partes toti. [*When we say that it is composed of a body and a soul we are dealing neither with the first nor with the second, but with the third; just as the bronze is the matter and the shape is the form "in artificialibus," the matter and the form are also necessary "in naturalibus."*][190]

d. Matter, As an Element of the Essence, is "Materia Non Signata"

We have seen that the composite essence has as its composing element neither matter alone nor form alone. Now, we are going to skip two paragraphs because these would carry us too far away. But, at the very end of chapter 2, there is a text that is

190 Ibid., III, 412a20 (Verbeke, pp. 94-95).

worth looking at.

Somebody might be brought to saying: "oh, very well, you say that the composite essence is composed of matter and form; but the matter is the principle of individuation, matter is what makes Socrates Socrates, what causes Socrates to be distinguished from Plato; and consequently..."

> Sed quia individuationis principium materia est, ex hoc forte videtur sequi [*someone might see as a consequence*] quod essentia, quae materiam in se complectitur simul et formam [*what we just established above*], sit tantum particularis et non universalis [*We admit that the composite essence is constituted from matter and form, but the matter in question, since it is the principle of individuation, must itself necessarily be particular, and not universal; so what follows is this*:]: ex quo sequeretur quod universalia diffinitionem non haberent [*It will follow that it will not be possible to define the universal.*], si essentia est id quod per diffinitionem significatur. [*We must return to one of the terms employed by the philosophers; we name the essence "quid" because it is what is signified in the definition; well, if the essence can only be individual, then one cannot define the universal, which is horrifying for the life of the intellect; so, he briefly responds*:]
>
> Et ideo sciendum est quod materia non quolibet modo accepta est individuationis principium, sed solum materia **signata**. [*Here is the word which one must retain well; we cannot very well translate it otherwise than by "designated"; I can designate that which, in Socrates, distinguishes him from Plato, etc.; but what does that mean*?] Et dico materiam signatam, quae sub determinatis dimensionibus consideratur [*that which is considered under certain dimensions: length, breadth, depth*]. Haec autem materia in diffinitione hominis, in quantum est homo,

> non ponitur [*that is, the "materia signata"*], sed poneretur in diffinitione Socratis, si Socrates diffinitionem haberet. [*But we cannot define Socrates.*] In diffinitione [*This is the conclusion.*] autem hominis ponitur materia non signata [*that which we will call elsewhere common matter; we will oppose "common sensible matter" and "individuated matter"*]; non enim in diffinitione hominis ponitur hoc os et haec caro, sed os et caro absolute, quae sunt materia hominis non signata.[191]

The Third Chapter

We must admit that the third chapter involves some difficulties. We would not present this Chapter were it not that in it are found some remarks of a logical order that are absolutely necessary for us. And they are expressed in a very marvelous way. St. Thomas is not content to say this and that; he gives examples. Let us note right away, in passing, that the relation between genus and species, for example, is going to appear to us by way of an example. So we must look at Chapter 3.

The considerations in Chapter 4 are clearly logical. We are going to look first at Chapter 3 and then, in Book 7 of the *Metaphysics*, we have a very important text. In sum, we might center all our remarks about Chapter 3 under the following title: matter and genus. These are not the same as each other. "Genus [and we see this affirmed pretty often in St. Thomas] non est materia et differentia non est forma; sed genus sumitur a materia et differentia sumitur a forma." What does this mean? There are probably no other places where we will find these notions better explained than here and in the text from Book 7 of the *Metaphysics* about which we just spoke. Also, thanks to Chapter 3, we are going to be able to gather some very important logical notions.

191 *De Ente et Essentia*, ch. 2, end.

Here is how Chapter 3 begins, just to give you an idea right away.

> Patet ergo [*What a rigorous consequence! We have seen that if, among other things, it is the matter that defines the composite essence, and that matter, on the other hand, is the principle of individuation, there is no possible definition of the universal; and so one makes a distinction, St. Thomas said: it is not the matter which is the principle of individuation, or designated matter, or individual matter, which enters into the definition of man, but undesignated matter; we are already seeing, at least in broad strokes, the difference between the two matters, designated and undesignated; immediately St. Thomas is going to base himself on this distinction in order to go further.*] quod essentia hominis et essentia socratis non differunt nisi secundum signatum et non signatum. Unde Commentator dicit super VII *Metaphysicae*: Socrates nihil aliud est quam animalitas et rationalitas, quae sunt quiditas eius. Sic etiam [*The logical remarks begin already.*] **essentia generis et speciei secundum signatum et non signatum differunt** [*This is enormous.*]; quamvis alius modus designationis sit utrobique. [*This is what we announced as the mode, that is, to base oneself upon examples: thus, in the same way that man and Socrates are distinguished "secundum signatum et non signatum," so too are genus and species; though the mode of designating is completely different, as we will see next time.*][192]

Let us repeat, for we must not fool ourselves, this Chapter 3 from *De Ente et Essentia* is more difficult. But happily, it may be the most proportioned explanation that exists of those given by St. Thomas on the question asked in Chapter 3. In Chapter

192 *De Ente et Essentia*, ch. 3. [Here ends the lecture given on February 25, 1975.]

4, moreover, as we have said, we will enter directly into the end that we are pursuing: the understanding of the subject of logic.

A. Reading of Chapter 3

So, at the beginning of Chapter 3, St. Thomas says that it is therefore evident that the essence of man and of Socrates differ only as "secundum signatum et non signatum." He spoke about this a little before: individual matter, the principle of individuation, we call designated matter, that is, matter designated thanks to three dimensions. This does not enter into the definition of man, but rather "non signatum," that is, common matter does. So St. Thomas says that it is evident that the essence of Socrates and man do not differ "nisi secundum signatum et non signatum."

> Sicut etiam essentia generis et speciei [*This belongs to logic.*] secundum signatum et non signatum differunt [*There is a likeness between the way that man and Socrates differ and the way that genus and species differ.*], quamvis [*Clearly, there is also a difference.*] alius modus designationis sit utrobique [*Of course, it cannot be a question of the same designation.*], quia designatio individui respectu speciei est per materiam determinatam dimensionibus [*"materia signata"*], designatio autem speciei respectu generis est per differentiam constitutivam, quae ex forma rei sumitur [*So a resemblance in the sense that one has "signatum et non signatum" in these two cases; but the mode of designating is very different: the one is formed thanks to dimensions; the other is thanks to the form which constitutes the essence.*][193]

Question (a student): What should be understood by dimensions, here?

193 Ibid.

Answer (Monsignor): Simply the three dimensions of every body: length, breadth, and depth.

And so St. Thomas adds:

> Haec autem determinatio vel designatio [*We can use both terms*.], quae est in specie respectu generis, non est per aliquid in essentia speciei existens, quod nullo modo in essentia generis sit [*This is fundamental: one cannot say that any determination which we encounter in the species is extrinsic to the genus*.], immo quicquid est in specie, est etiam in genere ut non determinatum [*The great difficulty is to distinguish carefully matter and genus, matter forming the object of the "physicus" and genus forming the object of the "logicus"; the two are involved in determination but not at all in the same way; well, the danger is to take the one for the other to say, for example: matter is the genus; the genus is matter. No! However much there might be a relation between the two; what must be well understood is that everything that is in the species is in the genus, but Aut non determinatum"; and here is a rule which is very important in logic*:]. Si enim animal non esset totum [*Suppose that not everything which is in the species were in the genus as something indeterminate, for example, if animal did not constitute all of man, but a part, what would happen*?] quod est homo, sed pars eius, non praedicaretur de eo [*We would not be able to attribute that genus to man because the genus would be a part; now, no integral part is attributed to (predicated of) the whole*.]; cum nulla pars integralis de suo toto praedicetur.[194]

Here again is an absolutely fundamental distinction in logic: the integral whole (or the integral part) on the one hand, and the universal whole, on the other. The integral whole: for

194 Ibid.

example, man is composed of body and soul; and the enunciation is composed of a noun and a verb; etc. But to say "Man is animal" is not at all the same thing as to say that man *is composed of* a body and of a soul. So animal is a whole, though an indeterminate whole; and if it were not a whole, the attribution "man is an animal" would be impossible.

We can note, in passing, that it is in this regard that, last year, with regard to the title of the very first logical treatise of Aristotle, the name *Categories* is, at first sight, repugnant. This is because the word "categories," in our modern languages, does not go beyond the notion of the integral whole. One must return directly to the Greek in order to find in it the notion of universal whole. Now, one must absolutely not give the logical treatise a title which refers to an integral whole; that is not possible. "Predicaments" can work, though it is a somewhat bizarre word; but "predicament" all the same leads to "predicatio"; this will work to indicate attribution. But we have found another way to get out of the problem: if we go directly to the Greek, we can conserve the word "categories," but precisely by giving to it a sense which is not in the dictionaries, that is, by jumping straight to the Greek. Again, this is what one must do for "homonyms," etc. In brief, if one jumps immediately to the Greek, this will work; but if one wishes to use intermediate living languages, this will not work at all.

Let us return to Chapter 3 of *De Ente et Essentia*. We have an affirmation: the genus is not an integral part, it is a whole, but it is a whole that involves indetermination. What is very interesting, and what saves us in some way, is the examples that St. Thomas follows up with.

> Hoc autem quomodo contingat videri poterit, si inspiciatur qualiter differt corpus [*St. Thomas is going to take "body" as an example of his doctrine.*] secundum quod

ponitur pars animalis et secundum quod ponitur genus. [*We can reasonably understand body sometimes as a part, sometimes as a genus and as a whole*.] Non enim potest eo modo esse genus, quo est pars integralis. [*If it is a part and a genus, this is not at all for the same reason; well, here is the explanation*.] Hoc igitur nomen quod est corpus multipliciter accipi potest. [*The word "body" can be understood in many ways*.] Corpus enim, secundum quod est in genere substantiae [*We can put body under the predicament substance; what does body mean then? It signifies the nature which…*], dicitur ex eo quod habet talem naturam, ut in eo possint designari tres dimensiones; ipsae enim tres dimensiones designatae sunt corpus, quod est in genere quantitates. [*This is interesting; body insofar as it is under the predicament substance is a nature such that one can designate in it three dimensions; but having three dimensions is an accident which permits us to put body also in the predicament quantity*.] Contingit [*and what he is going to add is very important*] autem in rebus [*What possesses one perfection can possess also a greater one, to translate a little loosely*.], ut quod habet unam perfectionem ad ulteriorem etiam perfectionem pertingat [*and next the explanation is very easy*], sicut patet in homine, qui et naturam sensitivam habet et ulterius intellectivam. [*To repeat: body can be put under the predicament of substance and under the predicament quantity; now here is what is like a principle of the statement: something that possesses one perfection can attain another or can possess another greater one, as, for example, man is endowed not only with a sensible nature but also with a rational nature*.] Similiter etiam [*We are going to return to "body," of course, because here man was like a sub-example, if you wish*.] et super hanc perfectionem, quae est habere talem formam, ut in ea possint tres dimensiones designari [*what one might call the form of corporeality*], potest alia perfectio adiungi, ut vita vel aliquid huiusmodi. [*The body might also be a living body; so in the body, there is not only this perfection, namely, that one can designate three dimensions in it, but besides this, there is life*.] Potest ergo hoc nomen corpus significare rem quandam, quae habet talem formam, ex qua sequitur in ipsa designabilitas trium dimensionum [*He takes the two up again here, substance and quantity; that is, to repeat: by body one can understand a thing which has such a form: a form upon which follows that one can designate three dimensions. But "cum praecisione," we consider it alone, to the exclusion of every other possible supplementary form or perfection; let us call this: a form of corporeity, to the exclusion of every other form.*] cum praecisione, ut scilicet ex illa forma nulla ulterior perfectio sequatur [*It can happen that this body which already possesses one perfection be elevated to a superior perfection; but here we are considering body as excluding every other superior form.*]; sed si quid aliud superadditur [*But if we should add something to this saying, well, this thing will be "praeter significationem corporis," this will be something the signification of which will be alien to the word "body" as such*.], sit praeter significationem corporis sic dicti. Et hoc modo [*"body" understood, that is, by excluding every superior form*] corpus erit integralis et materialis pars animalis, quia sic anima erit praeter id quod significatum est nomine corporis et erit superveniens ipsi corpori, ita quod ex ipsis duobus, scilicet anima et corpore, sicut ex partibus constituetur animal.[195]

Here body is considered as a part; so, it is a part when we are content to consider it to the exclusion of every other form; the plant is composed of body and soul; the animal composed of body and soul; man composed of body and soul. In all three

195 Ibid.

cases, *body* has the same sense. From the union of the two results a "tertium quid." There are, in all three cases, always two integral parts that form a whole. Just as noun and verb form a statement, soul and body constitute man. But the statement is neither a noun nor a verb; and a man is neither a body nor a soul. He is constituted from body and soul in two parts neither of which is the whole of man.

