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UNIVERSITY OF OTTAWA

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BY

SIMON SHAKES KUBUTU MAKHAKHE

TOPIC

ABSTRACTION AND/OR SEPARATION AS THE DETERMINING
FACTOR FOR THE DIVISION OF SPECULATIVE SCIENCES
IN ACCORDANCE WITH ST. THOMAS AQUINAS.

MAY 1991



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INTRODUCTION

There has been a lot of discussion and difference of opinion on the doctrine of abstraction in St. Thomas Aquinas; and more often than not, each different position is advanced with the claim of fidelity to the thought of St. Thomas Aquinas. Though a lot of opinions will come to the fore as the discussion ensues, the main concern of this paper is to look closely into St. Thomas Aquinas' doctrine of abstraction and/or separation as found in his multifarious writings. This will be done with a view to establishing the consistency of his thought on the aforementioned doctrine; more especially, abstraction and/or separation as the determining factor for the division of speculative sciences. And the method that will be at play, in order to achieve our present purpose, is a comparative one. That is, we shall compare the texts that have a direct bearing on abstraction and separation. Furthermore, frequent use of textual analysis will be made so as to put each text in its proper perspective.

St. Thomas, and this will be clearer as we proceed, in trying to solve the academic problems current in his time, made some important allusions to what his predecessors said on the same issue, but he did not blindly follow what had been said before him; instead, and most significantly, he made some enlightening adjustments and alterations whenever and wherever necessary. The immediate example in this regard is, as A. Maurer puts it in his introduction of St. Thomas Aquinas' On Being and Essence, p.10,

his use of the Boethian expressions quod est and esse. For Boethius himself to say that a thing is composed of quod est and esse meant that in an individual thing there is a difference between the concrete individual and the abstract form in which it participates, for instance, between Peter (quod est) and humanity (esse). As far as it is known, Boethius never taught that there is a distinction between a thing's essence and its act of existing. Yet, St. Thomas did not hesitate to quote Boethius' statement about the distinction between quod est and esse as it referred to the distinction between essence and the act of existing.

The question of abstraction, as we have already hinted above, surfaces in numerous writings throughout St. Thomas' philosophical career. Though the doctrine is woven into the fabric of his complete works, the best place to begin studying St. Thomas' teaching on the distinction of the speculative sciences is his Commentary on the De Trinitate of Boethius, question five. Nowhere else is the question elaborated as completely nor in such detail. Thus, every consideration will eventually revert here. However, and this is crucial, the question has to be seen as a whole. It is in the light of the doctrine detailed here that difficulties encountered elsewhere can and must be resolved. But, first, it is of cardinal importance that the doctrine itself be understood and this cannot be done unless the question is taken in its entirety. When one compares St. Thomas' doctrine of abstraction as it appears in his early writings with what appears in his late ones, one sees some sort of development of the doctrine, marked sharply by a change in vocabulary. Now, if there is any change in terminology, we shall investigate its cause with a view to finding a connection, if any, between the two terminologies.

In order to evaluate more accurately the doctrine of abstractions and/or separation, and the vital role they play in the division of speculative sciences, we shall begin by sketching in a few brief strokes the key stages in the development of this doctrine. This will help set the scene for a more intense discussion on how abstraction and/or separation plays in the division of speculative sciences.

Obviously, we do not get our knowledge of reality through the intellect alone. But the issue of how the human intellect comes to know reality has always caught the attention and preoccupied the minds of philosophers long before St. Thomas Aquinas; and this points to the fact that his doctrine of abstraction comes as a contribution, even perhaps more so, a solution to an age old problem that has baffled the minds of many philosophers and still continues to do so. This is why the historical background apropos of this doctrine is in order here.

Essence and Existence, which are known by different operations of the intellect, will also not take a back-seat in this paper. Hence, the second chapter will deal with ontological structures. Abstraction, as it stands, is a very broad topic that houses some important issues like the problem of Universals, which was a hotly debated issue in Medieval thought, and indeed, has a direct bearing on our present consideration. Undoubtedly, this paper will compare the different notions that have been entertained by various schools of thought on Universals.

More often than not, most attention is directed towards reconciling St. Thomas Aquinas' doctrine of abstraction with the theory of the three degrees of formal abstraction, belonging to the traditional commentators, viz., Cajetan and John of St. Thomas. One group, represented in large part by J. Maritain, F.G. Connolly, etc., sees an identity between these doctrines. Another group, on the other hand, does not see any identity whatsoever, and rules Cajetan's doctrine as completely out of place. F.A. Cunningham is one of those that categorically deny identity between these doctrines. References to philosophers mentioned here will be given later on when we shall be dealing with what they say about the doctrine of abstraction.

While it is not the purpose of this dissertation to prove at length which side is right and which is wrong, it is my conviction that a proper and deep investigation into St. Thomas' doctrine as it appears in his writings will help offer a solution to this interpretative discontent. This is why, I think, it is imperative to study this doctrine thoroughly before comparing it to any other doctrines of a similar nature. Hence, our main concern here of looking closely into the doctrine by making use of most, if not all, of the texts of St. Thomas where this doctrine is carefully and lucidly elaborated.

To conclude, I shall also make my own evaluation and present my comments with respect to the doctrine itself as spelled out by St. Thomas Aquinas and as regards the interpretations it has earned from different philosophers.

CHAPTER I - HISTORICAL BACKGROUND

1. Historical division of speculative sciences

In Medieval usage, every field of intellectual endeavour in which true casual explanations could be discovered, deserved the name 'science'. In the earliest latin classification of sciences or liberal arts, as they were commonly called, the following, which were later designated as the trivium and quadrivium, were considered essential and compulsory for any solid academic achievement. These were: a) Grammar, b) Dialectics, c) Rhetoric, d) Geometry, e) Arithmetic, f) Astronomy and g) Music. These liberal arts are mentioned here not because there will be any discussion on them, but with a view to preparing the ground for the main interest of this paper, viz., the division of speculative sciences.

It was Boethius, in his treatise De Trinitate, who gave the Middle Ages, even more so, the Latin west, the standard tripartite classification of speculative philosophy into Physics, Mathematics and Theology (Metaphysics). I shall use the translation of this treatise as given by Armand Maurer, in The Division and Methods of Sciences, p.3.

There are three divisions of speculative science; Natural science deals with motion and is not abstract, for it is concerned with the forms of bodies along with matter, which forms cannot be separated in reality from their bodies. These bodies are in motion (earth, for example, tending downward and fire tending upward), and the form that is joined with the matter takes in its movement. Mathematics does not deal with motion and it is not abstract, for it inquires into the forms of bodies apart from matter and therefore apart from motion, which forms, however, since they exist in matter cannot be separated from bodies.

Theology does not deal with motion and it is abstract and separable, for the divine substance is without either matter or motion.

As the quotation goes we realize that Natural science considers forms which are not abstract or separable because this science is concerned with forms which cannot exist or be considered apart from matter and motion. The second science of speculative philosophy, viz., Mathematics, considers forms without matter and motion; but, in actual fact, these forms can never exist separately from matter since they are really the forms of bodies. The third science, Theology, considers forms which are actually abstract and separable from matter and motion. To each of these parts of speculative philosophy, Boethius adds, corresponds and appropriate method to be utilized:

In the natural sciences, then, we shall have to follow the mode of reasoning in our thinking, in mathematics the mode of learning, and in divine science the mode of intellection. (Ibid., p.3-4).

The method used by natural science is the process of reasoning scientifically(rationabiliter); that of mathematics is disciplinary (disciplinabiliter), and that of divine science is intellectual (intellectualiter).

St. Thomas Aquinas, taking his cue from Boethius' tripartite division of speculative sciences, adopts this division but with considerable modifications and adjustments, and this will be clearer as we continue with our discussion. He goes even further to show the contribution rendered by the operation of abstraction and/or separation in this division of speculative sciences. His

vocabulary differs slightly from that of Boethius, for instance, where Boethius uses the word 'form' indiscriminately, like when he says that natural science is 'concerned with forms of bodies', St. Thomas, at least in this Commentary on Boethius, reserves the word 'form' to Mathematics. Hence, the abstraction of a form (abstractio formae).

Nonetheless, Boethius' De Trinitate is quoted here not because it is part of the discussion this paper is interested in, but because it lays the ground for a better evaluation of St. Thomas' doctrine of abstraction and/or separation as a determining factor for the division of speculative sciences.

2. Object of Science

The early Greek epistemology, up until Plato at least, in contradistinction to various modern epistemologies, bases knowledge on the universality and necessity of the object of that knowledge. Plato is, perhaps, the perfect example of the proponents of the early Greek epistemology. For him, scientific knowledge is universal and necessary and existing as such in reality (the idea or pure form).

This ancient Greek theory of knowledge is diametrically opposed to some modern theories of knowledge in that the former underscores the priority of the object of knowledge. That is, what we know in accordance with this theory is the thing (object). Whereas, according to some theories, what we know is not the thing, but the thought. For instance, for Descartes, the first thing we

know is the cogito, i.e., the existence of the thought-self. Likewise, for Kant, what we know is the representation of the thing(phenomenon) and not the thing itself(noumenon). In these modern theories of knowledge, the human mind is considered to be an active and productive faculty, whereas, with respect to the ancient theory of knowledge, the mind is a passive and receptive faculty that receives the object that is already there.