> Potest [*another sense of "body" now*] etiam hoc nomen corpus hoc modo accipi, ut significet rem quandam, quae habet talem formam, ex qua tres dimensiones possunt in ea designari, quaecumque forma sit illa, sive ex ea possit provenire aliqua ulterior perfectio sive non. [*It makes no difference; it is* ***as it were open****; the body is, as it were, open to another perfection.*] Et hoc modo corpus erit genus animalis, quia in animali nihil est accipere quod non implicite in corpore continetur. Non enim anima est alia forma ab illa [*This caused a big problem in the Middle Ages, namely, does man have but one soul or three? This problem is attached to this.*], per quam in re illa poterant designari tres dimensiones; et ideo, cum dicebatur quod corpus est quod habet talem formam, ex qua possunt designari tres dimensiones in eo, intelligebatur: quaecumque forma esset illa [*This is the opposite of what we saw just now; we excluded every other form than that which is limited to three dimensions; now, we no longer do this; we look at the same nature, but—we can form a kind of metaphor to try to understand better—it is as if this nature was open; it has a form, yes, but it matters little which: the body can be animated or not, etc.*], sive animalitas sive lapideitas sive quaecumque alia. Et sic forma animalis implicite in forma corporis continetur, prout corpus est genus eius.[196]

196 Ibid.

This is not very easy. But all the same, this is a model of good teaching, taking account of the difficulty of the question.

> Et talis est etiam habitudo animalis ad hominem. [*This is easier for us to see because of our internal experience.*] Si enim animal nominaret tantum rem quandam, quae habet talem perfectionem, ut possit sentire et moveri per principium in ipso existens [*if, by animal, we understand a thing which possesses this perfection of being able to sense or to move itself through a principle which exists in itself*] cum praecisione alterius perfectionis [*excluding every other perfection*], tunc quaecumque alia perfectio ulterior superveniret, haberet se ad animal per modum partis et non sicut implicite contenta in ratione animalis [*Everything which will be added to this will be something else than animal; so he says: animal would only be an integral part which, with rationality, forms man.*], et sic animal non esset genus; sed est genus secundum quod significat rem quandam, ex cuius forma potest provenire sensus et motus, quaecumque sit illa forma [*Just now, we said: an animal is a being that can sense and move itself; but what is the form thanks to which it can so sense and move itself? What is the very root form that is at the beginning of this? This could be equally a rational or a non-rational form.*], sive sit anima sensibilis tantum sive sensibilis et rationalis simul.
>
> Sic ergo genus significat indeterminate totum id quod est in specie, non enim significat tantum materiam; similiter etiam differentia significat totum et non significat tantum formam [*The genus cannot signify the part as such; the genus cannot signify the matter; nor can the difference signify the form alone.*]; et etiam diffinitio significat totum, et etiam species. Sed tamen diversimode, quia genus significat totum ut quaedam denominatio determinans id quod est materiale in re [*Here, now! The genus*

is not matter but is taken from something material.] sine determinatione propriae formae. Unde genus sumitur ex materia, quamvis non sit materia, ut patet quod corpus dicitur ex hoc quod habet talem perfectionem [*When one can add a further perfection, then body becomes a genus; but if we exclude this, it remains a part.*], ut possint in eo designari tres dimensiones; quae quidem perfectio est materialiter se habens ad ulteriorem perfectionem. Differentia vero e converso est sicut quaedam denominatio a forma determinate sumpta praeter hoc quod de primo intellectu eius sit materia determinata, ut patet, cum dicitur **animatum**, scilicet illud quod habet animam; non enim determinatur quid sit, utrum corpus vel aliquid aliud. Unde dicit Avicenna quod genus non intelligitur in differentia sicut pars essentiae eius, sed solum sicut ens extra essentiam, sicut etiam subiectum est de intellectu passionum. Et ideo etiam genus non praedicatur de differentia per se loquendo, ut dicit Philosophus in III *Metaphysicae* et in IV *Topicorum*, nisi forte sicut subiectum praedicatur de passione. [*The definition and the species comprehend both, namely, the determinate matter and the determinate form.*] Sed diffinitio vel species comprehendit utrumque, scilicet determinatam materiam, quam designat nomen generis, et determinatam formam, quam designat nomen differentiae.

Ex hoc patet ratio quare genus, species et differentia se habent proportionaliter ad materiam et formam et compositum in natura [*Ah, now! We have considered the two levels; but we see all the same that there is a correspondence between them: "a materia sumitur genus, differentia sumitur a forma, definitio sumitur a composito."*], quamvis non sint idem quod illa, quia neque genus est materia, sed a materia sumptum ut significans totum [*but "totum indeterminate"*], neque differentia forma, sed a forma sumpta ut significans totum [*but "determinate"*]. Unde dicimus

> hominem esse animal rationale et non ex animali et rationali, sicut dicimus eum esse ex anima et corpore. [*St. Thomas says: if we were to say that man is composed "ex animali et rationali," this would be insofar as the knowledge of man, that is, his definition, is obtained "ex multis intellectibus."*] Ex anima enim et corpore dicitur esse homo, sicut ex duabus rebus quaedam res tertia constituta, quae neutra illarum est. Homo enim neque est anima neque corpus. Sed si homo aliquo modo ex animali et rationali esse dicatur, non erit sicut res tertia ex duabus rebus [*as a whole formed from integral parts*], sed sicut intellectus tertius ex duobus intellectibus. Intellectus enim animalis est sine determinatione specialis formae, exprimens naturam rei ab eo quod est materiale respectu ultimae perfectionis. Intellectus autem huius differentiae **rationalis** consistit in determinatione formae specialis. Ex quibus duobus intellectibus constituitur intellectus speciei vel diffinitionis. Et ideo sicut res constituta ex aliquibus non recipit praedicationem earum rerum, ex quibus constituitur, ita nec intellectus recipit praedicationem eorum intellectuum, ex quibus constituitur. Non enim dicimus quod diffinitio sit genus aut differentia.[197]

Here, we are going to skip over a paragraph.

> Et quia, ut dictum est, natura speciei est indeterminata respectu individui [*We read above: "essentia hominis et Socratis non differunt nisi* ***secundum signatum et non signatum****."*] sicut natura generis respectu speciei, inde est quod sicut id quod est genus, prout praedicabatur de specie, implicabat in sua significatione, quamvis indistincte, totum quod determinate est in specie, ita etiam et id quod est species, secundum quod praedicatur de individuo, oportet quod significet totum id quod est

197 Ibid.

essentialiter in individuo, licet indistincte. Et hoc modo essentia speciei significatur nomine hominis, unde homo de socrate praedicatur. Si autem significetur natura speciei cum praecisione materiae designatae, quae est principium individuationis, sic se habebit per modum partis. Et hoc modo significatur nomine humanitatis; humanitas enim significat id unde homo est homo. Materia autem designata non est id unde homo est homo; et ita nullo modo continetur inter illa, ex quibus homo habet quod sit homo. Cum ergo humanitas in suo intellectu includat tantum ea, ex quibus homo habet quod sit homo, patet quod a significatione eius excluditur vel praecidit materia designata. Et quia pars non praedicatur de toto, inde est quod humanitas nec de homine nec de socrate praedicatur. Unde dicit Avicenna quod quiditas compositi non est ipsum compositum, cuius est quiditas, quamvis etiam ipsa quiditas sit composita, sicut humanitas, licet sit composita, non est homo, immo oportet quod sit recepta in aliquo quod est materia designata.

Sed quia, ut dictum est, designatio speciei respectu generis est per formam, designatio autem individui respectu speciei est per materiam, ideo oportet ut nomen significans id, unde natura generis sumitur, cum praecisione formae determinatae perficientis speciem significet partem materialem totius, sicut corpus est pars materialis hominis. Nomen autem significans id, unde sumitur natura speciei cum praecisione materiae designatae, significat partem formalem. Et ideo humanitas significatur ut forma quaedam, et dicitur quod est forma totius, non quidem quasi superaddita partibus essentialibus, scilicet formae et materiae, sicut forma domus superadditur partibus integralibus eius, sed magis est forma, quae est totum scilicet formam complectens et materiam, tamen cum praecisione eorum, per quae nata est materia designari.

> Sic igitur patet quod essentiam hominis significat hoc nomen homo et hoc nomen humanitas, sed diversimode, ut dictum est, quia hoc nomen homo significat eam ut totum, in quantum scilicet non praecidit designationem materiae, sed implicite, continet eam et indistincte, sicut dictum est quod genus continet differentiam; et ideo praedicatur hoc nomen homo de individuis. Sed hoc nomen humanitas significat eam ut partem, quia non continet in significatione sua nisi id, quod est hominis in quantum est homo, et praecidit omnem designationem. Unde de individuis hominis non praedicatur. Et propter hoc etiam nomen essentiae quandoque invenitur praedicatum in re, dicimus enim socratem esse essential quandam; et quandoque negatur, sicut dicimus quod essentia Socratis non est Socrates.[198]

B. A Complementary Text on the Same Problem

The text of the *Metaphysics* that we referred to above is very brief and very interesting. And there, the same problem is very explicitly posed: are matter and genus synonyms? This is in Book 7. In fact, we already said that in Book 7 there all kinds of things.

> Genus enim non est praeter ea quae sunt species generis. [*We cannot conceive a genus without a species.*] Non enim invenitur animal, quod non sit nec homo, nec bos, nec aliquid aliud huiusmodi. [*This is not possible precisely because the genus signified indistinctly, indeterminately, that which the difference signified distinctly; there must be a form for "animal"; it may be "rationality" or it may be "irrationality," but there must be one; so St. Thomas says this: the genus is not "praeter ea quae sunt species generis."*] Aut si inveniatur aliquid quod est genus praeter species, sic acceptum ut est praeter species, non accipitur ut

198 Ibid.

genus, sed ut materia. [*The genus is not outside the species; and if we find something which is outside the species, this is not properly speaking the genus, this is something material*.] Contingit enim aliquod et esse genus aliquorum, et materiam. [*Here is the difficulty; it happens that we have both, but one must distinguish them*.] Sicut vox [*Here again are some examples which are going to help us*.] est genus literarum, et est materia. [*Is "vox," the genus of letters or the matter? Both; in which sense?…*] Et quod sit genus patet per hoc quod differentiae additae voci faciunt species vocum literatarum. Et quod etiam sit materia, patet; quia ex hac, scilicet ex voce faciunt elementa, idest literas, sicut aliquid fit ex materia. [*As an example, this is easy: the voice is that from which the letters are composed and it is a genus of letters because, by adding something to the genus, we have the species of voice.*]

Sciendum est [*Now here is the doctrine; we are presented it with an example; now we will explain it*.] autem quod, licet idem secundum nomen possit esse genus et materia [*As "vox," he has said, can be the genus, and the matter, of letters; well, one must know that, however much the same thing with regard to the name can be both genus and matter…*], non tamen idem eodem modo acceptum. [*It does not have at all the same sense; and we will see, as we said just now, how central this distinction is between the universal whole and the integral whole; this is a point of extreme importance in logic*.] Materia enim est pars integralis rei [*This is why it is easier: when one says that voice is the matter of letters, it is the matter as an integral part of the letters*.], et ideo de re praedicari non potest. Non enim potest dici quod homo sit caro et os. [*We cannot say this; it is composed of flesh and bone, yes; but it is neither flesh nor bone*.] Genus autem praedicatur de specie. [*One must see the opposition: the integral part can never be attributed to the subject of attribution, while the genus*

can be attributed to the species: "homo est animal."] Unde [*That the genus can be attributed to the species is a sign that it signifies, at least in a certain way, the whole;* ***"predicatio," or attribution, and whole, go together****; otherwise, we are outside of logic; this is why it is so important*.], oportet quod significet aliquo modo totum. [*He says "aliquo modo" "totum" because "vox" is going to signify the genus of letters but in an indeterminate and indistinct way*.] Sicut enim propter hoc quod est innominata privatio [*a nice text again drawn from the science of nature: when the privation is not named…*], aliquando simplici nomine materiae significatur materia cum privatione [*The privation does not have a name: matter with privation is going to be called matter; what is important is that it does not have form*.], ut supra dictum est, quod aes accipitur pro aere infigurato, cum dicimus quod ex aere fit statua [*It is evident that the bronze is deprived of its first form when the artisan imposes on it another; it is sufficient to say "ex aere fit statua"; we are going to use a simple name in order to signify what, in fact, implies privation, a matter which implies privation*.]; ita etiam quando forma est innominata, simplici nomine materiae intelligitur compositum ex materia et forma, non quidem determinata, sed communi; et sic accipitur ut genus. [*The genus implies this common aspect; the form is not named: it is something composed from form and we do not have a name to designate the form; we will say "common form."*] Sicut enim compositum ex materia et forma determinata est species, ita compositum ex materia et forma communi est genus. [*In order to show that the genus signifies a whole; if the form is unnamed, we will designate the whole by the genus*.]

Et hoc in pluribus patet [*and now, once again, the example of body*]. Corpus enim [*This is the same doctrine but said in a slightly different way*.] potest accipi, et ut materia

animalis, et ut genus. [*It is as if he should say: body can be envisaged as a part of an animal, as a genus of an animal.*] Si enim in intellectu corporis intelligatur substantia completa ultima forma [*It is complete, there is nothing beyond; this is why one can remark that this is said in a slightly different way; if by body we understand "a complete substance or one finished by the ultimate form, having itself three dimensions."*], habens in se tres dimensiones, sic corpus est genus, et species eius erunt substantiae perfectae per has ultimas formas determinatas [*Just now we said, "formas ulterioras," here we said "forma ultima," and so: body is genus.*] sicut per formam auri, vel argenti, aut olivae, aut hominis. Si vero in intellectu corporis non accipiatur nisi hoc, quod est habens tres dimensiones cum aptitudine ad formam ultimam, sic corpus est materia. [*It can receive other forms, but we do not consider it in that way; we consider it as such, such as to put it into the predicament quantity, no further; so, matter; but this is easier in the case of "vox."*]

Et similiter est de voce. Si enim in intellectu vocis includatur ipsa vocis formatio in communi [*if by voice, "vox," we understand the formation of the voice, but a common formation*] secundum formam quae distinguitur in diversas formas literarum et syllabarum, sic vox est genus. [*If in the concept which we have made of the voice there is implied the formation of the voice "in communi," well then, it is a genus because this formation of the voice can become determined in many, many ways.*] Si autem in intellectu vocis accipitur solum substantia soni, cui possibile est advenire praedictam formationem [*Evidently, we can always add to it something, but we do not understand it in this way, we are content with the consideration of it as sound purely and simply; well, this is the matter of letters; the voice is an integral part of letters to the extent that we do not include the aspect "formation of the voice" even "in communi"; but if we understand the aspect, "formation of the voice" "in communi": "genus."*], sic vox erit materia literarum.[199]

Question (Louis Brunet): What are the species of voice that one must think of here?

Answer (Monsignor): "Vox," considered as such, belongs to the science of nature. Here, pretty much, is how it is defined in the treatise *On the Soul*: "Vox est sonus ab animali prolatus cum imaginatione quadam." From this point of view, we will have voices which are natural signs, as with the animals, for example, and we will have conventional, arbitrary, artificial signs which man will form with a view to communication, etc. But the voice is another thing than sound. Noise, for example, is a sound, but it is not voice. But it remains that there must be sound in order to constitute a letter. So insofar as it constitutes the letter: integral part.

Ex quo etiam patet quod vox, secundum quod est genus, non potest esse sine speciebus. [*This voice, to the degree that we speak of formation, even "in communi," will be formed either by one or by the other, either by animal or by different animals, or by man.*] Non enim potest esse sonus formatus, quin aliquam determinatam formam habeat

199 St. Thomas, *In VII Metaphys.*, lect. 12, nn. 1545-48.

> huius vel illius literae. [*Evidently, he says "formatus": this will not work if we take out the word "formatus"; it is simply part of the letter; but it is to explain the very beginning, where he said: "non potest esse genus sine speciebus," "praeter ea quae sunt species generis"; if one exemplifies with the voice, one says: "non potest esse sonus formatus sine..."; in saying: "sonus formatus," again, this is not the: "substantia soni"; this is what he said before.*] Sed si omnino careret forma literali prout est materia, sic inveniretur sine literis, sicut aes invenitur absque his quae fiunt ex aere.[200]

As we said, this is not very easy. But we can all the same retain this: the irreducible opposition between integral parts and the universal whole. The universal whole permits attribution, the integral part does not. This is enormous from the point of view of logic. This is not to say that no logical treatise will use integral parts. In the treatise *On Interpretation*, for example, what do we do? We speak of the noun and a verb as integral parts of the statement. But we cannot say: "Enuntiatio est nomen." We will say, "enuntiatio est oratio"; but this is something else! And we will say "oratio" of all the species, of all the subsequent instruments. Although in the *Topics*, we will say that it is preferable to use the word "progressio" instead of "oratio"; but we can certainly still use "oratio." This is because, in this case, it is more manifest to employ "progressio." And so it is a question of definition in terms of act. "Oratio" signifies, in logic, every complex understanding, and so, a whole. But this will be an *undetermined* whole. "Est oratio." But what "oratio"? The definition "est oratio"; well, one must add: "significans quod quid est rei"; division "est oratio." But what does this mean in this case? Etc. Thus, "oratio" implies a multiplicity of parts, it is always composed of parts. The syllogism is what is most manifest as an "oratio" because of

200 Ibid., n. 1548.

its complexity: major, minor, conclusion, etc...

These notions are absolutely fundamental. Clearly, the difficult part is to understand how it is that the genus is not an integral part. Matter is an integral part; the genus is not an integral part. This is the difficulty. And so this is why St. Thomas, in *De Ente et Essentia*, is going to give "body" as an example. In the *Metaphysics*, "body" is used again but further "voice" is added. However, we can add, in the *De Ente et Essentia*, the example of animal and man.

Next—if the subject of the course bore on this, we would remain here longer, but to give an understanding of the subject of logic, its end, we will now still have to add something else—it remains for us to read Chapter 4 and add to it some complementary and very determinate things on the subject of logic.

Question (Michel Lemelin): Just now, in the *Metaphysics*, St. Thomas said that what is composed "ex materia et forma communi" gives the genus; should we take the same formula, "mutatis mutandis," for what gives the species? "Materia et forma in communi et forma ultima?"

Answer (Monsignor): No! Not "forma communi" but "forma determinata" only. Suppose, for example, there is a question of the sound of voice such as is defined in the treatise *On Interpretation: "vox significativa ad placitum."* There, one would not say: "forma communis." It would be a question of a form that depends

on practical understanding (which is a determinate form). For that to be a genus, it must signify all that, but "indistincte" and "indeterminate." The form is unnamed, but what to do? Being unnamed, we are going to content ourselves with saying "hic animal," to show that it is there, but that we do not mention it explicitly.

Question (Michel Lemelin): So that one can say that animal is a certain form, but indeterminate?

Answer (Monsignor): But in the sense that "genus sumitur a materia." Animal signifies the whole man, that is, that everything which is in man is in animal but "indistincte." So animal signifies a whole and not a part. Evidently, when we say animal, one thinks of a body purely and simply. It is easier. The notion of the integral part is infinitely easier than the logical notion of genus. So, for the most part, animal means simply: "what has a sensible nature." And this is true, but in the measure in which such a being has sensible knowledge while being able to receive a further perfection, namely, rationality, that animal becomes a genus.

Question (Michel Lemelin): And if one conceives it without

reference to the possibility of adding a perfection?

Answer (Monsignor): If one excludes it, if one does not wish this: animal is no longer seen as a part. Well, man would be said to be composed of body and soul. There will evidently be differences of the body and the soul, but man will be said to be composed of a body and soul as a plant is said to be composed of a body and soul. In both cases, the body is not conceived except as a part.

Question (Michel Lemelin): When one says "to add something," does this mean that the genus contains species which are necessarily a hierarchy?

Answer (Monsignor): What you have touched upon there is absolutely fundamental for the treatise on the *Predicaments*. Because, whether the reality is substance, quantity, quality, relation, etc., is not for the logician to say. The logician assumes this from the metaphysician. So what belongs to him properly? There, this remark plays an enormous role. Because the logician precisely orders, starting from the supreme genus, everything that it contains. But he still has to know what a genus is to

be able to do it. And here, it will be a question of a specifically logical consideration, thanks to this principle: *things, in which is found the foundation of truth, which possess one form, can possess another one.* Thus, he who has a sensible nature can also possess a rational nature. And there is no genus, not even the supreme genera, in logic, which could make an exception to this. The first sense of the word "corpus" could never constitute a logical subject. The voice considered only as "sonus," not more.

There is a whole order of understanding and this order *makes the subject* of logic. We must not say: *it is the subject*, for it is not a question of the subject of a treatise. *The* subject concerns all the treatises. The light that we encounter in all the treatises must also be encountered in the *Predicaments*. And there we have an example, it seems: *it cannot be that the natures in question are as it were closed upon themselves; this would precisely impede the hierarchy in a properly logical order*. The logician receives substance, that he might order it, that he might organize it. This is a point

that strikes us when we read: that which possesses one perfection can possess a further one. This makes one think immediately of the order that would be the proper order for the treatise of the *Predicaments*. We will see this some day.

And so this is why this is one of the difficulties of this treatise. The treatise receives its foundation from metaphysics. If we do not know what a substance is, what quantity is, what quality is, we can't do anything. But having assumed it, nonetheless, and knowing according to this light, we have what we need. In the other logical treatises, the logician does not need to assume so much from metaphysics. Something like this happens in the treatise *On Interpretation*: the great danger there is to confound logic and grammar because what is considered in logic, namely, noun and verb, is also considered by grammar. But there again, one must make a distinction, though not the same one. Still, there is a distinction due to which there is a consideration of the noun and a verb proper to the logician, and another proper to the grammarian.

Here we see that "logica maximam habet difficultatem." [201] The objection to which St. Thomas was responding presented as a principle for discovery the following: one must begin by what is easier. St. Thomas says: on condition that the easier does not depend, for its understanding, on the more difficult. Now, the science of nature, understood properly as *science*, and metaphysics, and mathematics, as sciences, are unintelligible without logic. When one speaks of science properly, one is speaking about intellectual virtue; this is not to say that without logic we understand nothing, but that we will not truly possess the

201 St. Thomas, *In Boethii De Trinitate*, q. 6, a. 1, second question, ad 3.

intellectual virtue that is the science of nature or of mathematics if we do not know logic. Thus, that "we ought to begin from what is easier" is a principle which allows exceptions.

But to go from the "notius quoad nos" to the "notius quoad se," "innatum est nobis"; for this there is no exception. If the science of nature were "notior quoad nos" with respect to logic, it would be necessary to know it before logic. Someone might believe that the science of nature, bearing on things which are more proportioned, is "notior quoad nos." And, in fact, if the science of nature did not demand so much experience, it would be most conformed to the nature of our intellect. But no, it is not "notior quoad nos." Scientifically speaking, in any case. So, logic is about the "notius quoad nos," at this point, despite its difficulty. And so much so that, if someone had only 15 years to consecrate to the speculative life with the idea of rising to truly scientific knowledge, he would have to concentrate almost entirely on logic. Which goes against the customs of today, evidently...[202]

The Fourth Chapter

Now we are going to begin the fourth chapter of *De Ente et Essentia*, and we are not going to go any further than this in the reading of this treatise. We must underline that these current classes are the most important in the present series. We ought to return to the order so as to avoid all confusion. First of all, we must carefully distinguish between the intention and the execution of the intention. And here in particular, there is a danger of confounding the two because, in the execution of the intention, in reading *De Ente et Essentia*, we have been led to speak, however briefly, of the word "logical" three times, though this did not directly concern our intention. There was first of all the question of the *logical mode* of the seventh book of the

202 [Here ends the lecture given on February 26, 1975.]

Metaphysics. Recall that primary matter could not be defined except "*per viam motus*," but Aristotle manifested its diversity with regard to form "*per viam predicationis*," which is a properly logical mode. Next, in reading the last lesson of this Book 7, we spoke of a "quod quid est *logice loquendo*." And finally, the third sense which we have seen of the word "logical" was the *logical definition* as opposed to the natural definition: "appetitus vindinctae," for example, is called a logical definition of anger. This makes a lot of "logicals" and might lead us into confusion, since our intention, which these three "logicals" do not concern, is also a logical order.

Let us repeat: we have spoken three times of "logical," because these three senses were necessary for the understanding of the treatise *De Ente et Essentia*; but these three "logicals" are clearly distinguished from a logical that truly forms our object. The word "logical," then, has yet another sense, and this last sense, which is of interest to us with regard to our intention, properly signifies the speculative art, this method, as St. Thomas will say in his *Commentary on the Trinity of Boethius*, "qui ministrat instrumenta speculationis." And what we are properly looking for is to make more precise what the subject of this logic, of this speculative art, is.

Of course, one must not think that there is no link between the four senses of the word "logical." But, as we said at the beginning, we cannot base ourselves on the word and its different senses to manifest the sense that interests us, because this would put before us too many unknowns and would multiply difficulties. The other senses of the word "logical" are not, in fact, more manifest than the one which interests us. For why is the definition that is opposed to a natural definition called logical, or dialectical? And why is the mode of Book 7 called logical? These are not very easy questions. So, let us not be distracted by the logical mode of Book 7, nor by the "quod quid est logice loquendo," nor

by the logical definition that is opposed to the natural definition. And we will now see in what way precisely *De Ente et Essentia* leads us to our true intention. This is why the classes that follow are the most important of the present series.