Aristotle, on the other hand, though he does not abandon the theory that science should be universal and necessary, somehow differs from Plato in that, for Plato, this universality depends exclusively on the object, which is universal by itself, while for Aristotle, this universality is reached through the activity of the subject, i.e., the universality and necessity are based on abstraction and demonstration respectively.

The comparison of these opposed views on the theory of knowledge is warranted here by the fact that St. Thomas Aquinas, as we shall see, subscribes to the Aristotelian way of viewing this issue.

Following his predecessors, Heraclitus, in particular, Plato holds that all sensible objects change, and he draws the conclusion that consequently they cannot be known because they do not sustain universality and necessity. The criteria of knowledge, for him, must include exactitude, reality and justification, i.e., in the first place, genuine object of knowledge must be absolute, fixed and infallibly apprehended. Secondly, it must be an apprehension

of perfectly real and not illusionary objects, like those of the senses. He discusses these matters in *Cratylus* 439b-440d.

Sense perception, as Plato observes in *Theaetetus* 184b - 186b, is always not absolute. For instance, what we see or hear is never absolute beauty or harmony as they are in themselves but only as they appear to us. Perception, he continues, only uncovers a diversity of particulars. Perceptual objects, he contends, are neither perfectly real nor intelligible because they change, and as such, they lack objectivity and justification; as we cannot, in any perceptual experiences, perceive or observe the why of things. This is the case because, according to Plato, senses are inaccurate witnesses giving conflicting reports.

In an attempt to solve this problem brought by the inaccuracy of sense perception, Plato proposes the Theory of Forms, which is the cornerstone of his whole philosophy. For him, each group of particular things partakes or participates in one Form that defines its nature, e.g., behind the many beautiful things in the world, there is a single Form of Beauty. And these particular things get their beauty through participation in the Form of Beauty. The reason for this is that Forms are eternal and changeless while particulars are in every case transient and in a state of continual change. Forms, unlike particulars, cannot be perceived by the senses, because only the intellect makes us aware of their existence. There can be genuine knowledge of Forms, but not of particulars because, owing to their changeable nature, the best we may hope to achieve concerning them is opinion.

In The Republic, 509a ff., Plato illustrates how the mind may ascend through the hierarchy of Forms till it reaches the highest and most universal Form of all, viz., the Form of Good, which, as he puts it, is the 'sum of the intelligible world,' the cause of the other Forms and of our knowledge of them; the first principle and final explanation of reality.

On the other hand, Aristotle, heavily attacks Plato's theory of Forms because, he charges, it makes universals exist apart from changing particulars, hence, giving the Forms separate existence. In fact, Aristotle is critical of Plato's dualism and theory of Forms in several respects. This is clear from what he says in Metaphysics, 991a27-29, 1079b31-33, In Metha. 991a8-19, Aristotle counters:

Above all one might discuss the question what on earth the Forms contribute to sensible things, either to those that are eternal or to those that come into being or cease to be. For they cause neither movement nor any change in them. But again, they help in no way towards the knowledge of the other things (for they are not even the substance of these, else they would have been in them), nor towards their being, if they are not in particulars which share them; though if they were, they might be thought to be causes as white causes whiteness in that with which it is mixed...

In short, Aristotle, objects that if forms are essences, they cannot be outside of things; but must be in things of which they are the essential nature. Secondly, if forms are static and unchanging, they cannot be used at all to explain change or changing things. For Aristotle, Forms are unnecessary duplications of things leading to an infinite regress, e.g., if the universal man stands apart from an individual man, then there arises a third

man which is a relation between the two and so on and so forth to infinity.

Although Aristotle's conception of reality stands in sharp contrast to Plato's, Aristotle agrees entirely with Plato that our business as rational beings is to know objective truth and that the objects of true knowledge are immaterial and unchanging. But, of course, for Aristotle, it is in this changeable world of individual things that we have to find, somehow, the unchanging objects of true knowledge which are necessary for science.

It is obvious, then, that Aristotle's theory of abstraction by no means denies the existence of universals or the general characteristics of things or supposes them to be "creations" of our minds. They must be "abstracted" because they exist objectively, but only as characteristics of individual things, not as Plato taught, in a transcendent world of separate substantial beings, because if what Plato held was anything to go by, then the Forms are so completely cut off from the material world that they cannot possibly be the objects of our knowledge, immersed as we are in that material world. Furthermore, the Forms are so completely cut off that they can hardly be the cause of the being of the things of which we have experience, anymore than our knowledge of them. In any case, the things of which we have experience are individual, concrete things, and how can separately existing universals be their essential and immanent cause!

The purpose to the above digression about the different conceptions of reality is not so much to prove the falsity of one

conception and the truthfulness of another, as to show that, according to classical epistemology, the object of science has to be universal and unchanging. Long as the digression seems to be, it is not irrelevant to the subject under discussion. Instead, it serves as a catapult that is much needed to get this discussion off the ground.

The object of science must be immaterial, because immateriality is the basis of all knowledge, sensation as well as intellection. The difference between a knowing and a non-knowing being in the capacity of the former to have the form of another as other while retaining its own form; whereas, the latter is incapable of having any form, except through physical composition which renders a form incommunicable to another subject. Now, immateriality is not equally realized by all knowing powers. The external senses, for example, require the physical presence of their objects in such manner that in the absence of these objects, external sensible knowledge ceases. The reason, obviously, is that sensation is exercised in conjunction with a corporeal organ through which the sense faculty is in contact with its object. "Now, sense is a passive power, and is naturally immuted by the exterior sensible." (S. Theol., Ia, q.78,a.3). Sight attains individually existing material things as they are visible. "Colours, as being in individual corporeal matter, have the same mode of existence as the powers of sight: and therefore they can impress their own image on the eye." (S. Theol., Ia,q.85,a.1,ad3). It is this original experiential contact with the real as it is in

itself that guarantees the validity of human knowing. But, if each of the senses attains a certain aspect of the real, it can attain that and no more. Its sphere of activity is limited by the organ to which it is affixed. As a result, the object of each external sense is determined and beyond which it is ineffectual. What I have just exposed above is vividly supported by what St. Thomas says, in De Veritate, q.15, a.2:

Some powers, however, are adapted to those aspects in which bodies are diversified by reason of a difference in the mode of producing change (in the sense). Thus, sight relates to colour, hearing to sound, and so on for the other senses. From the fact that the sensitive part of the soul uses an organ in its activity two things follow: first, a power referring to an object common to all beings cannot be attributed to it, for this would immediately transcend physical reality; second, it is possible to find in the sensitive soul powers which differ according to the different nature of the objects because of the disposition of the organ, which can be suited to this or that nature.

The intellect, a more perfect knowing power than the senses, illustrates the principle that a superior agent enjoys, commensurately, a more unified principle of activity and a more extensive influence. The intellect exercises its proper activity without a corporeal organ. Freed from determination in this regard, the intellect is not limited to knowing only certain, definite natures, but attains an object common to all things. St. Thomas adds in the same article as the one just quoted above:

But the part of the soul which does not use a physical organ in its activity does not remain limited, but is, in a sense, infinite, in so far as it is immaterial. Therefore, its power extends to an object common to all beings. Hence the object of understanding is said to be "something" (quid), which is found in all classes of beings. For this reason, the Philosopher says

"understanding is that by which one does all things and by which one becomes all things."

This brings us to the second characteristic of the object of science, viz., necessity. Because of the particular habit by which it is attained, the scientifically known object is rendered necessary since science is of the necessary. In the measure that it cannot be otherwise than it is, the object of science must, in that respect, be unchangeable, for whatever is changeable, in so far as it is changeable, can be other than it is. The unchangeable object of science is knowledge characterized by certitude that something is such and such and that it cannot be otherwise. Such knowledge is not possible with regard to things capable of being other than they are. The apparent certitude accompanying even the most elementary sensation is no guarantee that the present experience could not be other than it is. Charles De Koninck, perfectly elaborates on the same issue of necessity in his article on "Abstraction from Matter", in Laval Theologique et Philosophique, V.16(1960) p.169:

If science were of the thing that changes as changing, science could not remain true except by changing with the thing as it changed, so that what was true at one instant would be false at another. For that 'Socrates is walking' is true only so long as he is actually walking; so that, if there were a science of Socrates walking, it would cease to be true and to be science when he halted. Such a science would share the conditions of sensation.

Charles De Koninck, of course, takes his cue from what St. Thomas says in his Commentary on Boethius' De Trinitate. q.5, a.1:

From the side of the habit of science it has the fact that it is necessary, for science treats of necessary matters, as is shown in the Posterior Analytics. Now everything that is necessary is, as such, immobile

because everything changeable is, as such, able to be and not to be, either absolutely or in a certain respect.

In the Posterior Analytics, Book I, Ch.2 71b 8ff, Aristotle explains, what is meant by 'to know'.

We suppose ourselves to possess unqualified scientific knowledge of a thing, as opposed to knowing it in the accidental way in which the sophist knows, when we think that we know the cause on which the fact depends, as the cause of that fact and no other, and, further, that the fact could not be other than it is.

It is general agreement among people that to know the cause of something, to know it as the cause of that thing and to know that such a thing cannot be otherwise, is to know simply. In the Posterior Analytics, it is shown that such knowledge is possible only as the result of a discourse whereby the necessary connection of two terms is shown by a middle or third term. The expression of this connection is a proposition forming the conclusion of a reasoning process called demonstration.