In the very text of *De Ente et Essentia* we will discover in a relatively simple way the subject of logic. And then we will enunciate it in a more and more precise way with the aid of very determined texts.

Now, note well the rigor of St. Thomas's discourse. This rigor continues through the whole of *De Ente et Essentia*, but in a particular way in Chapter 4. And this rigor is even more important now because we are very close to the end that we proposed.

A. Reading of Chapter 4: Discovery of the Subject of Logic

> Viso quid significetur nomine essentiae in substantiis compositis…[203]

St. Thomas sums up the three previous chapters before continuing on from them. For up to now, it was asked what exactly the word "essence" signifies. We recall that this sense of essence, drawn from the first sense of "ens" was applied principally to substance, whether simple or composed. But because the composed is easier to understand, we limited ourselves to the examination of essence in composed substance. This is why we were led to speak of matter, of form, and of natural definition. In order to understand the essence of composed substance well, it was necessary, among other things, to see that it is composed of matter and form as from *integral parts*; and in order to manifest this more, St. Thomas began in Chapter 3 to use as "opposita" notions of genus and species, which are themselves not composed of their parts as from integral parts. And in Chapter 4,

203 *De Ente et Essentia*, ch. 4.

we are going to continue to compare the essence or nature of composed substances to objects of the logical order in order to better understand it. It is really the metaphysician who takes up logic in this explanation. And it is thus that we are able to see in a very clear way what the subject of logic is. And we have been leading up to this for a long time. In sum, it is the notion of composed essence that will have led us to the understanding of the subject. It was preferable to go through this opusculum in this way rather than to give the subject of logic directly. Without seeing the subject of logic in this way, in its reference to essence, to the nature of things, we would risk never really understanding very well how the subject of logic is not a mere chimera and is truly an object of science.

> Viso igitur quid significetur nomine essentiae in substantiis compositis videndum est quomodo se habeat [*still speaking about the essence of composed substance*] ad rationem generis, speciei et differentiae.[204]

With a view to knowing the nature (that is, the essence) better, we must compare it to some objects of a logical order that, in fact, are treated by Porphyry in his *Isagoge*. So at the same time, we will find ourselves with a little idea of what genus, species, and difference are. In other words, the end that St. Thomas proposes here is to know nature better by comparing it to logic; now, since our end is to better understand logic by basing ourselves on nature, the exposition of St. Thomas can help us.

a) In Order to Be the Subject of Logic, the Essence Must Be Signified "Per Modum Totius"

> Quia autem id, cui convenit ratio generis vel speciei vel

204 Ibid.

differentiae, praedicatur de hoc singulari signato [*For example, animal, to which the "ratio generis" belongs, is attributed, and that to which it is attributed is a designated singular; we have seen what a designated singular is: Socrates, Plato, etc.; thus, Socrates is a man (which has the "ratio specei"), Socrates is an animal (which has the "ratio generis"), Socrates is rational (which has the "ratio differentiae"), etc.; in other words, "id cui convenit esse hominem, animal, rationale" is "hic homo," this designated singular; from this, St. Thomas says: because what is so attributed and is of the logical order is attributed to the singular as such, it is impossible that…*], impossibile est quod ratio universalis, scilicet generis vel speciei, conveniat essentiae secundum quod per modum partis significatur [*For this essence, this composed essence, can be signified in two ways: either in the mode of a part, and this would be "humanity," "animality," or in the mode of the whole, and this would be "man," "animal." But we say "hic homo est animal," and because we say, "hic homo est animal," it is impossible that genus, species, or difference, are said of the essence considered in the mode of parts; it is absolutely necessary that all these be attributed to the essence as conceived, represented, signified "per modum totius."*], ut nomine humanitatis vel animalitatis. Et ideo dicit Avicenna quod rationalitas non est differentia, sed differentiae principium; et eadem ratione humanitas non est species nec animalitas genus.[205]

Note that the principle of manifestation here, as it is in the following paragraph, is logical attribution. It is true that we are speaking of essence, but we show something about essence based on attribution, which properly belongs to logic. Evidently, St. Thomas here presupposes a statement that he made above in Chapter 3: "Nulla pars integralis praedicatur de suo toto." This

205 Ibid.

is an extremely important point in logic. In all the treatises, we find that when we speak of a whole in logic, it is a question of the universal whole or the logical whole, and not of the integral whole. Nevertheless, this does not mean that Aristotle never uses the integral whole in logic; Aristotle determines the noun and a verb as integral parts of the enunciation in his treatise *On Interpretation*. But when he defines the enunciation, he still will not say: "enunciatio est nomen" nor "enunciatio est verbum"; he's going to say "enuciatio est oratio," because "oratio habet rationem totius."

Let us look at an example that we have already given. The title *Categories* is, at first sight, repugnant for a logical work because in current usage the English and the English word "category" does not go beyond the integral whole. This is why, last year, we said that if we can respect the necessity of designating a whole which is other than the integral whole, even while using the word "category"—there is no danger of being mistaken with the word "predicament": "predicament" leads to "praedicatio," and through this to "attributio"—it will be because we jump immediately to the Greek without going through a modern language. We turn to a material copy of the Greek, as it were. For when we say "category," in logic, it is necessary that the "ratio quam significat nomen" be the "ratio" which Aristotle himself understood when he said "κατηγορίαι" (*categoriai*). All right! But, again, the danger due to which one might be led at first to exclude this word is the difficulty, due to current usage, of giving to this word any sense other than integral whole. But when we study a little, we see that there are other cases where living language can imitate, can make a sort of tracing of a Greek word, giving to the modern word exactly the sense of the Greek word without referring to the sense which current usage has established. Normally, when you go from one language to another there are differences in the senses. But here, it is truly exactly the

same sense that Aristotle gives to the word "κατηγορίαι" which we must give to the modern word "categories." Otherwise, we must purely and simply exclude this word as the title of the first treatise in logic. But when we cannot thus exclude a current word, in the end it is better to keep it.

But let's return to our considerations. We said that what is important in what we are reading is that the principle of manifestation is attribution. This is very much like Book 7 of the *Metaphysics* where we also proceed "per viam predicationis." We rely here on the fact that the predicate, the attribute, is said of the singular, and on the fact that the latter is a whole. "Animalitas," then, which signifies a part, can never be called a genus, nor "rationalitas" a difference, nor "humanitas" essence or species. We must rather say: "animal," "rationale," and "homo," which signify the essence as a whole. In brief, we must toss out the "essentia per modum partis," that is, signified as an integral part: this can be neither genus, nor difference, nor species.

> Similiter etiam [*a second consideration relying again on attribution*] non potest dici quod ratio generis vel speciei conveniat essentiae, secundum quod est quaedam res exsistens extra singularia, ut Platonici ponebant [*This is very interesting; it is a very brief, very summary refutation of the separated ideas; in sum, neither can one say that the genus, species, and the difference belong to the essence as something "praeter rem exsistens," something separated; why?…*], quia sic genus et species non praedicarentur de hoc individuo [*In both cases we rely on this: it is the individual which is the subject of attribution; because of this, the predicate cannot be something purely and simply outside of the singular.*]; non enim potest dici quod Socrates sit hoc quod ab eo separatum est; [*and another consideration*:] nec iterum illud separatum proficeret in cognitionem huius singularis. [*When the understanding wishes to*

> *be elevated from the singular to the universal, if we see the singular in the way the Platonists do, or the essence in the way the Platonists do, we'll never be able to attain to the true universal starting from the singular, nor moreover to apply universal notions to the individuals; but, again, what is very interesting is that these two considerations rely on attribution, and on an attribution of which the subject is the singular*.]
>
> Et ideo relinquitur [*so it is necessary for us to say*:] quod ratio generis vel speciei conveniat essentiae, secundum quod significatur per modum totius, ut (in) nomine hominis vel animalis, prout implicite et indistincte continet totum hoc, quod in individuo est.[206]

One can say, all the same, that the genus is not the individual. No, certainly not! But everything which is in the individual is in the genus, though *indistinctly* and *implicitly*.

b) In Order to Be the Subject of Logic, the Essence Signified "Per Modum Totius" Must Be Considered "Ut Habens Esse in Anima"

1. Three Ways of Considering the Essence Signified "Per Modum Totius"

In what follows, this becomes extremely interesting for us. We are going more quickly toward a more precise understanding about the subject of logic. Certain distinctions are going to be laid down which will allow us to say: well, *this* is the subject of logic! All this will occur due to having taken composed substance, material substance, as a point of departure. Next, we will read some texts that are more precise, in which we will be better able to understand because we have followed this road. This is why it was good to go through *De Ente et Essentia*.

206 Ibid.

We have, then, excluded essence "per modum partis." We have also excluded essence seen as something separated. Neither the one nor the other can be the subject of logic because neither the one nor the other can have the "ratio generis, differentiae, vel speciei." Let us, then, turn to nature signified "per modum totius," to a whole which implicitly contains everything which the individual implies.

> Natura autem vel essentia sic accepta [*Here is the first distinction to make*:] potest dupliciter considerari [*and this is an absolutely fundamental distinction*]: uno modo, secundum rationem propriam, et haec est absoluta consideratio ipsius. [*We can consider the essence according to the nature which is proper to it, and according to a consideration which can be called absolute; the nature in itself, what it is*.] Et hoc modo nihil est verum de ea nisi quod convenit sibi secundum quod huiusmodi. [*Again, attribution; if we consider the nature in the absolute way, we cannot attribute to it anything but what belongs to it purely and simply, without anything at all foreign*.] Unde quicquid aliorum attribuatur sibi, falsa est attribution. [*In this absolute consideration, everything which one attributes to the essence other than what belongs to it in its own nature, that is, all predicates other than those which define it, cause the attribution to be false*.] Verbi gratia, homini [*for example, to man* ***as man*** *(this is what the "absolute consideration" which we are speaking of means) "convenit"*] in eo quod est homo convenit rationale et animal [*This, then, is why we will say "homo est animal rationale"; so, which are the predicates which belong to man according to this first, absolute consideration? Animal, rational.*], et alia, quae in diffinitione eius cadunt. [*We will also speak of mortal, etc.*] Album vero aut nigrum vel quicquid huiusmodi, quod non est de ratione humanitatis [*which do not enter into the very essence of man*], non convenit homini in eo

> quod homo. [*Of course, it might be true to say that "homo est album," but not according to the absolute consideration which we are talking about*.] Unde si quaeratur utrum ista natura sic considerata possit dici una vel plures [*So here is the problem: can we say that human nature is one or many? Neither the one nor the other*.], neutrum concedendum est, quia utrumque est extra intellectum humanitatis et utrumque potest sibi accidere. [*This is extrinsic and might be attributed to it or might not be attributed to it; thus, if we consider human nature* ***absolutely****, one can neither say that it is one nor that it is many*.] Si enim pluralitas esset de intellectu eius [*Because, let us note, absolute consideration of the nature is the nature considered "secundum propriam rationem"; "id quod est de ratione ejus"; so he says*:], nunquam posset esse una [*It could never be one*], cum tamen una sit secundum quod est in Socrate [*While we already know that this nature is one in Socrates, who is an individual*]. Similiter si unitas esset de ratione eius, tunc esset una et eadem Socratis et Platonis nec posset in pluribus plurificari. [*There would only be one and we would not be able to say that the natures are many; the nature of Socrates and Plato would be exactly one and the same nature This is to deny division; this is marvelous. So, for the first member of the division: "secundum rationem et naturam propriam," where "nihil est verum de ea dicere, nisi quod convenirat sibi secundum quod hujusmodi," everything else is excluded; this excludes everything else to such a point that if we ask the question: is it one or many? Neither of the two attributions is true, so long as the nature is considered absolutely*.]

Alio modo consideratur secundum esse quod habet in hoc vel in illo [*Now this is something else: this is not the nature "secundum propriam rationem," this is the nature "prout habet esse," insofar as it has existence in this or that*.], et sic de ipsa aliquid praedicatur per accidens

ratione eius, in quo est [*Here these coincide, to be man and to be white, these go together.*], sicut dicitur quod homo est albus, quia Socrates est albus, quamvis hoc non conveniat homini in eo quod homo. [*Man is white because Socrates is white.*][207]

Question (Gerald Allard): In the case of nature considered in itself, can we say something like this: man is colored because of his animality? Would that be true for the nature of man considered absolutely?

Answer (Monsignor): Evidently, this would be like an inseparable accident, a property, something like that.

Question (Gerald Allard): And properties can...?

Answer (Monsignor): Because what is a property, like "to be teachable," and "to be an animal that wonders," are so many properties which...

Question (Gerard Allard): And which would be found with the nature considered absolutely?

Answer (Monsignor): Yes.

Question (Gerard Allard): These would be true attributions?

Answer (Monsignor): Yes, true. Yes, because this follows necessarily the "ratio propria." And we already said this, by saying that these are properties. This is the

207 Ibid.

well-known distinction between the proper accident and what is not, which is subdivided into separable and inseparable.

Alio modo [*in another way, then, we consider the nature in so far as it exists in this or that*] consideratur secundum esse quod habet in hoc vel in illo, et sic de ipsa aliquid praedicatur per accidens ["*per accidens*," *because it* ***coincides****; it is not man as man which is white; but only insofar as Socrates, who is a man, is white*] ratione eius, in quo est, sicut dicitur quod homo est albus, quia Socrates est albus, quamvis hoc non conveniat homini in eo quod homo.[208]

So, there are things which belong to the nature considered as an existent and which do not belong to the nature considered absolutely. And so, here is the first insinuation of the subject of logic. We said: "secundum quod habet esse in hoc vel in illo" and we are not content with simply exemplifying by a "hoc" which would signify a singular "ut existens extra animam." But...

Haec autem natura duplex habet esse [*Once again, the nature can be considered absolutely or as existent; now we are to distinguish with regard to this second consideration a double "esse" of the nature.*], **unum in singularibus** [*We have just exemplified this "esse."*] et **aliud in anima** [*Here is the subject of logic: the nature "prout habet esse in anima," but do not forget "****nature****"; this is what forms the power of our procedure for leading to the subject of logic; because the logical object is not, as we have said already, a pure chimera;* ***it is the nature, such or such a nature, "ut habens esse in anima****." Clearly, this will demand that we make things more precise, but this is already a first statement.*],

208 Ibid.

et secundum utrumque [*"Duplex esse"; so, everything depends on the "esse"; there will be properties, accidents, qualities, which will follow the "esse" in the singulars, and other properties, etc., which will follow the nature insofar as it has its "esse" in the soul.*] consequuntur dictam naturam accidentia. Et in singularibus etiam habet multiplex esse secundum singularium diversitatem [*in the measure in which the nature exists in the singular: multiplicity*] et tamen ipsi [*"ipsi" returns; what is opposed to the second consideration, that is, the first*] naturae secundum suam primam considerationem, scilicet absolutam, nullum istorum esse debetur. Falsum enim est dicere quod essentia hominis in quantum huiusmodi habeat esse in hoc singulari [*It is false to say this; it can exist in the singular; but as such, we cannot say that it exists in the singular; nor that exists in the soul; it can exist in this way or in that way, in this subject or in that subject.*], si enim [*And St. Thomas proceeds with the sort of contradiction, and by a sort of argument "ad hominem."*] esse in hoc singulari conveniret homini in quantum est homo, nunquam esset extra hoc singulare. Similiter etiam si conveniret homini in quantum est homo non esse in hoc singulari [*If it were essential to the nature to be in Socrates, we would never find it except in Socrates, which goes against common experience.*], nunquam esset in eo. Sed verum est dicere quod homo non in quantum est homo habet quod sit in hoc singulari vel in illo aut in anima. Ergo patet quod natura hominis absolute considerata abstrahit a quolibet esse, **ita tamen quod non fiat praecisio alicuius eorum.** [*We do not exclude that the nature can have this or that existence; but to have existence in this way or that way does not belong to it insofar as it is the nature considered absolutely.*] Et haec natura sic considerata est quae praedicatur de individuis omnibus.[209]

209 Ibid.

Absolutely considered, it can be said of all the individuals.

Question (John White): When we speak of the nature as it exists "in anima" does this mean in the knower?

Answer (Monsignor): Yes. And according to an "esse" which is immaterial, intentional, that is to say, in the knower as knower. When we know a rock, it is not the rock in its physical aspect which is united to us. There must be an assimilation between the knower and the object for there to be knowledge; all the same it is not the known, considered physically, which enters into the eye, into the faculty of knowing. And this is a big difficulty when we try to analyze the problem of knowledge as such.

We are discovering more and more what the subject of logic is. Always starting from nature, that is what is important. We might have looked at some more precise texts on the subject of logic; but for someone who has not been warned, the aspect that has to do with nature can very easily be overlooked. And then there would be every difficulty in the world in understanding how logic can be a science.[210]

Let us repeat a little in order to understand what follows. St. Thomas has introduced the first important distinction, a fundamental distinction: nature or essence (signified "per modum totius") can be considered in two ways: *either* in an absolute way, and in this way it is only true to say of this nature what belongs

210 [Here ends the lecture given on March 11, 1975.]

to it properly and what is foreign to it will be falsely attributed to it; *or* no longer with an absolute consideration, but "ut habens esse in hoc vel in illo." The second member is subdivided again: either in reality, or in the soul.

> Haec autem natura habet duplex esse: unum in singularibus, aliud in anima.[211]

And finally, we said that neither of these two distinctions properly belongs to the nature considered absolutely, but, nevertheless, it does not exclude them either: "ita quod non fiat praecisio alicujus eorum." Because otherwise this wouldn't work. We wouldn't be able to say that Socrates is a man.

2. The "Ratio Universalis" Belongs to the Essence only according to the Third Consideration: The Essence "Ut Habens Esse in Anima."

Now, we are getting more and more into the topic of logic strictly speaking.

> Non tamen potest dici [*and this while always given the nature absolutely considered*] quod ratio universalis [*Whatever the universal will be, genus, difference, or species, we cannot say that the definition, the notion of the universal, belongs to the nature considered absolutely.*] conveniat naturae sic acceptae, quia de ratione universalis est unitas et communitas. [*Here already is something very important; the universal is going to be defined by unity and community; we will see, moreover, that is absolutely necessary that it be the intellect which gives to it this unity and community; so the universal does not belong to the nature considered absolutely because it is of the very "esse" of the universal to be one and common; unity and*

211 Ibid.

community enter into its very definition.] Naturae autem humanae neutrum horum [*"unitas" and "communitas"*] convenit secundum suam absolutam considerationem. Si enim [*It is always the same way of arguing, "ad hominem."*] communitas esset de intellectu hominis [*Here we might say: "de ratione hominis," it would be the same thing; if the community or the unity should exist in the very definition of man…*], tunc in quocumque inveniretur humanitas inveniretur communitas. [*Wherever humanity would be, there would be community.*] Et hoc falsum est, quia in Socrate non invenitur communitas aliqua [*This is marvelous; this is where one can see in general what is meant by the principle of individuation.*], sed quicquid est in eo est individuatum. [*This goes far: "Socrates est* ***hic*** *homo,* ***hic*** *animal"; everything which we find in him is individuated; when we analyze Socrates as Socrates, there is nothing at all which belongs to unity and to community as such; so this is another sign that universality cannot belong to the nature considered absolutely.*]

Similiter etiam non potest dici quod ratio generis vel speciei accidat naturae humanae [*We just excluded the universal from the absolute consideration of the nature; this is why we say that we are entering into logic, because this universal is truly a subject for logical consideration. Now, it is impossible that this unity, this universality, this community which defines the universal, should enter into the definition of the nature considered absolutely; but it is also impossible that they enter into a nature insofar as it is in an individual.*] secundum esse quod habet in individuis, quia non invenitur in individuis natura humana secundum unitatem, ut sit unum quid omnibus conveniens, quod ratio universalis exigit.

Relinquitur ergo quod ratio speciei accidat naturae humanae [*We can understand: "neque secundum*

> *considerationem absolutam, neque secundum esse quod habet in individuo, sed…*] secundum illud esse quod habet in intellectu. [*And so he explains:*] Ipsa enim natura humana in intellectu habet esse abstractum [*There! from the moment when the nature is received into the understanding of the knower, it is abstract; abstracted from what? From all the individuals, abstracted from individuated matter, from singular matter.*] ab omnibus individuantibus, et ideo habet [*Very important!*] rationem uniformem ad omnia individua, quae sunt extra animam [*We might ask: what does this unity and this community consists of? It comes from this, that we abstracted from everything which is individuated as such while still keeping a relation to reality: "et habet rationem uniformam ad omnia individua, quae sunt extra animam"; and this universal, because it is abstract, it is not cut off from reality; we see already that the aspect of relation is insinuated.*], prout essentialiter [*always speaking of universal or the abstract nature*] est similitudo omnium. [*The universal man is like an image of all men.*]

Question (Louis Brunet): I have "aequaliter" instead of "essentialiter." Does that work as well?

Answer (Monsignor): Yes.

> ...et ducens in omnium cognitionem in quantum sunt homines. Et **ex hoc quod talem relationem habet ad omnia individua intellectus** [*We often find the following expression in St. Thomas:*] **adinvenit rationem speciei et attribuit sibi.**[212]

By considering the nature insofar as it exists in the soul

212 Ibid.

and in its bearing (in its relation) to the individuals which exist in matter, reason *discovers* what a genus is, what the difference is, what species is. There is a beautiful article from this point of view in the *Commentary on the De Trinitate of Boethius*. St. Thomas begins by saying that our understanding has for its proper object the quiddity of material things and that it can never immediately know the pure intelligible.

> Immediate quidem intellectus noster ferri non potest secundum statum viae in essentiam Dei et in alias essentias separatas, quia immediate extenditur ad phantasmata, ad quae comparatur sicut visus ad colorem, ut dicitur in *III De Anima*. Et sic immediate potest concipere intellectus quiditatem rei sensibilis, non autem alicuius rei intelligibilis.[213]

But, St. Thomas says, there is one case in which our intellect is able to attain the intelligible *mediately*. Of course, it cannot attain the "quid" of a separated substance; this is why, moreover, there is no science having separated substance for its object. But our intellect can attain the "quid" in the case of the intelligibles which form the subject considered in logic, though mediately, because, St. Thomas says, in seeing what man is and what animal is, we see very well the relation of genus and species.

> Sed quaedam invisibilia sunt, quorum quiditas et natura perfecte exprimitur ex quiditatibus rerum sensibilium notis. Et de his etiam intelligibilibus possumus scire quid est, sed mediate, sicut ex hoc quod scitur quid est homo et quid est animal, sufficienter innotescit habitudo unius ad alterum et ex hoc scitur, quid est genus et quid est species.[214]

213 *In Boethii De Trin.*, q. 6, a. 3.
214 Ibid.

This is what "adinvenit" means: in considering natures as they are in the intellect, already abstract, we perceive, we discover certain relations among them—the word "discover" is especially fitting to translate "adinvenit" (though we will see better what this means in a text from the *Disputed Questions on Ability*). In other words (in the terms which St. Thomas uses at the beginning of his prooemium to the *Posterior Analytics*), just as men have discovered an "ars fabrilis" by considering the act of the hand, so he has discovered logic by considering the act of his own reason. Man has discovered logic, but has done so by discovering the relations proper to logic. An example is that between genus and species, discovered by examining the relation between two known natures: animal and man. In brief, man discovers in his own intellectual act that which is already there. (For there are other relations of reason which will not form the object of logic; we will see this in the very last text we will be reading, the most precise, but because of that, the most difficult, text.) Again, a way of saying the same thing: the intellect, in examining natures as it knows them, discovers the "unitas," the "communitas," the "universalitas," with which they are clothed in being known, and the type of relation which they maintain with things "extra animam." This is why the expression of Averroes is so right...

Question (Michel Lemelin): When you say that you like the word "discover" to translate "adinvenit," is this because this shows that what it discovered already existed in reason?

Answer (Monsignor): That's it! If someone should be content to say "invent" we might believe that the logician makes all

this out of whole cloth. One must base oneself above all on the teaching in order to justify this translation, rather than on the dictionary.

We had come to this very beautiful expression of Averroes:

> Unde dicit Commentator in principio *De Anima* quod **intellectus est qui facit universalitatem in rebus**. Hoc etiam Avicenna dicit in sua *Metaphysica*. [*This is magnificent; it is the intellect that makes universality in things, for this universality does not exist in singular things as such; it is the intellect that renders the natures universal.*][215]

What follows is also interesting. This little paragraph is interesting because St. Thomas very clearly tells us, however briefly, about the position of this same Averroes who spoke so well just now, but who is now going to commit a gross error, later repeated by his disciples, and which St. Thomas attacks at greater length in his opusculum, *De Unitate Intellectus*.