The object of science, in the strict sense of the term, is the conclusion of a demonstration in which a universal and necessary property is predicated of its proper subject. As known mediately, a conclusion, is inferred from prior principles, immediately known, and which in this case refer to proper principles of that which is demonstrated. The conclusion, a proposition which is not self-evident, is only known as true when seen in relation to something already known as true and self-evident.

For one passes from the knowledge of principles to a demonstration of a conclusion on which science, properly speaking, bears. But those immediate principles are not made known through an additional middle term but through

an understanding of their own terms. For as it is known what whole is and what part is, it is known that every whole is greater than its part, because in such a proposition, as has been stated above, the predicate is included in the very notion of the subject. And therefore it is reasonable that the knowledge of these principles is the cause of the knowledge of conclusions, because always, that which exists in virtue of itself is the cause of that which exists in virtue of something else. (St. Thomas Aquinas, Commentary on the Posterior Analytics of Aristotle, Lect.7, p.26).

The medium is that which provides the reason for the predicate's inherence in the subject, and in a strict demonstration, it is the definition of the subject. Once attained, the definition, containing the principles of the subject, serves as middle term in a demonstration by revealing the subject as cause of the property which is predicated of it in the conclusion. A conclusion or object so understood is what is scientifically known. So, necessity is not a property of the object itself but of the way we know it through demonstration. Abstraction and demonstration are the ways by which the subject ensures universality and necessity.

Then, if science or demonstration is to have any meaning at all there must be a difference between what is known of a subject in the premises and what is said of it in the conclusion. Such is the difference between the object of a science and its subject. The subject of a science is both that which is known and about which further knowledge is sought.

St. Thomas, following Boethius' tripartite division of speculative sciences, contends that these sciences are divided in accordance with the radically different ways in which they exclude

matter and motion in the comprehension of their respective objects. In other words, an object characteristic of a distinct speculative science, must reveal an exclusion from matter and motion that is essentially different from that manifested by the speculabile of another science.

3. The division of speculative science is threefold

St. Thomas, in his Commentary on Boethius' De Trinitate, q.5, a.1, spells out differences between objects owing to the exclusion or remotion from matter and motion in the following manner:

Now there are some objects of speculation that depend on matter for their being, for they can exist only in matter. An these are subdivided. Some depend on matter both for their being and for their being understood, as do those things whose definition contains sensible matter and which as a consequence cannot be understood without sensible matter. For example, it is necessary to include flesh and bones in the definition of man. It is things of this sort that physics or natural science studies. On the other hand, there are some things that, although dependent upon matter for their being, do not depend upon it for their being understood, because sensible matter is not included in their definitions. This is the case with lines and numbers - the kind of objects with which mathematics deals. There are still other objects of speculative knowledge that do not depend upon matter for their being, because they can exist without matter; either they never exist in matter as in the case of God and the angels, or they exist in matter in some instances and not in others; as in the case of substance, quality, being potency, act, one and many and the like. The science that treats of all these is theology or divine science, which is so called because its principal object is God. By another name it is called Metaphysics; that is to say, beyond physics, because it ought to be learned by us after physics; for we have to proceed from sensible things to those that are non-sensible. It is also called first philosophy, in as much as all the other sciences, receiving their principles from it, come after it. Now there can be nothing that depends upon matter for its being understood but not for its being, because by its very nature the intellect is immaterial. So there is no fourth kind of philosophy besides the ones mentioned.

To understand what St. Thomas, has done here, the roots of this variant immateriality must be exposed. Science, like sensation, is knowledge of things and not merely of their representations.

Some have asserted that our intellectual faculties know only the impression made on them; as for example, that sense is cognizant only of the impression made on its own organ ... This is however, manifestly false for two reasons. First, because the things we understand are the objects of science; ... Secondly, it is untrue, because it would lead to the opinion of the ancients who maintained that whatever seems is true, and that consequently contradictories are true simultaneously ... (Ia, q.85, a.2).

Although sense knowledge and intellectual knowledge are vastly different kinds of knowledge, both are capable of the same precision in regard to what they attain as object.

The basis for the division of the speculative sciences is, therefore, nothing other than different modes of defining, so that there are as many different sciences as there are modes of defining. St. Thomas says, that sciences are distinguished now according to principles, now according to the modes of defining. The reason is that definition can be considered in two ways: it can be considered in itself, absolutely, and as such, it is neither true nor false; or it can be considered as constituting a virtual proposition, e.g., as predicated of the definitum when the definition is good. If the definition is to have an illative power, it must be taken as the element of an enunciation. The following texts serve to clarify what we have submitted above.

... in order to understand how the speculative sciences differ from each other, the quiddity of a thing and the way in which 'the conceptual expression', i.e., the

definition signifying it, should be expressed in each science, must not remain unknown. for in seeking the aforesaid difference 'without this', i.e., without knowing how to define things, our search would be unfruitful. For since a definition is the middle term in a demonstration, and is therefore the starting-point of knowing the difference between the speculative sciences must depend on the different ways of defining things. (In VI Metaph., Lect.1, n.1156).

... since each of the sciences must somehow come to know the quiddity and must use this as a starting-point with a view to demonstrating, the sciences must be distinguished on the basis of a different method of defining. Hence, in order to understand how the philosophy of nature differs from the other sciences, we must not neglect to consider the method which philosophy of nature uses in defining things, and how the definition should be considered in the philosophy of nature; that is, whether a thing should be defined in the way that snub is or in the way that concave is. (In XI Metaph., Lect.7, n.2256).

In the Commentary on De Trinitate, we have a literal application of the criterion announced in the two texts above. Some speculabilia do in fact depend on matter for their complete being and others do not. Of those which can be only in matter, some are dependent on matter to be understood while others are not. Those which depend upon matter in accordance with both being and understanding are considered by the science whose mode of defining is with sensible matter. Definitions with sensible matter are like the definition of animal. 'What it is to be an animal' must include sensible matter, e.g., flesh and bones. The science which defines in this way is natural science or philosophy of nature.

Those speculabilia whose complete being is with matter, but which can be understood without it, are considered by a science whose mode of defining is without sensible matter. Such are the

definitions of line and number. This is the science of mathematics.

A third science considers those things which do not depend upon matter to be, and consequently are not dependent upon matter to be understood. The mode of defining of this science is thus without any matter. It differs from that of mathematics, because it considers those things that do not depend upon matter for their being and for their being understood. Another difference, which will become clearer as this discussion gains ground, is that though mathematics abstracts from sensible matter, it does not abstract from all matter. But, the third science abstracts from any kind of matter. This science has been given different names depending on what it focuses on. And a lot of articles have been penned with regard to the significance of these names. To mention, in passing, one such article, John F. Wippel's article "First Philosophy According to Thomas Aquinas," in Metaphysical Themes in Thomas Aquinas, pp.56-77, comes to mind. But, in this paper we are dealing with this science mainly as metaphysics.

St. Thomas rules out the possibility of a fourth science, due to the fact that it would have no object, for it could be only on the hypothesis of a speculabile that is given independently of matter and yet requires matter in order to be understood or defined. Such an hypothesis implies a contradiction, viz., that a definition which would have to contain and not to contain something essential to it. In terms of accessibility by scientific knowledge, all reality is thus embraced in the classification in

accordance with dependence on matter in being or a denial of such dependence. Therefore, the division of speculative science is threefold, viz., natural philosophy, mathematics and metaphysics.

CHAPTER II - ONTOLOGICAL STRUCTURES

1. Matter and Form.

a. Prime Matter and Substantial form

In order to understand prime matter and substantial form one has to evoke the theory of hylomorphism, which has made a valuable contribution to the explanation of how physical change comes to be. The term "hylomorphism" is derived from two Greek words, hylē (matter) and morphē (form), and therefore it may loosely be referred to as matter-form theory. In accordance with this theory every material being is essentially composed of prime matter and substantial form as its ultimate constituent principles. As we have already hinted above, this theory, which was introduced by Aristotle and perfected by St. Thomas Aquinas, is meant to explain change, and more precisely, substantial change.

Beings that can change essentially are composed of prime matter and substantial form. Prime matter is the determinable principle and substantial form is the determining one. In any material being, essential change is not an annihilation followed by a creation, but it implies a determinable principle that remains as a substratum and common bond when a new determining principle endows such a being with essentially different characteristics.

In other words, prime matter is capable of accommodating a variety of forms, at least, one at a time.

Although prime matter is not a being in its own right but merely a principle of being and is defined by its potentiality, it is, nevertheless, real, for the ontological realities of substantial change and multiplication of individuals in the same species require an ontological and not a purely logical principle of explanation. Of course, as a mere principle of being, prime matter cannot exist separately in a pure state, but only as actuated by substantial form in the matter-form composite. This being the case, prime matter itself, as such, is not subject to substantial change because it is not composed, but it makes the composite changeable in so far as no form actuates it to the fullness of its capacity. Substantial form also is dependent on the matter it actuates.