> Et quamvis haec natura intellecta habeat rationem universalis secundum quod comparatur ad res extra animam, quia est una similitudo omnium [*Because the universal is one, St. Thomas calls it "one likeness" of all the individuals.*], tamen secundum quod habet esse in hoc intellectu vel in illo [*The one forms the universal man, the other also forms it; the first forms its concept and the second its own; this makes two concepts; so it would be a very bad argument to go from the unity which defines the universal to the unity of the understanding; now this is the position of Averroes.*] est quaedam species intellecta particularis. [*The concept is in the intellect which forms it.*] Et ideo patet defectus Commentatoris in *III De Anima*, qui

215 *De Ente et Essentia*, ch. 4

> voluit ex [*Here is the bad conclusion drawn by Averroes.*] universalitate formae intellectae unitatem intellectus in omnibus hominibus concludere [*The concept is one because it is universal, but that does not permit us to conclude: therefore there is but one intellect which can form it; the unity belongs to the abstract nature, not to the concept which we form of it.*], quia non est universalitas illius formae secundum hoc esse quod habet in intellectu, sed secundum quod refertur ad res ut similitudo rerum [*It is a universal in so far as it is a likeness of things which are outside the intellect; and so St. Thomas gives a very good example*:], sicut etiam, si esset una statua corporalis [*Suppose there were a corporeal statue representing many men, even all men, it makes no difference…*] repraesentans multos homines, constat quod illa imago vel species statuae haberet esse singulare et proprium secundum quod esset in hac materia, sed haberet rationem communitatis secundum quod esset commune repraesentativum plurium [*It is the same image, but reproduced sometimes in wood, sometimes in marble; but it is the same likeness. It is the same for the universal: all the unity is on the side of the abstract nature; but it remains all the same that it is grasped by this concept here, by that concept there, etc.*].[216]

We return to what we said at the beginning:

> Et quia naturae humanae secundum suam absolutam considerationem convenit quod praedicetur de socrate, et **ratio speciei** non convenit sibi secundum suam absolutam considerationem, sed **est de accidentibus, quae consequuntur eam secundum esse, quod habet in intellectu** [*Here is yet another way of expressing the subject of logic.*], ideo nomen speciei non praedicatur de Socrate [*We cannot say: "Socrates est species"; though*

216 Ibid.

> *we may say: "homo est species."*], ut dicatur: Socrates est species, quod de necessitate accideret, si ratio speciei conveniret homini secundum esse, quod habet in socrate vel secundum suam considerationem absolutam, scilicet in quantum est homo. Quicquid enim convenit homini in quantum est homo praedicatur de Socrate. Et tamen praedicari convenit generi per se [*Despite everything which we have just said, namely, that genus does not belong to the nature considered in an absolute way, but the nature can have either this existence or that existence, still, "to be attributed" belongs essentially to the genus.*], cum in eius diffinitione ponatur [*How does Porphyry define the genus? "The genus is that under which the species is arrayed"; "The genus seemed to contain the whole multitude arranged under it"; "The genus is the* ***essential attribute*** *applicable to a plurality of things";[217] etc.; and the same thing for the difference, the same thing for the species: "in fact, among attributes, some are said only of one being, such as the individuals, for example, Socrates, this man here, that thing there; others said of many beings, and this is the case for genera, for species, for differences;[218] so, here is a definition, a marvelous description of attribution*:] Praedicatio enim est quiddam, quod completur per actionem intellectus componentis et dividentis [*Why does predication enter into the very definition of genus? Precisely because this act of attribution is done by the intellect which composes and divides; but be careful—this answers the question posed just now by Mr. Lemelin.*], **habens tamen fundamentum in re**, ipsam unitatem eorum, quorum unum de altero dicitur. Unde ratio praedicabilitatis potest claudi in ratione huius intentionis, quae est genus, quae similiter per actum intellectus completur. Nihilominus tamen id, cui intellectus intentionem

217 Porphyry, *Isagoge*, ch. 1.
218 Ibid.

> praedicabilitatis attribuit, componens illud cum altero, non est ipsa intentio generis, sed potius illud, cui intellectus intentionem generis attribuit, sicut quod significatur hoc nomine animal.[219]

3. Conclusion and Summary: How Essence or Nature Is the Subject of Logic

> Sic ergo patet qualiter essentia vel natura se habet ad rationem speciei, quia ratio speciei [*We can enlarge: the subject of logic*] non est de his quae conveniunt ei secundum suam absolutam considerationem, neque est de accidentibus, quae consequuntur ipsam secundum esse, quod habet extra animam, ut albedo et nigredo, sed **est de accidentibus, quae consequuntur eam secundum esse quod habet in intellectu** [***as an abstract nature***], et per hunc modum convenit etiam sibi ratio generis vel differentiae.[220]

Question (Gerard Allard): Can the being that the nature has in the understanding be considered by the logician and by the naturalist? In the study of the soul?

Answer (Monsignor): Certainly! This is why in the *Metaphysics*, for example, we will say that the word "universal" can have two senses: sometimes it can signify the nature itself, sometimes the nature "ut subest intentioni universalitatis"; and the latter belongs to

219 *De Ente et Essentia*, ch. 4.
220 Ibid.

> logic. To oppose it to the singular, to speak of the nature according to its absolute consideration, we can also speak of universal. But it is not the universal with which we are dealing here. It is a nature, but not the nature considered as abstract. For it is the intellect which makes the nature abstract, one, uniform. Whence the beautiful expression of Averroes: "intellectus est qui facit universalitatem in rebus." It is not the intellect that makes man to be man. But it is the work of the intellect that man be one and thus universal.

That is the big picture. In the *Summa Theologiae*, St. Thomas says:

> Sicut in actibus exterioribus est considerare operationem et operatum [*That is, the act of constructing a house and the house itself; this distinction is very manifest here.*], puta aedificationem et aedificatum; ita in operibus rationis est considerare ipsum actum rationis, qui est intelligere et ratiocinari, **et aliquid per huiusmodi actum constitutum.**[221]

Here is what belongs to logic. It is another way of saying again the same thing. And what is interesting here is that the two aspects are considered: namely, both the act, and what is constituted in and by this act.

Now, the statement formed by the intellect and in which it attributes something to something else, according as the subject considered is a mobile being or a being that is abstracted from

221 I-II, q. 90, a. 1, ad 2.

sensible matter, or another that is abstracted from all matter, will be formed either by the "naturalis," or by the "mathematicus," or by the "metaphysicus." But all three have in common that they do not attain this truth except by means of the same work, the same "constitutum," namely, the notion of subject, the notion of predicate, the notion of attribution. Moreover, in all three cases, the subject to which the intellect attributes the predicates is a nature which exists "extra animam," in the real world. And it is by this that the logician is distinguished: his subject has no being except in reason: his subject is each of the accidents which are attached to these natures which interest the three others, but in the measure in which these natures are known, abstract, existent in the intellect.

Question (Michel Lemelin): When we say: "Man is composed of body and soul" and on the other hand: "Man is a rational animal," is there attribution in both cases?

Answer (Monsignor): Sure.

Question (Michel Lemelin): What distinguishes these two cases now?

Answer (Monsignor): That the subject is an integral whole in the first case, and a universal whole in the second.

Thus, as you might have seen, there may be no other way more proportioned—though, of course, this is still philosophy—than this reading of the *De Ente et Essentia* for such an abstract subject as that of logic.

B. Complementary Texts and Considerations:

Manifestation of the Subject and of the Goal of Logic.

Now here are some considerations, and some texts too, at the end of this investigation.

Question (Michel Lemelin): When we say that man is a species, we say that this is a universal whole. A whole because it has parts, which are a genus and a difference. When we get to the brute, the lion, for example, what do you give for a difference?

Answer (Monsignor): That is something else! That belongs to the "naturalis." But clearly, at that point, because of the matter, the philosopher can no longer truly define. He must content himself with a description or something like that.

Question (Michel Lemelin): We can't speak of the universal whole?

Answer (Monsignor): That is, yes, in a certain sense. But effectively, the statements will be made more in the line of the integral. Meanwhile, if one says, for example, that the lion is a "vivens sensibile," it is all the same still a question of the universal. But lion insofar as it is distinguished from the other animals is more difficult. Well, we would consider the different parts of its body, and we'll

> arrive at certain things, but not truly at defining it.
>
> The impossibility of defining for us can have two sources:[222] the matter, or the disproportion and weakness of our intellect. Either the thing is too elevated for our intellect or rather, as is the case here, the obstacle comes from a matter which is too imperfect, to the point that, considered "secundum se," it is unintelligible. That's as far as it goes.

But to finish up, let's see some texts that are very appropriate if we now wish to describe briefly that in which the subject and the end of logic consist.

a) Manifestation of the End of Logic: the Truth

Logic is ordered to the truth and in this way it is opposed to grammar. There is a very clear and beautiful text on this. This is a text that we could have given, speaking absolutely, at the very beginning. But as we said, though there are these texts which are very precise on the end and the subject of logic, what was very important, if we wish to profit from reading them, is to manifest them well in regard to the universal which forms the subject of logic and its relation with nature and truth.

The text which we are speaking of is very brief and taken from Book 6 of the *Metaphysics*, a relatively brief book in which one finds principally the distinction of the sciences, their modes of defining, and so on. In this context, Aristotle has excluded

222 *In II Metaph.*, lect. 1, n. 279ff.

from the subject of metaphysics the "*ens per accidens*," which, moreover, is to be removed from every science. Next, he also removes "ens ut est in anima," so as to keep only "ens extra animam." This is the paragraph which we are going to read.

> Verum autem et falsum, etsi sint in mente, non tamen sunt circa illam operationem mentis qua intellectus format simplices conceptiones [*So, the true and the false are in the intellect, not in the first act but in the second: the intellect which composes and divides; but this is neither here nor there.*], et quod quid est rerum. Et hoc est quod dicit, quod verum et falsum, circa simplicia et quod quid est, nec in mente est. Unde relinquitur per locum a divisione, quod ex quo non est in rebus, nec est in mente circa simplicia et quod quid est, quod sit circa compositionem et divisionem mentis primo et principaliter; et secundario vocis [*in the word also, as in its sign*], quae significat conceptionem mentis. Et ulterius concludit, quod quaecumque oportet speculari circa ens et non ens sic dictum, scilicet prout ens significat verum, et non ens falsum, posterius perscrutandum est, scilicet in fine noni et etiam in libro *De Anima*, et in logicalibus [*and what one must retain is this, the very last line*:]. **Tota enim logica videtur esse de ente et non ente sic dicto**. [*This is very strong!*][223]

Here is another way of expressing the subject of logic; and this time, we indicate the end at the same time: all of logic seems to concern being in the sense in which it signifies the truth of what is said. There is all the same a certain restriction, for he has just left out the first act. The logic of the first act forms a somewhat special case, about which we will have occasion to speak further on, since we will finish the year with considerations on

223 *In VI Metaph.*, lect. 4, n. 1233.

the logic of this first act.

In brief, logic is ordered to the truth precisely because we can say that "Tota enim logica videtur esse de ente et non ente sic dicto": "ens verum," "ens falsum." It should be noted that here we can see the second sense of the word "ens" in the *De Ente et Essentia*, which second sense we left aside because essence did not draw its name from this sense. We left it aside, but in fact, the "ens verum et falsum" about which we are speaking here is this very "ens quod significat veritatem propositionis" about which we spoke at the beginning of the *De Ente et Essentia*. It's the same thing.

b) Manifestation of the Subject of Logic

i. The Subject of Logic: Things In a Way Other Than They Are in Reality

In order to manifest the subject of logic, the text which is perhaps the finest in one sense, and which we can now understand after having gone through *De Ente et Essentia* is, paradoxically enough, the text which says that logic c*onsiders things in a way other than they are in reality.* This might seem bizarre at first sight. In the first article of a question devoted to the divine names, St. Thomas asks "utrum propositiones affirmativae possint formari de Deo." We wish to know God; in knowing Him and in expressing what we know on this subject, can we form affirmative propositions? For God is so distant from us that it might seem that we can only know about Him what He is not. So one must ask: can we truly form affirmative propositions on the subject of God? that is, propositions that say what God is, not only propositions that deny what He is not.

But here, first of all, is the objection the response to which interests us.

> Omnis intellectus intelligens rem aliter quam sit, est falsus. [*It seems we have just said that the contrary is the subject of logic; to manifest and describe the subject of logic, we said that logic considers things otherwise than as they are: but is not the intellect which does this false?*] Sed Deus habet esse absque omni compositione, ut supra probatum est. Cum igitur omnis intellectus affirmativus intelligat aliquid cum compositione, videtur quod propositio affirmativa vere de deo formari non possit.[224]

In other words, there is no composition in God. Now, we cannot know the truth except by composing and dividing; by dividing, that is, by forming negative propositions; by composing, that is, by forming affirmative propositions. So it seems that if the intellect forms affirmative propositions about God, it will be false. And here is St. Thomas's answer:

> Dicendum quod haec propositio [*Here is what causes the difficulty*.], intellectus intelligens rem aliter quam sit, est falsus, est duplex [*First of all, then, what do we understand by an intellect which conceives things otherwise than they are? What does this mean?*], ex eo quod hoc adverbium "aliter" [*This is what we have to look at; this is where we see that grammar can be assumed by the theologian; we are dealing with an adverb; but what does this adverb "aliter" determine?*] potest determinare hoc verbum "intelligit" ex parte intellecti, vel ex parte intelligentis. Si ex parte intellecti [*on the side of the object*], sic propositio vera est, et est sensus, quicumque intellectus intelligit rem esse aliter quam sit, falsus est. [*Every intellect which conceives and says a thing is otherwise than it is in reality is in error.*] Sed hoc non habet locum in proposito [*But this is not the sense in which we must take here, it is not in this way that the adverb "aliter" is said here.*], quia intellectus noster,

224 *STh* I, q. 13, a. 12, obj. 3.

formans propositionem de Deo, non dicit eum esse compositum, sed simplicem. [*We are forming an affirmative proposition, but in this very affirmative proposition, we say: God is simple—we affirm his simplicity; so, we do not understand the object otherwise than it is*.] Si vero ex parte intelligentis, sic propositio falsa est. **Alius est enim modus intellectus in intelligendo, quam rei in essendo**. [*And this is why for Plato, who identified the mode of being with the mode of knowing, logic was impossible; the fact that the universal receives a certain unity and uniformity by and in the intellect does not mean that it is one and uniform in things; this is what we have shown in the* De Ente et Essentia. *This is true for every object, every logical work; a logical work stands on the side of the knower; and nature remains completely intact. If we make a mistake, it not because of that; if we make a mistake, it is because we have not seen what the nature is; so we can see it or represent it otherwise than it is, but the way of representing any truth at all does not in any way imply, for example, that, because there is composition on the side of the knower, therefore, everything signified is composed; this is false*.] Manifestum est enim quod intellectus noster res materiales infra se existentes intelligit immaterialiter [*Our intellect, which is a purely spiritual faculty—we understand that it is a power of a soul which is in itself a form of the body, but the intellect as such is a spiritual faculty—so, being a spiritual faculty, our intellect knows its proper object, which is the quiddity of material things, without individual matter, it knows it "immaterialiter"; the thing is material, the way of knowing is immaterial*.]; non quod intelligat eas esse immateriales [*not in the sense that it says that these things are immaterial*], sed habet modum immaterialem in intelligendo. Et similiter, cum intelligit simplicia quae sunt supra se, intelligit ea secundum modum suum, scilicet composite, non tamen ita quod intelligat ea esse composita. Et sic

> intellectus noster non est falsus, formans compositionem de Deo.[225]

This is marvelous! This text is absolutely marvelous!

Here is why we said above that a good way of describing the subject of logic is to say that it knows things otherwise then as they are, on condition, of course, of understanding in what sense "otherwise" determines the verb "know." In the intellect that knows them, the natures that the intellect knows do not exist according to the same mode and with the same accidents as they do in the real singular things from which the intellect abstracts them. And what forms the subject of logic is precisely this other being and these accidents which are proper to the nature as it exists in the intellect which knows it.

ii. The Subject of Logic: "Quodammodo Omnia"

There is something else. Aristotle speaks about the universality in the soul in Book 3 of *On the Soul*. This is where he says: "anima est quodammodo omnia."

> Anima data est homini loco omnium formarum, ut sit homo quodammodo totum ens, inquantum secundum animam est quodammodo omnia, prout eius anima est receptiva omnium formarum.[226]

Obviously, the soul is not all things physically. This is the sense of the "quodammodo."

A consequence follows for the subject of logic: "ens in anima": *this universality of the soul has as a consequence the universality of logic*. Of course! If the subject of logic is "ens ut est in anima" and "anima est quodammodo omnia," "logica est quodammodo omnia." Here is a text taken from the *Posterior*

225 Ibid., ad 3.
226 St. Thomas, *In III De Anima*, lect. 13, n. 790.

Analytics to apply and manifest this.

> Et quia circa omnia quae in rebus sunt habet negotiari ratio [*Intellect can know anything at all.*], logica autem est de operationibus rationis [*On the other hand, the operations of reason concern logic.*]; logica etiam erit de his quae communia sunt omnibus, idest [*And here is this famous expression which we will perhaps understand better with the following text:*] **de intentionibus rationis**, quae ad omnes res se habent. [*We are not going to explain this expression "intentiones rationis" for the moment.*] Non autem ita, quod logica sit de ipsis rebus communibus, sicut de subiectis. [*The latter belong to metaphysics.*][227]

This is an extremely important text because it allows us to understand the special affinity between logic and metaphysics about which Aristotle speaks. St. Thomas is going to say: "quodammodo idem subiectum habet," but be careful! "Quodammodo!" This text displays well the universality of logic. Just as our intellect can understand everything in a certain way, so logic directs it in everything that it understands. So, nothing that reason knows is purely and simply alien to logic.

There is another text on the subject that, at the same time, again insists on the very tight link between logical relations and reality, between logic and the real.

> Huiusmodi autem intentiones intelligibiles [*We are speaking of them just now: genus, species, difference, enunciation, division, definition, syllogism, etc.*] **entibus naturae aequiparantur** [*There is a sort of equivalence.*], eo quod omnia entia naturae sub consideratione rationis cadunt. Et ideo subiectum logicae ad omnia se extendit, de quibus ens naturae praedicatur. Unde concludit, quod

227 St. Thomas, *In I Post. An.*, lect. 20, n. 171.

> subiectum logicae aequiparatur subiecto philosophiae, quod est ens naturae.[228]

iii. The Subject of Logic: "Ratio Ut Nomen Intentionis," "Intentio," "Ens Rationis"

1) The Subject of Logic: "Ratio Ut Nomen Intentionis"

> Sciendum est autem, quod ratio [*This famous word "ratio" can be a nightmare for the intellect, it is as difficult to analyze as the Greek word "λόγος" (logos), and that is saying something! We grasp certain senses, but the others... And one difficulty is that, while we certainly find many texts to define senses of the word here and there, St. Thomas never gathers together all the senses; here St. Thomas will say: "sumiter dupliciter"; and for the moment, this is sufficient, given his intention.*] sumitur dupliciter: quandoque enim ratio dicitur id quod est in ratiocinante, scilicet ipse actus rationis, vel potentia quae est ratio [*This is the easiest sense: by reason, we can understand either the power, the faculty, or its act; this is easy.*]; quandoque autem [*Ah, now look at this!*] ratio **est nomen intentionis** [*Here again is this famous word; "nomen intentionis" is opposed to "nomen rei"; this is a whole other story; for example, there is a question with regard to the person; when we define the person, we get many names; there is "res naturae," there is also "suppositum"; we will say: "actiones sunt suppositorum"; well, "suppositum" is a "nomen intentionis" which we have transferred to make it signify something real, but if we take a "nomen intentionis" and let it keep its sense, this is opposed to the real, to "ut est in re," to "ut habens esse extra animam"; it is the second sense which interests us.*], sive [*here, clearly, this lends itself to many*

228 St. Thomas, *In IV Metaph.*, lect. 4, n. 574.

> *cases*] secundum quod significat definitionem rei [*at a given moment, "ratio," "ut nomen intentionis," can signify the definition; moreover, there is this famous text: "ratio quam significat nomen est definitio"* Metaphysics *IV, text. 11); "ratio," at that moment, is precisely synonymous with definition*.] prout ratio est definitio, sive prout ratio dicitur argumentatio.[229]

"Ratio" may also signify argument. Sometimes it can even signify in a more contracted way, syllogism. Think of the treatise on the *Physics*, when Aristotle proves, in the first book, the necessity of the very first subject, which is the primary matter. St.Thomas says that it belongs to the "naturalis" to prove the existence of primary matter by the way of induction, but "per *rationem*" to the metaphysician (in Book 7). "Per rationem," here, means syllogism, not induction. "Ratio" is opposed to induction, because the syllogism is the instrument *par excellence* of reason. In the case of induction, we start from singulars, etc. So the sense has its role to play.

Question (Gerard Allard): So "ratio" signifies demonstrative syllogism?

Answer (Monsignor): It makes no difference.

Question (Gerard Allard): But in the case that you have indicated in the *Physics*?

Answer (Monsignor): Oh, yes! yes! But when "ratio" signifies "argumentatio," if you take the word "ratio" it is not going to be divided "aequaliter." Sometimes, it will signify definition, sometimes argumentation. And by

229 St. Thomas, *In I Sent.*, d. 33, q. 1, a. 1, ad 3.

> argumentation: either induction, or syllogism. In each of these cases, "ratio" will be defined in a completely different way. But if "ratio" becomes contracted to the point of signifying syllogism, and we divide it with regard to its matter into probable (or dialectical) and demonstrative: here, the division is univocal. In other words, the probable (dialectical) syllogism must be ruled by the same laws, by the same principles, as the demonstrative syllogism, laws and principles which were stated in the *Prior Analytics*, where we abstracted from any determinate matter. We would not say abstraction from all matter; that would be Kantianism. In logic we cannot abstract from what is called the content of knowledge; that is impossible. But still we can abstract from some determinate matter. Whether the matter be necessary or contingent, it remains that the syllogism will have three terms, three propositions, etc.

Let's go on.

> In omnibus autem intentionibus hoc communiter verum est [*Here is what interests the logician*.], quod intentiones ipsae non sunt in rebus sed in anima tantum [*This is what we saw in the* De Ente et Essentia; *the universal exists only in the soul, because it exists only insofar as it*

> *is abstract, and, as we have seen at the beginning of the class, this abstraction gives to it a unity and a community that enter into its definition; thus, these "intentiones" (this will be made more precise with another text) are not in the things but in the soul.*], sed [*Careful!*] habent aliquid in re respondens [*But there is all the same something on the side of reality to which they correspond.*], scilicet naturam, cui intellectus hujusmodi intentiones attribuit; sicut intentio generis non est in asino, sed natura animalis, cui per intellectum haec intentio attribuitur. [*This is the same teaching, but with a different example.*][230]

2) The Relation of the "Nomen Intentionis" to the Things

The last text which we indicated at the end of the last class concerns the word "ratio" and was taken from the *Sentences* and, in general, gave this division: we can understand by a "ratio" either a part of the intellect itself or an act of the intellect, and so "ratio est nomen rei." This is easy enough. But there is also another sense. And moreover, this is the one that interests us particularly; and in this second sense, "ratio" is a "nomen intentionis."

Now, in another text, which is much more developed, St. Thomas takes up this problem. Here, in outline, is a problem that St. Thomas responds to at great length. St. Thomas asks himself—in regard to divine attributes, but this makes no difference—is "ratio" insofar as it is a "nomen intentionis" in things? This seems odd because insofar as it is a "nomen intentionis" it is opposed to a "nomen rei." But still, can't we say in some way that "ratio" is in things, even "ut nomen intentionis"?

Let us indicate only two points in this article. In the first, St. Thomas makes precise a sense of "ratio."

> Ratio, prout hic sumitur, nihil aliud est quam **id quod**

230 Ibid. [Here ends the lecture given on March 12, 1975.]

> **apprehendit intellectus de significatione alicujus nominis** [*what the reason or the intellect conceives and grasps in trying to explain the sense of a name; and he says this first of all, of course, with regard to things in which one can form a true definition.*]: et hoc in his quae habent definitionem, est ipsa rei definitio [*so, in things which we can truly define, "ratio" is synonymous with definition; but even if the thing cannot be truly defined, as in the case of the supreme genera, for example—insofar as they are supreme, they have nothing above them, they will have no genus, so there will not be able to be truly defined—still, one can apply the name "ratio" to them anyway; we speak of the "ratio qualitatis," "ratio quantitatis," etc.*], secundum quod Philosophus dicit: ratio quam significat nomen est definitio. Sed quaedam dicuntur habere rationem sic dictam, quae non definiuntur, sicut quantitas et qualitas et hujusmodi, quae non definiuntur, quia sunt genera generalissima. Et tamen ratio qualitatis est id quod significatur nomine qualitatis [*This is founded on the text of Aristotle from Book 4 of the* Metaphysics, *where he says that "ratio quam significat nomen est definitio; well, "ratio" is what reason grasps with regard to a name; if we ask: what is a man? The response: "rational animal" is a "ratio"; now here, we are going to make things more precise; so we can speak of "ratio sapientiae" in God, even if we cannot define wisdom in God, since this is already true in things which we know but cannot truly define; but here:*]; et hoc est illud ex quo qualitas habet quod sit qualitas. Unde non refert, utrum illa quae dicuntur habere rationem, habeant vel non habeant definitionem. Et sic patet quod ratio sapientiae quae de Deo dicitur, est id quod concipitur de significatione hujus nominis, quamvis ipsa sapientia divina definiri non possit. **Nec tamen hoc nomen ratio significat ipsam conceptionem** [*But this word does not signify the concept (the content of the concept), the*

> *term of the act (it does not signify anything but that it is this which is represented), because the "conceptio intellectus" is signified by the "nomen rei."*], quia hoc significatur per nomen sapientiae vel per aliud nomen rei; sed significat intentionem hujus conceptionis [*So, "ratio" as such does not signify "id quod apprehendit intellectus de significatione alicuius nominis," at least directly, "sed significat* ***intentionem*** *huius conceptionis." "Ratio" does not signify the object of the concept, if you will, it does not signify what is represented by the concept; "ratio" does not signify, for example, the concept of divine wisdom, which is a sort of quality, and so rendered by a "nomen rei," but this word "ratio" signifies that which is conceived as such, that which the reason grasps, what it conceives, what it represents for itself according to the very character which is implied in the fact of being grasped, conceived, represented; thus "significat intentionem huius conceptionis."*], sicut et hoc nomen definitio, et alia nomina secundae impositionis. [*"Secunda impositio" is again opposed to "res"; what we name first of all (according to a "prima impositio") are things; next, the intellect, by reflecting on its own proper act, is also going to be able to name not the thing, or, as we have seen in the* De Ente et Essentia, *not the nature considered absolutely, nor the nature having an existence in singular things, but the nature such as it is in the soul.*][231]

Here is the second point and at the same time the great difficulty for us.