St. Thomas elaborates clearly on the union of matter and form, in On Being and Essence chapter two:

Form and matter are found in composite substances, for example, soul and body in man. It cannot be said, however, that either one of these alone is called the essence. That matter alone is not the essence of a thing is evident, for through its essence a thing is knowable and fixed in its species and genus. But matter is not a principle of knowledge, nor does it determine anything in a genus or species. Only that which is actually something does this. Neither can the form alone of a composite substance be called its essence...Evidently, then, essence embraces matter and form. We cannot say, however, that essence signifies the relation existing between matter and form, or something added to them. This would of necessity be accidental or extraneous to the thing, and it would not enable us to know the thing: none of which characteristics befits essence. For through form, which is the actuality of matter, matter is rendered being in act and a substance (hoc aliquid.)"

As the quotation indicates, matter, because of its purely potential character, cannot be known except in so far as it is related to its determining co-principle or form. Like prime matter, substantial form is merely a principle of being. It is real, but does not exist separately from the matter that it actuates. The quotation further attests to the fact that prime matter and substantial form unite of themselves, without any intermediary common bond, because - it is the very nature of substantial form to actuate matter and it is that of matter to be actuated by form. A common bond would be called for only if there were a question of uniting two beings, but it is not needed for mere principles of being.

Therefore, substantial form and prime matter are distinct but interdependent principles that together constitute the essence of physical beings. Matter, as we have already mentioned, is the material, passive and indeterminate principle, which is subject to all substantial determinations and substantial changes. Substantial form is the formal and determining principle that actuates matter.

b. Individual matter and common matter

Matter is the reason for individuality. It would therefore seem that a notion demanding matter together with form would itself be individual. But definition is only of the universal, not of the individual. St. Thomas provides the solution to this difficulty by distinguishing between individual (signate) matter and common (non-signate) matter. The notion of man, signified by a definition

and, as such, a subject of science does not include this flesh and these bones but it definitely includes flesh and bones.

Thus the nature of man, which his definition signifies and which is the object of science, is considered without this flesh and these bones, but not absolutely without flesh and bones. And because individuals include determinate matter in their nature, whereas universals include common matter, as is said in the Metaphysics, the above-mentioned abstraction is not said to be abstraction of form from matter absolutely, but the abstraction of the universal from the particular. (De Trinitate q.5, a.2, c)

Now, if the individual cannot be defined and if there are definitions of natural things whose forms are enmattered, then the universal notions in natural philosophy, in some way, include matter but not individuating matter. Because if they included individual matter or even excluded common matter, they could not be defined.

Obviously, we are dealing here with an analogical word that can lead to hopeless confusion if its various meanings are not respected. When mention is made of common matter and individual matter, that which the word "matter" signifies in each case is quite different. Matter in so far as it is responsible for individuation is a principle of numerical difference among things within the same species, a principle of sheer multiplicity. Such matter does not form part of the definition. In defining we must abstract from this matter. The definition does, however, contain common matter; in natural definitions we cannot abstract from it, for what the thing is cannot be understood without it. The definition, therefore, must signify not only form but also matter. Common matter is part of the species and, as such, it must be

included in the definition which answers the question: What is this?

In S. Theol., Ia, q.85, a.1, qd:3, St. Thomas explains fully what we just submitted above:

Some have thought that the species of a natural thing is form only, and that matter is not part of the species. If that were so, matter would not enter into the definition of natural things. Therefore, it must be said otherwise, that matter is twofold, common, and signate or individual; common, such as flesh and bones; and individual, as this flesh and these bones. The intellect therefore abstracts the species of a natural thing from the individual sensible matter, but not from common sensible matter; for example, it abstracts the species of man from this flesh and these bones, which do not belong to the species as such, but to the individual (Metaph., vii, Did. vi.10), and need not be considered in the species; whereas the species of man cannot be abstracted by the intellect from flesh and bones.

When, in its quest for knowledge about anything the intellect frames this question: what is this? And it proceeds towards an answer in a comparative way, that is, it comes to know it first in common with other things and only later as distinct from them. The unity of the genus is a work of the intellect in the measure that it is a result of our way of knowing.

So, too, in the case of things whose definitions we know. We locate them in a genus, through which we know in a general way what they are. Then we add differences to each thing, by which it be distinguished from other things. In this way, a complete knowledge of a substance is built up. (SCG, I, Ch. 14)

The unity is established by the intellect in attending to that which many things have in common. There is no such thing in nature as "animal" taken as a genus. There are men, dogs, mice etc., but there is no animal that is only animal. This common notion according to which something, is arranged within a genus grants

admittedly, a confused knowledge susceptible to further determination. It receives such determination from its differences which render it more and more distinct. Genus is related to its differences as matter to form in the sense that form which the genus is taken is matter for the form from which the difference constituting the species is taken.

For the proper object of the human intellect is the quiddity of a material thing, which comes under the action of the senses and the imagination. Now in a material thing there is a twofold composition, First, there is the composition of form with matter; and to this corresponds that composition of the intellect whereby the universal whole is predicated of its parts: for the genus is derived from common matter, while the difference that completes the species is derived from the form, and the particular from individual matter.

(S. Theol., q,85, a.5, ad 3)

Committed to a study of things in nature, the natural philosopher cannot neglect common matter. Because if he did he would be neglecting a fundamental principle upon which his knowledge depends. So, it is that when he defines, the natural philosopher must attempt a determinate account of the matter in which the form is found. What something is made up of is part of its definition; man, for instance, cannot be fully defined without flesh and bones. Throughout, all things considered by the natural philosopher are intelligible and definable with or in relation to common sensible matter.

c. Sensible Matter and Intelligible Matter.

The subject of natural philosophy is given or made known through the senses. This is not to say that the senses know the subject as such. Only the intellect does. But the intellect comes

to know this subject with dependence on the senses - Nihil est in intellectu, nisi prius fuerit in sensu.

Thus when sense knows a thing through a form received from things, it does not know it so effectively as the intellect. Sense is led through it to a knowledge of the external accidents; the intellect reaches to the bare quiddity of the thing, distinguishing it from all material dispositions. Thus, when the mental knowing is said to take its origin from sense, this does not mean that sense apprehends all that the mind knows, but that, from those things which sense apprehends, the mind is led on to something more, just as the intellectual knowledge of sensible things leads to knowledge of divine things. (De Veritate, q.10, a.6, ad2)

Sensible matter is twofold. It includes both individual and common matter. The individual matter, as this flesh and these bones, is sensible, i.e., it is the property of the senses. By the same token, common matter is also sensible. St. Thomas goes on to distinguish between sensible and intelligible matter.

All accidents are related to substance as form to matter, as determining to the determinable. But, since an accident cannot be defined without its subject, no accident as form can be abstracted from substance as form from matter. An accident cannot be considered or conceived as though it were not an accident.

It should be noted here that, according to the teaching of Book VII of the Metaphysics, there is this difference between defining substance and defining accidents that in the former case nothing extrinsic is included: every substance is defined in terms merely of its material and formal principles; but in the latter case something extrinsic to the thing defined is referred to, i.e., the subject of accidents in question- as when one defines snubness or "curvature of the nose." The reason is that a definition must express what a thing is, and while substance is something complete in its being and kind, accidents have being only in relation to a substance. (In II De Anima, Lect.1, n.213)

However, accidents befall substance in a certain order (of nature but not in time.) Quantity inheres in substance prior to quality, and after quality comes action and passion, etc. Quantity can be grasped as a form in matter prior to understanding such matter as the subject of the sensible qualities by reason of which it is called sensible matter. Quantity can be grasped without sensible matter but not without substance. Substance, as necessary to the understanding of quantity, is called intelligible matter. Being the subject of quantity, known as prior to the sensible qualities that attend it in reality, substance can only be attained by the intellect. It is quantity thus abstracted from sensible matter, but not from intelligible matter, that constitutes the subject of mathematics. Or, in the words of St. Thomas, mathematics considers quantities, i.e., both discreet and continuous, as well as certain qualities that are consequent to quantity.

Here he gives a second sense in which the term quality is used. He says that the term quality or "qualified" is used in another sense in so far as immobile things and the objects of mathematics are said to be qualified in a certain way. For the objects of mathematics are abstracted from motion, as stated in Book VI of this work (536:C 1161). Such objects are numbers and continuous quantities, and of both we use the term quality...
(In V Metaph., Lect.16, nn.989-92)

Perhaps the subjects of mathematics can be clarified by investigating that from which they are abstracted, i.e., sensible matter. Sensible matter has been explained above in reference to the senses as the subject of sensible qualities; it is that which is apprehended as the subject of qualities which affect the senses

in such a way that these qualities are called sensible per se. This subject is not attained by senses per se. It is said to be sensible only per accidens because it is apprehended by the mind while per se sense experience occurs. As subject of the sensible qualities of a material being, sensible matter is not the whole material being. That is, it is not the same as substance in every way. Rather it is material substance qua subject to sensible accidents. It is that of which the thing is made, e.g., the flesh and bones of man.

Quantity, when understood as prior to the sensible qualities is likewise understood as prior to the per accidens sensible subject of these qualities and is related to it as accident to subject only in the sense of that from which it is abstracted. Sensible matter is not part of what mathematics abstracts; on the contrary, it is the subject that is abstracted from. Such abstraction does not leave aside the subject qua subject of quantity, but qua subject of sensible qualities. Taken as sensible subject, i.e., sensible matter, it is subject of both sensible qualities and quantities. But this is not the business of the mathematician.

By 'material' is meant not only that which has matter as a part, but also that which exists in matter; and in this way a sensible line can be called something material. So this does not prevent a line from being understood without matter. For sensible matter is not related to a line as a part, but rather as the subject in which it exists, and this is also the case with a surface or body.... (In Boeth. De Trin. q.5, a.3, ad2)

If mathematics, as distinguished from natural philosophy, abstracts from sensible matter, it does not abstract from all

matter. The matter from which mathematics cannot and does not abstract is intelligible matter. Now, what is intelligible matter? In the expression of St. Thomas, it is substance qua subject to quantity. "For sensible matter is corporeal matter as subject to sensible qualities, such as being cold or hot, hard or soft, and the like: while intelligible matter is substance as subject to quantity" (S. Theol., Ia., q.85, a.1, ad 2). Substance so considered is likewise related to quantity as matter to form but in a different way than sensible matter is. Intelligible matter is attained by the mind, without proximate dependence upon sense experience. Impervious to the senses, abstract quantity is comprehensible to the intellect inasmuch as the intellect is capable of recognising its natural priority to other accidents. But even when considered as prior to other accidents, abstract quantity does not cease to be an accident and cannot be conceived without substance as though it were not an accident. Quantity is the order of the parts of material substance and hence cannot be considered apart from that of which it is the order.

Just as quantity considered as such is dependant upon intelligible matter to be understood, so likewise are its species. "But the other mathematical sciences do not consider any substance, as is clear in the case of arithmetic, which treats of numbers, and in the case of geometry, which treats of continuous quantity. Number and continuous quantity are accidents." (In Metaph., Lect. 9, n.2563). In geometry, whose subject is magnitude, all definitions include the continuum as intelligible matter. This may

be seen in the particular subjects as attained by way of construction, viz., the sides of a triangle or the surfaces and depth of a cube. A proportion can be established between intelligible matter in mathematics and sensible matter in nature. Allowing for their radical differences we can safely say that a curve is to mathematics what a snub-nose is to nature. "...But the continuum is intelligible matter, as what is snub-nosed in sensible matter." (In III De Anima, Lect. 8, n. 714). As in natural philosophy, the definitions of mathematics contain more than that which is in the mode of form. They also include intelligible matter because the "what it is" of mathematical subjects is dependent upon something more than form.

Hence, whether in the case of sensible things or in that of the objects of mathematics, their definitions must always contain something as matter and something as form: for example, in the definition of a mathematical circle, a circle is a plane figure, plane is as matter and figure as form. For a mathematical definition and a natural definition are each one thing on the same grounds (even though there is no agent in the realm of mathematical entities as there is in the realm of natural entities), because in both cases one part of the definition is as matter and the other as form." (In VIII Metaph., Lect. 5, n.1761).

Not only do the mathematical objects have their form in matter, but there can also be individuals of the same species, e.g., many equal lines, many circles, etc. These numerically different individuals can be identified by a symbol. In other words, this means that there is a principle of individuation in mathematics, analogous to that in nature, which distinguishes individual mathematical objects from that which is directly signified by the definition.

...Now matter is the principle of individuation not only in singular things but also in the objects of mathematics: for there are two kinds of matter, one sensible and the other intelligible. And by sensible matter is meant such things as bronze and wood, of any changeable matter, such as fire and water and all things of this sort; and singular sensible things are individual by such matter. But by intelligible matter is meant what exists in things which are sensible but are not viewed as sensible, as the objects of mathematics. For just as the form of man exists in such and such matter, which is an organic body, in a similar way the form of a circle or of a triangle exists in this matter, which is a continuum, whether surface or solid. (In VII Metaph., Lect.10, n.1496).

In order to consider without sensible matter things that are in sensible matter, mathematics abstracts a form both from individual and common sensible matter, and also from individual intelligible matter—for mathematics as such does not deal with this circle B, But merely uses it, and any this would make do. From the preceding it should be clear that form here does not mean substantial form nor matter here means prime matter. As we have already seen, substantial form demands its appropriate matter and vice versa. Just as matter can neither be nor be understood without form, knowledge of the substantial form would require knowledge of the proper matter of which such a form is the act. Form in mathematics is the accidental form of quantity.

2. Essence and Existence and their unity.

We shall see later on when we come to discuss the operations of the intellect that esse (to be), indeed, cannot be grasped by the intellect the way it grasps essence. The first operation of the intellect, viz., apprehension, corresponds to the nature of

things, while the second operation, whereby the intellect joins and divides deals with the fact of their being in act, their act of existing.

In On Being and Essence, St. Thomas begins by explaining the meaning of various terms he intends to employ in his treatise. Being, and essence are among those explained but, as Armand Maurer points out in his introduction of the same treatise, pp. 11-12, St. Thomas does not define the act of existing (esse.) And Maurer contends that this is no oversight in the part of St. Thomas because for him, "the act of existing is not an essence; it is really distinct from essence. It cannot, then, like essence, be the object of concept or be defined."

We have seen that the composition of matter and form serves to explain change or movement. The composition of essence and esse should also serve to explain something. And this is finitude or participation. The act of existing is always exercised within limits. The essence receives the act of existing. What is and esse differ, e.g., I have being, but I am not being, because if I were I could have always existed. The essence is the way one exercises his act of existing. The composition of matter and form is called physical because it has to do with change in corporeal beings. That of essence and existence is called metaphysical because it does not only have to do with physical beings but also with incorporeal beings.

St. Thomas defines a "being" as the existing thing embracing both essence and esse. In other words, a being is composed of

essence and the act of existing. And, according to him, "being" can be considered in two ways; first, as connoting the ten categories, i.e., substance and the nine accidents; and secondly, as signifying the truth of propositions. The difference between these two ways, he observes, lies in the fact that in the second sense, every thing about which an affirmative enunciation can be made can be called "being." On the contrary, in the first sense, a thing has to posit something in reality in order for it to merit to be called being.

Now essence and esse are two distinct elements but, like matter and form, they are interdependent. To prove that essence is distinct from esse, St. Thomas shows that an essence of a thing can be known irrespective of whether that thing exists or not. That is, one does not necessarily need to know that a thing exists in order to know that it is something. The example he gives is that of humanity, i.e., "humanity" can be comprehended even if there were no things representing it in reality. The "whatness" of humanity can be apprehended even if there were no human beings existing in reality. This means that essence and esse are, in finite beings, two separate co-principles that team up to make a being. Separate as they are, their nature is to co-exist.

St. Thomas contends that there is or there can only be one Being whose essence is His existence, and this he calls God. That is, God's essence is not separate from His existence. He clearly spells this out in On Being and Essence, pp 51 and 54:

Indeed, we find in substances a threefold manner of having essence. There is a being, God, whose essence is

His very act of existing. That explains why we find some philosophers asserting that God does not have a quiddity or essence, because His essence is not other than His act of existing. From this it follows that He is not in a genus, for the quiddity of anything in a genus must be other than its act of existing, since the different beings within a genus or species have the same generic or specific quiddity or nature, whereas their act of existing is diverse.

In a second way we find essence in created intellectual substances. Their act of existing is other than their essence, although their essence is immaterial. Their act of existing is thus not a separated, but a received one; and it is therefore limited and restricted to the capacity of the receiving nature. Their nature or quiddity, however, is separated and unreceived in any matter.

We find essence in a third way in substances composed of matter and form. Their act of existing is received and limited because they have it from another; what is more, their nature or quiddity is received in designated matter....Moreover, because of the division of designated matter, individuals can now be multiplied in one species.

It is clear from what appears above that in every created thing essence is distinct from existence and they have the relationship of potency and act. Every created being participates in the act of existing. Now whatever is participated is related to the participator as its act. Nonetheless, participated act of existing is limited by the receptive capacity of the participator. In intellectual substances, indeed, there is a composition of act and potentiality; not, however, of matter and form, but of form and participated act of existing.

It is interesting to note that there has been a big debate in the Middle Ages and the focus of controversy was whether, in composite substances, form alone represents the essence or both matter and form constitute the essence. St. Thomas levels an

accusation at Averroes and his disciples for holding that form alone was necessary to make the essence.

Neither can form alone of a composite substance be called its essence, although some would endeavour to assert it. For it is evident from what has been said that essence is what the definition of a thing signifies. Now the definition of physical substances includes not only form but matter; otherwise there would be no difference between physical and mathematical definitions. Neither can it be said that the definition of physical substance includes matter as something added to its essence, or as a being outside of its essence because this manner of definition is proper to accidents, which do not have a perfect essence. (On Being and Essence, p. 30)

Natural or physical substances, as the above quotation reveals, have a composite essence because they are composed of matter and form, which are the principles that enter into their essential definitions. Unlike accidents, which are defined by adding the substance in which they inhere, physical substances are not defined by addition that does not pertain to their being. And as composed of matter and form, essence and existence, physical substances are mobile and finite.

On the contrary, with regard to intelligences or spiritual substances there is only one composition, which is that of form (which alone suffices to make their essence) and the act of existing. Since these substances do not need matter for their being and being understood, their form alone takes care of their essences. But their act of existing is received by their essences to form the being that they are. Therefore, although the intelligences, unlike the physical substances, are immobile, nonetheless, because of the fact that their act of existing is received they are finite.

The distinction that obtains between essence and existence in created substances, more often than not, has been, so to speak, blown out of proportion to the extent of neglecting, if not ignoring, their unity. The esse is the act of the essence and essence is the limit within which the act of existing is exercised. As we shall see in the next chapter, essence is known through the first operation of the intellect while existence is known through the second operation. It is again interesting to note here that the same intellect is at work although it exercises two operations aimed at acquiring complete knowledge of being.