> Et ex hoc patet secundum, scilicet qualiter ratio dicatur esse in re. [*But how can we say that "ratio," which is a "nomen intentionis," and which he makes more precise by saying "nomen secundae impositionis," is in the thing? Must we not rather say that it is only in the intellect? This*

231 *In I Sent.*, d. 2, q. 1, a. 3, sol.

> *is the problem.*] Non enim hoc dicitur, quasi ipsa intentio quam significat nomen rationis, sit in re [*No! No! Clearly, we must throw that out; if we say that "ratio est in re," this does not mean that the "ipsa intentio est in re," because "ipsa intentio" is only in the soul.*]; aut etiam ipsa conceptio [*nor, clearly, the conception as such*], cui convenit talis intentio, sit in re extra animam, cum sit in anima sicut in subjecto: sed dicitur esse in re [*still speaking of "ratio"*] **inquantum in re extra animam est aliquid quod respondet conceptioni animae** [*This means: Is there something outside the soul and the intellect that corresponds to the concept which we form? As the signified corresponds to its sign...*], **sicut significatum signo.**
>
> [*Here now is the division which we must keep*:] Unde sciendum, quod ipsa conceptio intellectus tripliciter se habet ad rem quae est extra animam. [*It is now a question of seeing the relation between "intentio" and what is in the thing; what does the conception correspond to on the side of the thing?*] Aliquando enim hoc quod intellectus concipit, est similitudo rei existentis extra animam [*Sometimes, what the intellect conceives is a similitude of a thing which truly exists outside the soul.*], sicut hoc quod concipitur de hoc nomine homo [*This is easy; so the "ratio hominis" is truly "in re" because the concept has as an object the thing itself and the concept is a likeness of the thing itself which exists outside the soul; and so, in this case, we ought to say that the conception of the intellect possesses its foundation in the "immediate" thing; the reality is the immediate foundation in this case.*]; et talis conceptio intellectus habet fundamentum in re immediate, inquantum res ipsa, ex sua conformitate ad intellectum, facit quod intellectus sit verus, et quod nomen significans illum intellectum, proprie de re dicatur. [*This is the easiest case; again: "ratio est in re" because there is on the side of the thing something which corresponds to the*

> *concept, but not only that, something which corresponds to it as an immediate foundation*.] **Aliquando autem hoc quod significat nomen non est similitudo rei existentis extra animam, sed est aliquid quod consequitur ex modo intelligendi rem quae est extra animam: et hujusmodi** [*Here, among other things, is the subject of logic*.] **sunt intentiones quas intellectus noster adinvenit**; sicut significatum hujus nominis genus non est similitudo alicujus rei extra animam existentis; sed ex hoc quod intellectus intelligit animal ut in pluribus speciebus [*insofar as the intellect grasps animal as being in many species*], attribuit ei intentionem generis [*Reason attributes to it being a genus, and says: "animal est genus."*]; et hujusmodi intentionis licet proximum fundamentum non sit in re sed in intellectu [*The proximate foundation of this "ratio" is in the intellect; still, there is a remote foundation on the side of the thing; and this suffices for there to be a subject of the science*.], tamen remotum fundamentum est res ipsa. Unde intellectus non est falsus, qui has intentiones adinvenit. Et simile est de omnibus aliis qui consequuntur ex modo intelligendi, sicut est abstractio mathematicorum et hujusmodi.[232]

Here is a short extract, in passing, to say the same thing again, that is, what the subject of logic is, but in other words:

> Ens est duplex: ens scilicet rationis et ens naturae. Ens autem rationis dicitur proprie de illis intentionibus, quas ratio adinvenit in rebus consideratis; sicut intentio generis, speciei et similium, quae quidem non inveniuntur in rerum natura, sed considerationem rationis consequuntur. Et huiusmodi, scilicet ens rationis, est proprie subiectum logicae.[233]

232 Ibid.

233 *In IV Metaph*., lect. 4, n. 574.

But let us return to the text of the *Sentences*, which names a third possible relation between "intentio" and the real thing.

> Aliquando vero id quod significatur per nomen, non habet fundamentum in re, neque proximum neque remotum, sicut conceptio chimerae [*So we have man, genus, chimera; in the first two cases, there is a foundation on the side of reality, though in the first case, the foundation is proximate while in the second the foundation is remote; in the third, there is no foundation at all; clearly there are material elements which permit reason, aided above all by the imagination, to represent to itself a chimera; but there isn't truly a chimera in reality*.]: quia neque est similitudo alicujus rei extra animam, neque consequitur ex modo intelligendi rem aliquam naturae: et ideo ista conceptio est falsa. Unde patet secundum, scilicet quod ratio dicitur esse in re, inquantum significatum nominis, cui accidit esse rationem, est in re: et hoc contingit proprie, quando conceptio intellectus est similitudo rei.[234]

Question (Michel Lemelin): Would an example be a poet who would give as a title: "The Ship of Gold"? As such, a ship of gold does not exist…

Answer (Monsignor): No, that does not exist as such. But we have to pay attention: at a certain moment, we might enter into metaphor. And it is not a question of metaphor at all here, in the text which we are reading.

Question (Michel Lemelin): Must it be something that truly

234 *In I Sent*., loc. cit.

does not exist?

Answer (Monsignor): Yes. For example, when Shakespeare says about the hour hand of the clock: "the iron tongue of midnight hath told twelve," the tongue is something that exists; the poet has simply given it a *new sense*, a new sense. Here, in what interests us, it is the first sense that counts and there is already nothing on the side of reality. But in the case of poetry, there is a transposition from a proper sense to an improper, or figurative, sense.

iv. The Subject of Logic: "Relatio Rationis"

Finally, in a last text, we are going to speak about "intentio," that is, to make its sense more precise, we are going to see how "intentio" signifies "relatio." In *De Ente et Essentia*, we had arrived at this: there are attached to the nature "ut habens esse in anima" certain qualities, certain modalities, certain properties, and this is what the logician considers, this is his subject. And these modalities, these qualities are "intentions," as we have seen. But there are "intentiones" which are not subjects of logic. To see this, we must speak about relation. Also, a text like the one we are going to read, which explains in what sense the "intentio" of which we are speaking in logic is a relation, is the most precise text which we can give on the subject of logic.

1) Which Relation of Reason Is the Subject of Logic

Dicendum quod sicut realis relatio consistit in ordine rei ad rem [*Just as a real relation consists in a bearing of one thing toward another, for example, of a father to his son (so we speak of the relation of paternity or of filiation), in an "ordo rei ad rem..."; there is no question here of "intentio," so this real relation is something which we must remove from the subject of logic.*], ita relatio rationis consistit in ordine intellectuum [*Here now the relation does not exist in reality, it is the reason which forms this bearing; but what is important is to see that reason can form this bearing, this relation of reason, in two very different ways: in one case, we will have a relation of reason which is called logical and which will also be called "second intention," "intentio secundae impositionis"; in the other case, there will be relations of reason, but not logical ones; we are going to see the difference.*]; quod quidem dupliciter potest contingere: uno modo secundum quod iste ordo est **adinventus** per intellectum [*The intellect, contemplating such or such an object, in fact, considering its own act, discovers there what reason has formed: definition, syllogism, genus, species, etc. ; for example, by comparing "homo" and "animal" as they are in the intellect (abstract, known), we are going to discover "genus" and "species"; moreover, not only is this discovered by the intellect, but* ***it is attributed to that which is said relatively****: "homo est species," man insofar as he is known, of course, and not as an individual in reality; this is why the text from* De Ente et Essentia *is so important; the end of Chapter 4: "Natura ut habens esse in anima." This text is necessary for us because of the word nature; so we understand better the text from the Sentences where St. Thomas speaks of a foundation, though remote, in reality. Another way of speaking would be this: what belongs to things known insofar as they are known.*], et attributus ei

> quod relative dicitur; et huiusmodi sunt relationes quae attribuuntur ab intellectu rebus intellectis, prout sunt intellectae, sicut relatio generis et speciei [*We say: man is a rational animal; at that moment, man is not a "nomen intentionis"; it is man as universal which is "species," and so "intention."*]: has enim relationes ratio adinvenit considerando ordinem eius quod est in intellectu ad res quae sunt extra, vel etiam ordinem intellectuum ad invicem.[235]

2) What Is the Relation of Reason That Is Not the Subject of Logic

There are other relations of reason that reason can form and that are necessary for our mode of knowing: but in this case, reason makes a relation of what is not at all relation. In the case that we have just considered, though the intellect does in fact form something, though there is "aliquid per huiusmodi actum intellectum constitutum," there is also a foundation in reality.

Let us begin by seeing an example of this second case of "intentiones." When we say, "God is Lord," "Lord" is said of God in reality and not insofar as he is known. Still, there is not and cannot be a real relation of God to a creature; this is impossible, otherwise there would be dependence. If our intellect attributes being "Lord" to God in this way, it is because it cannot represent God to itself as master, as creator, etc. without, so to speak, *turning Him* toward creatures. It is reason which turns God, and yet "esse dominus," to be Lord, to be master, will be said *of God as such*, not of God as known. What is important is to grasp that here something which follows on the mode of knowing is all the same attributed to the very thing, which was not so in the case above: "to be a genus," is attached to a nature insofar as it is known; it is not attributed to this nature insofar as it is real, but

235 *Q. D. de Potentia*, q. 7, a. 11, c.

only insofar as it is known.

Take another example: science and the object of science. Think of speculative science. Speculative science is measured by its object, and this is a real relation; but we cannot know the object, the "scibile," without turning it towards science, which is indicated by the name which we give it: "scibile." But still there is no real relation here, there is no such relation in reality. In brief, when the intellect represents to itself the "scibile," which is in fact not really ordered to science and has no real bearing toward science, the intellect itself orders it, it *turns* it toward science: this is the type of relation of reason which is to be excluded from the subject of logic.

But let us read the text of St. Thomas:

> Alio modo secundum quod huiusmodi relationes consequuntur modum intelligendi, videlicet quod intellectus intelligit aliquid in ordine ad aliud; licet illum ordinem intellectus **non adinveniat**, sed magis ex quadam necessitate consequatur modum intelligendi. **Et huiusmodi relationes intellectus non attribuit ei quod est in intellectu, sed ei quod est in re.**
>
> Et hoc quidem contingit secundum quod aliqua non habentia secundum se ordinem, ordinate intelliguntur; licet intellectus non intelligat ea habere ordinem, quia sic esset falsus. Ad hoc autem quod aliqua habeant ordinem, oportet quod utrumque sit ens, et utrumque distinctum (quia eiusdem ad seipsum non est ordo) et utrumque ordinabile ad aliud.[236]

And St. Thomas gives many examples to illustrate the different species of relations of reason of this genus that are going to arise according as, due to one or the other of the preceding

236 Ibid.

conditions being missing, the relation is not real. Here are the last examples that he gives; they are the ones we spoke about at the beginning.

> Quandoque vero accipit aliquid cum ordine ad aliud, in quantum est terminus ordinis alterius ad ipsum, licet ipsum non ordinetur ad aliud: sicut accipiendo scibile ut terminum ordinis scientiae ad ipsum; et sic cum quodam ordine ad scientiam, nomen scibilis relative significat; et **est relatio rationis tantum**. Et similiter aliqua nomina relativa deo attribuit intellectus noster, in quantum accipit deum ut terminum relationum creaturarum ad ipsum; **unde huiusmodi relationes sunt rationis tantum**.[237]

Conclusion

So this is how we can come to understand in the best way what the subject of logic is, by looking at texts as precise as the last ones that we have read. But it truly was a condition for coming to this point that we prepared for these texts by carefully looking at the resemblance between logic and the science of nature (both being interested in the nature of things), and their difference—while the science of nature looks at the nature of things according to the existence that it has in real singular things, logic, for its part, proposes to know this same nature according to the mode of existence with which it is clothed when in the intellect which knows it.[238]

237 Ibid.

238 [Here ends the final lecture, given on March 18, 1975.]

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