As we have already indicated, no potency can be known apart from its act, e.g., prime matter cannot be known without substantial form. Essence is related to esse as potency to act. In On Being and Essence, p.28, St. Thomas describes essence as "that through which and in which a being has its act of existing (esse.)" Again on p.31, he says that "essence is that according to which a thing is said to be." Therefore, despite their distinction, essence and esse are closely intertwined.

CHAPTER III - THEORY OF KNOWLEDGE

1. Operations of the intellect

There are three operations of the intellect, viz., Simple apprehension, Judgement and Reasoning. But, in his Commentary on Boethius' De Trinitate, q.5,a.3, St. Thomas mentions only the first two operations of the intellect and the third is merely implied.

Taking his cue from what Aristotle says in De Anima III, 6, 430a 26-28, St. Thomas agrees that:

The intellect has two operations: one called the 'understanding of indivisibles', by which it knows what a thing is, another by which it joins and divides, that is to say, by forming affirmative and negative statements. Now these two separations correspond to two principles in things. The first operation concerns the nature itself of a thing, in virtue of which the object holds a certain rank among beings, whether it be a complete thing like some whole, or an incomplete thing, like a part or an accident. The second operation has to do with a thing's being(esse), which results from the union of the principles of a thing in composite substances, or, as in the case of simple substances accompanies the thing's simple nature. (In Boeth. de Trin., q.5, a.3).

St. Thomas here is explaining the various meanings of abstraction. In order to elucidate this difference in meaning he first shows how the word is applied to the different operations of the intellect. And for this purpose, he finds it sufficient to mention only the first two. The third operation, though not expressly mentioned here, is implied by the second. This is clear from what he says in his reply in S. Theol., Ia, q.79, a.8:

To understand is to apprehend quite simply an intelligible truth. To reason is to move from one thing understood to another, so as to know an intelligible truth.... But men come to grasp intelligible truth by moving from point to point, as the passage notes, and are therefore described as reasoning.

The first operation is called understanding of the indivisibles; elsewhere it is also called formation.

"Now that which is understood, or the thing which is understood, is as something which is constituted or formed through the activity of the intellect, whether this thing be a simple quiddity or whether it be the composition and division of a proposition. (On Spiritual Creatures, a.9.ad 6).

In this (first) operation the intellect attains first of all what something is, and by division and composition it reaches a definition stating distinctly what something is.

The necessity of more than one intellectual operation is a condition peculiar to the human way of knowing. Unlike the intellect of separated substances, the human intellect cannot, at once, grasp everything that is contained in a given nature. The potentiality which marks the inception of human intellection continues throughout its development. A more perfect intellect, such as that of separated substance, in one simple apprehension knows immediately whatever pertains or does not pertain to a given subject. The grasp of the intellection of a separated substance carries beyond specific to individual principles of the thing and the disposition of the subject, attained in concretion, is an adequate principle for knowing all that may or may not inhere in that subject. To attain the knowledge that superior intellects achieve immediately, the human intellect must proceed gradually, moving from vague to distinct apprehension. But, it does not apprehend for the sake of apprehension.

But in apprehending incomplexes, our intellect does not yet reach its ultimate perfection, because it is still in potency to composition or division... But our intellect reaches truth in its perfect knowledge, that is to say, when it already has arrived at composition. (SCG. I, Ch.59).

Apprehension leaves us at half-way house. We must make our way from here by composition and division. By knowing what man is, we do not, ipso facto, have knowledge of the truth unless we assert that he is such and such. Whatever further knowledge we

must acquire about man will be referred to the initial knowledge of 'what man is'. This is done by successive compositions and divisions. The reason for the debility of human knowing lies in the fact that our intellect is posterior to things to be and is measured by them. This means, of course, that our intellect is dependent on things for what it knows about them. It also means that what it knows of one thing does not necessarily imply knowledge of something else actually inhering in it. As a result, our intellect is forced, so to speak, to take its knowledge where it can find it, and must go from knowledge of one thing to another.

Corresponding to the intellect's first operation is the nature or quiddity of things, viz., what they are. This, as we have already seen, may be something complete, a whole, like man, tree, etc. Or it may be an incomplete nature as part or accident. The actuality found in things includes more, however, than their essential nature. Other things can be attributed to this nature or denied of it. It has properties and accidents such as relations. To attain this actuality, the intellect, which in its first operation knows the nature at first vaguely and then distinctly according to what it is, must have recourse to a second and a third operation in order to know the way in which it is or is not.

So also the human intellect does not immediately, in first apprehending a thing, have complete knowledge; rather, it first apprehends only one aspect of the thing - namely, its whatness, which is the primary and proper object of the intellect - and only then can it understand the properties, accidents and relationships incidental to the thing's essence. Accordingly, it must necessarily either combine one apprehension with another or separate

them, or else it must go from one combination to another which is the process of reasoning. (S. Theol., Ia, q.85, a.5, c)

In general, to abstract means to consider or to understand one thing without the other. By abstraction we distinguish or understand one thing or aspect apart from something else to which it may really be united. Abstraction accounts for the devious way in which the intellect copes with the extreme complexity of objects confronting it. This intellectual process is not arbitrary, nor is it fictive since every type of abstraction has its proper criterion based, at least remotely, on things outside the mind. In the case of the second operation, this criterion is things themselves in the way they are. That is, in this operation, the intellect can abstract(separate) only if things are separated in reality. The second operation deals with the very being of a thing. Now, what, exactly, does this mean? If we hope to grasp the implications of the importance of this issue the question cannot go unanswered.

In approaching this question, let us recall, first of all, that the immanence of knowledge holds good for all three operations. Again, by way of preparing the ground, a basic difference between cognitive and appetitive powers should be underscored. It is proper to the will, not to the intellect, to incline towards things in their condition outside of the intellect...

the act of a cognitive virtue is completed by the thing being in the knower, as distinct from the act of an appetite's virtue which is realized in the appetitive's reaching out to the very thing, itself. Hence, the movement of an appetitive virtue goes out to things as they exist in reality, while the act of a cognitive power

is determined by the condition of the knower. (IIa-IIae, q.27, a.4, c)

This much having been said, what then is the being(esse) in things which the intellect, in its own manner, attains by second operation? Assuredly, it is not the act of existing, as if, having grasped an essential nature, such as 'man', by a prior apprehension, the intellect in this subsequent operation were to reveal that man exists the way Motlepu does, and that the actuality of existence as thus found in the singular would be the subject of metaphysics. Appealing as it may be, the attempt to make of this operation the act of wisdom, as though by it alone we are able to extract what is most perfect in the real, is based on an assumption that is hardly found anywhere in the teaching of St. Thomas, and which, even more so, is unsupported by experience. Nonetheless, our present concern is not to dispute, but to discover what, in this context, St. Thomas means by the thing's being(esse).

Composition or division is the complement of apprehension inasmuch as it brings about the unification of the manifold concepts acquired in the first operation. Hence, its function is not to replace the first operation by grasping aspects of the real that escape apprehension, but to organize its discontinuous knowledge. It reconstructs the original unity possessed by the thing in its mode of being outside the intellect which, due to the debility of our intellect, is not so grasped in a single operation, but only successively by operations differing in kind.

By composition or division our intellect does not know more things; rather it knows the same things as true or false. Although

composition here implies a duality of subject - predicate, the predicate is as form to the subject, manifesting the aspect of inherence or existence in the subject.

In order to know a subject and an accident and to know different accidents, our intellect forms separate concepts, and consequently, passes from knowledge of a substance to knowledge of one of its accidents, it joins one species with the other, and, in a certain manner, unites them. In this way, the intellect forms propositions in itself. (De Veritate, q.2, a.7, c).

The composition of the intellect is according to the mode of identity, whose sign is the copula 'is'. Unlike composition in things themselves, wherein component parts are united in so far as they are different, the composition of the intellect is according to similitudes of the same thing.

Nevertheless, the intellectual combinations, differ from real combinations, since the things combined in reality are distinct, whereas intellectual combination signifies the identity the things combined. For the intellect's combination is not such as to say that 'man is whiteness'; rather it says that 'man is white', i.e. 'has whiteness', and it is the same subject which is man and has whiteness. (S. Theol., Ia, q.85, a.5 ad3).

And yet, that the intellect composes at all, or divides, is because of the composition in things that are proportional to our intellect and the way that we come to know their truth. Exterior reality is the criterion whereby validity of the intellect's composition is determined.

You are not white because we think truly that you are white; but conversely we think you are white because you are white. Hence it has been shown that the way in which a thing is disposed is the cause of truth both in thought and in speech... For the truth and falsity found in speech and in thought must be traced to a thing's disposition as their cause. Now when the intellect makes a combination, it receives two concepts, one of which is related to the other as a form; hence it takes on as

being present in the other, because predicates are taken formally. Therefore if such an operation of the intellect should be trace to a thing as its cause, then in composite substances the combination of subject and accident must serve as a foundation and the cause of the truth in the combination which the intellect makes in itself and expresses in words. For example, when I say 'Socrates is a man', the truth of this enunciation is caused by combining form humanity with the individual matter by means of which Socrates is this man; and when I say 'man is white', the cause of the truth of this enunciation is the combining of whiteness with the subject. It is similar in other cases. And the same thing is evident in the case of separation. (In IX Metaph., Lect.11, nn.1897-98).

The repeated reference to combination in the foregoing discussion should not obscure the fact that the second operation of the intellect is one of composition and division.

However, the being in which the intellect's act of combining consists, inasmuch as there is affirmation, indicates a certain composition or union; whereas non-being, which negation signifies, does away with composition and union and indicates plurality and otherness. Hence it was shown that in the case of things which may be combined and separated one and the same statement is sometimes true and sometimes false; for example, the statement 'Socrates is sitting' is true when he is sitting; but the same statement is false when he gets up. (Ibid, n.1900).

To return to abstraction, St. Thomas says that the intellect in its second operation cannot truly abstract things unless that is the way they really are; that is, if it were to represent as separate things which in reality are not separate the intellect would be in error. The immediate reason for this is that the adequation which defines truth is only accomplished when, by composition and division, the intellect enunciates that a thing is or is not such and such or so and so.

Abstraction as performed in the first operation enjoys a certain freedom from the exigencies of truth. This freedom is essential to mathematical abstraction. Truth is found in the intellect, and more precisely, in the intellect composing and dividing, rather than in the apprehension of the first operation. The following text from the De Veritate, q.I, a.3,c., explains why this is so.

Just as the true is found primarily in the intellect rather than in things, so also it is found primarily in an act of the intellect joining and separating, rather than in an act by which it forms the quiddities of things. ... Consequently the nature of truth is first found in the intellect when the intellect begins to possess something proper to itself, not possessed by the thing outside the soul, yet corresponding to it, so that between the two - intellect and thing - a conformity may be found. In forming the quiddities of things, the intellect merely has a likeness of a thing existing outside the soul, as a sense has a likeness when it receives the species of a sensible thing. But when the intellect begins to judge about the thing, it has apprehended, then its judgement is something proper to itself - not something found outside the thing. And the judgement is said to be true when it conforms to external reality.... Moreover, this is why truth is found primarily in the joining and separating by the intellect, and only secondarily in its formation of the quiddities of things or definitions, for a definition is called true or false because of true or false combination....

The composition or division of the intellect is expressed by either an affirmative or negative enunciation that intends to signify the truth. Conformity, as the preceding citation states, between the intellect and what is, obtains when an enunciation expresses what in fact is or is not. However, if an enunciation asserts what is not or negates what is, the intellect is not in conformity with what is or is not, and its composition or division

is false. If, to use the example of St. Thomas, I say "man is not white", what I signify in this negative enunciation is a separation made by my mind between man and whiteness. Since, in fact, there are white men, there is no conformity between my intellect and what is. If, however, I say 'man is not an ass', my intellect, in making this separation, is true because man and ass are really separate. Accordingly, by this operation the intellect can 'abstract' only those things which are really separate.

By contrast, the first operation is less restricted in as much as it can abstract or 'separate' in mind things which are not really separate. But it cannot abstract things which are really separate. Nonetheless, it cannot, however, do so indiscriminately. The reason is that anything, to be understood at all, must be intelligible in act. To know is to be another as other.

... the difference between knowing and non-knowing subjects is that the latter have nothing but their own form, whereas a knowing subject is one whose nature it is to have in addition the forms of something else; for the likeness of the thing known is in the knower.
(S. Theol., Ia, q.14, a.1,c).

To know is an actuality, a perfection. But, it is a perfection that is proportioned to the one who knows. Cognitum est in cognoscente per modum cognoscentis. For this reason, it is more proper to say of the human intellect that to know is to become the other as other in a purely immaterial way, or, if you will, intentionally. While our intellect has a capacity to know, it knows now in potency, now in act.

But the human understanding ... is in a state of potentiality in relation to what it can understand, and is initially like a blank page on which nothing is

written, as Aristotle writes. Which is obvious from the fact that initially we are solely able to understand and afterwards we come actually to understand. (S. Theol., Ia, q.79, a.2,c)

Since nothing acts as it is in potency, but only in so far as it is in act, in order to know the intellect must be reduced from potency to act by something already actual.

The potency of the intellect is a potency for a formal determination of its act of knowledge, which must come from the nature of things (provided that they are actualized and put on the level of its mode existence by the agent intellect). Some of these things are most actual and, therefore, most knowable since, of themselves, they present no obstacle to the assimilative union that is knowledge. These are simple, wholly immaterial substances. So eminently intelligible are they, there can be no proportion between them and an intellect which, in order to know, is dependent upon and posterior to composite things. Even in regard to composite, sensible things which it knows naturally, there is an original disproportion between our intellect and its object. This disproportion, however, must be resolved if we are to know as we do.

Between the intellect and sensible things it knows, a twofold relation obtains; one of act to potency, according to which the intellect is immaterial in act whereas, sensible things existing in matter and its individuating conditions are intelligible in potency; the other of potency to act, inasmuch as the intellect is in potency to the formal determination borne by sensible things. The intellect, accordingly, is compared to things to be both as

making them intelligible in act and as being actualized by them insofar as the formal determination of the act of understanding is concerned. Things are rendered intelligible when, through abstraction from individual matter and its conditions, they are assimilated to the immateriality of the intellect. To accomplish this it suffices that the intellect possess in act the basis of similarity. We know in fact that there must be in us such power of illumination. This power which is completely active, is called the agent intellect.

To know actually beyond assimilating many things to itself, the intellect must somehow be proportioned to them in order that it might have determinate knowledge of each. But this requires that it possess, in act, the forms of all these things. The nature of the human intellect, however, is limited. Of itself unable to be assimilated to the natures of all these things it knows, it relies on the reception of something from outside itself. Owing to the aspect of passivity implied in this reception, the power in which it is accomplished is called the possible intellect. Through the joint cooperation of agent and possible intellect, the disproportion obstructing the advance of knowledge is remedied.

The reason why we have to say that we have a 'potential' intellect is simply, that we sometimes find ourselves not actually but potentially understanding; for this implies a power in us that is in potency to intelligible objects before it actually understands them, and which is then brought into act, with regard to these, when it knows them, and again when it returns to reflect on them. And this power we call the potential intellect. And the reason for saying that our intellect is also 'agent' is that the material things we understand do not exist as non-material and actually understood until they are received into the soul; before this they are only

potentially intelligible. There must, then, be some power in us to make them actually intelligible; and this power we call the agent intellect. (S. Theol., Ia, q.54, a.4, c)

St. Thomas mentions something of a similar nature to what is contained in the above quotation in SCG, II, Ch.77, and also in S. Theol., Ia., q.79, a.3. Sensible things then, existing in their proper nature, are incapable of acting on the intellect. They are intelligible only in potency. They can become intelligible in act through the intellect's ability to abstract from the phantasm the what of sensible singular apart from the individuating conditions which render the singular a mere instance of that what.

A phantasm actually contains a likeness of a definite nature; but this likeness of a definite species is in the phantasm in potency able to be abstracted from material conditions. But on the intellectual side the opposite is the case; for it does not actually possess likeness of distinct things; but yet it actually possesses an immaterial light which has the power of abstracting those things which are able to be abstracted in potency. (On Spiritual Creatures, a.10, ad4).

A similar thing is expressed in S. Theol., Ia, q.79, a.4, ad4.

Although only potentially intelligible, sensible things have an actuality of their own independently of the intellect. If they did not, they would not be knowable qua sensible in any way. They have this actuality through the form.

For the likeness in our intellect is received from a thing insofar as the thing acts upon our intellect by previously acting upon our senses. Now, matter, because of the feebleness of its existence (for it is being only potentially), cannot be a principle of action; hence, a thing which acts upon our soul acts only through its form; consequently, the likeness of a thing which is impressed upon our sense and purified by several stages until it reaches the intellect is a likeness only of the form. (De Veritate, q.2, a.5, c.).

That which of itself is not actual can offer no determination to the intellect and hence can only be as related to what is actual. It is through its natural forms that prime matter is somehow knowable.

Expressions like, 'things act upon the intellect', 'the intellect receives its knowledge from things', 'the possible intellect is moved by the intelligible', can give rise to a good deal of confusion, unless correctly understood. Nonetheless, these expressions are true, but passivity is understood here in a very wide sense to mean the reception by the intellect of the formal determination of its act of understanding. But, this is something prerequisite to the act of intellection and not intellection itself. "...knowledge as such does not require that the knower undergo a change caused by the object of knowledge; this is required only so far as the knower is potentially such." (S. Theol., Ia, q.56, a.1,c). To know, our intellect requires a twofold information: one entitative and physical, according to which the intelligible species and the act of intellection are present in the intellect as accidents in a subject; the other, intentional, by which the intellect becomes the thing known in an immaterial way. The first, absolutely necessary, is a condition ancillary to the second which, formally speaking, constitutes the act of knowledge.

Knowledge, because of immateriality, is an immanent act perfecting the principle whence it proceeds. It is not a passion undergone, nor a perfection received from without. It is not even

something which the agent performs upon itself. So misconstrued, knowledge would be of the effects that things cause in the knower but not in things themselves. The determination which the thing known affords the act of intellection as such is in the line of formal, not efficient, causality because the intellect in act is the thing understood in act. Form exercises its causality by perfecting that which it informs: "... a form as a form has its act of existing by perfecting that in which it is, and by resting in that thing." (De Veritate, q.2, a.14, c).

In his reply in Boet. de Trinitate, q.5, a.2, St. Thomas uses the word form (ratio) to designate a nature signified by its definition in the sense that the form from which the definition is taken is called ratio. But, here, it seems that he uses the word according to its prior imposition signifying the definition itself. "... for the intelligible expression of a thing which a word signifies is a thing's definition." (In IV Metaph, Lect.16, N.733). The change in meaning is understandable. In article two of Boet. de Trinitate, there is a question of that which is. Here, in considering abstraction, the emphasis is rather on the way or the manner in which something is.

Now, when a nature has actual intelligibility without dependence upon something else, it can be abstracted by the intellect so as to be understood without this other. This holds good not only when the intellect apprehends one thing without understanding something else from which it is really separate, but is also true of things actually conjoined as whole and part without

knowing the whole. For instance, it can grasp a letter without the syllable of which the letter is an element. The converse, however, is not true. Sometimes, of course, the intellect can grasp the whole without the part as, for example, animal can be understood without foot, but, as seen above, the converse is not true. 'Whiteness', as an accident in man is such that it can be without understanding man, and man is understood without it. It is not necessary to be white in order to be a man, and vice versa.

Now, as it is clear from what has been said above, the first operation of the intellect, which is commonly as simple apprehension, is that operation by which the intellect grasps something without affirming or denying anything about it. This is so because by simple apprehension the intellect grasps the nature of a thing without bothering whether it exists or not. In other words, in the first operation, the intellect distinguishes one thing from something else by understanding what one is while understanding nothing of the other. That is, the intellect does not consider the one to be without the other by simply considers the one and not the other.

On the other hand, the second operation of the intellect or judgement considers things not merely separately, but as actually separate, and this, St. Thomas contends, is rightly called separation. Judgement is that operation of the intellect by which it(the intellect) unites by affirming and separates by denying. It is clear then that the intellect in the first operation distinguishes one thing from another differently than it does in

the second operation. St. Thomas, in SCG. I, Ch.71, calls, to know one thing apart from something else, distinction. "But negation is found within the notion of distinction; for those things are distinct of which one is not the other." Distinction, as the quotation suggests, is accomplished in the second operation when the intellect understands that one thing is not in another.

The third operation of the intellect or reasoning is not explicitly mentioned in the Commentary on Boethius' de Trinitate, it is merely implied. But, it is that operation by which the intellect acquires new knowledge by means of what it already knows.

Hence it is that human reasoning, by way of inquiry and discovery, advances from certain things simply understood, viz., the first principles; and again, by way of judgement returns by analysis to first principles, in the light of which it examines what it has found.
(S. Theol., Ia, q.79, a.8, c)

Again in S. Theol., Ia, q.58, a.3, c, St. Thomas says:

... the human intellects obtain their perfection in the knowledge of truth by a kind of movement and discursive intellectual operation; that is to say, as they advance from one thing to another. But, if from the knowledge of a principle they were straightaway to perceive as all its consequent conclusion, then there would be no discursive process at all.

It is clear from the foregoing, that the operations of the intellect are not isolated one from the other, because they are meant to achieve one end, viz., knowledge of things. J. Maritain, also agrees with this in his Formal Logic, p.79.

Thus simple apprehension should be considered as ordained to the definition as to its most evolved and perfect product, the first operation of the mind itself being ordained to the judgement, and the latter in turn to the reasoning....; the acts of the mind are not isolated one from the other, we must beware of pigeon-holing them, of shutting them up in little compartments to work for

themselves alone. They are vital and synergetic, they converge dynamically towards one end... the knowledge of things.

After all, it is one intellect that is at work in all these operations.

2. Abstractiones - Totius et Formae

Having seen how the intellect operates, now we have to discuss abstraction properly so-called. We have already seen that properly considered abstraction belongs to the first operation of the intellect-simple apprehension. St. Thomas, in his Commentary on Boethius' de Trinitate, q.5, a.3, c, summarizes abstraction properly so-called in the following manner:

So there are two abstractions of the intellect. One corresponds to the union of form and matter or accident and subject. This is the abstraction of form from sensible matter. The other corresponds to the union of whole and part; and to this corresponds the abstraction of the universal from the particular. This is the abstraction of a whole, in which we consider a nature absolutely, according to its essential character, in independence of all parts that do not belong to the species but are accidental parts. But, we do not find abstractions opposed to these, by which a part is abstracted from a whole or matter from form, because a part either cannot be abstracted from a whole by the intellect if it is one of the parts of matter in whose definition the whole is included; or it can even exist without the whole if it is one of the parts of the species; for instance, a line without a triangle, a letter without a syllable, or an element without a mixed body. But in the case of things that can exist separately, separation rather than abstraction obtains. Similarly, when we say form is abstracted from matter, we do not mean substantial form, because substantial form and the matter correlative to it are interdependent, so that one is not intelligible without the other, because the appropriate act is in its appropriate matter. Rather, we mean the accidental forms of quantity and figure, from which indeed sensible matter cannot be abstracted by the intellect, because sensible qualities cannot be understood unless quantity is presupposed, as is clear in the case of surface and colour.

The abstraction that is common to all sciences, (because science disregards accidental features and treats of necessary matters), and which natural philosophy employs in its own fashion, is the abstraction of the universal from the particular. It corresponds to 'things' united as whole and part. The terms 'whole' and 'part' are essentially correlative. And just as form cannot be abstracted from all matter, so that which is as a whole cannot be abstracted in natural philosophy from all things which are essentially related to it as parts. In Metaph. V, c.25, 1023b 11-25, Aristotle explains the various meanings of the word 'part'. It means that into which a thing is divided according to quantity, and this in two ways: whatever smaller quantity into which a greater quantity is divided is called a part; or the smaller quantity is called part of the greater only when it is in some way a measure of the latter. The name 'part' is thence applied to that into which something is divided apart from quantity, as species are called parts of the genus. 'Part' has a further meaning of that into which a whole is divided or of which it is constituted, the whole being either a species or that which has the species. Aristotle goes on to give a fourth meaning, i.e., the part of a definition. But, it is the third meaning of 'part' that is of interest to us presently. This third sense of 'part' implies two kinds of whole: either the species itself, and corresponding to it, its proper parts, as triangle has three sides; or the species as in an existing subject with its parts, as semicircle is a part of a circle.

In commenting on the previous chapter where Aristotle distinguishes the ways in which one thing is said to come from another, St. Thomas designates these parts as parts of the species and parts of matter respectively.

For some parts are parts of the species and some parts are parts of matter. Those which are called parts of the species are those on which the perfection of the species depends and without which it cannot be a species. And it is for this reason that such parts are placed in the definition of the whole, as body and soul are placed in the definition of an animal, and an angle in the definition of a triangle, and a letter in the definition of a syllable. All those parts which are called parts of matter are those on which the species does not depend but are in a sense accidental to the species; for example, it is accidental to a statue that it should come from bronze or from any particular matter at all. And it is also accidental that a circle should be divided into two semicircles; and that a right angle should have an acute angle as part of it. (In V Metaph., Lect.21, n.1089).

There in a parallel text In Boet. de Trinitate, q.5, a.3, c. It is obvious from these two texts that the whole, which is the species, cannot be abstracted from those parts which are parts of the species because the 'what it is' of such a whole is to be composed of these parts. When defining the whole these parts must be considered, as letters in relation to a syllable. Material parts, on the other hand, do not make up the whole as such, but are merely accidental. It is, for instance, accidental to the circle as such that it have parts such as two equal semicircles. A circle can be understood and constructed without the intervention of semicircles, for circle enters into the definition of half-circle, and not vice-versa; however, this is not the case with the three straight lines which are essential to the triangle. The

independence of the circle from semicircle is explained by the fact that semicircle is not a part of the species as such, but is a part of the subject in which the species is received. A similar thing is expressed in, In VII Metaph., Lect.9, nn.1474-75.

It should be taken into consideration here that material parts should not be identified with the individual as such. Although they require the whole for their definition, these parts can be defined while an individual cannot be. In conjunction with the whole, material parts can have actual intelligibility, as in the case of semicircle, while the individual as material individual can be no more than potentially intelligible. Material parts are so called because they are not understood as constitutive of the whole, such as a species, meaning that they are not parts of the definition of the species. Tseliso and Sehlabo are material parts of the species man and so are their flesh and bones.

Material parts are thus accidental to the species, whether these parts be universal, as semicircle in relation to the circle, or individual, as this flesh and these bones in relation to man. For this man Fokoane to exist, he must possess this soul and this body of these bones and this flesh. And if it were possible to define Fokoane, these parts would be part of his definition. But these parts, as parts of this man, add nothing to the species itself since it is accidental that the species be in this particular man rather than in another. Hence, the intellect can abstract the species from these parts. This is the abstraction of the universal from the particular - abstraction totius.

The abstraction of a form (abstraction formae) is the one peculiar to mathematics, at least, in St. Thomas' Commentary on Boethius' de Trinitate. This will be discussed at length when we deal with how abstraction and separation are employed by the speculative sciences. But, as we have already indicated above, the form that is being abstracted from sensible matter is the accidental form of quantity, and not, as it were, the substantial form. And this kind of abstraction does not abstract from all matter. It abstracts from both individual and common sensible matter, but not from common intelligible matter, which is the matter from which mathematics does not, even more so, cannot abstract.

Knowledge that is acquired by way of abstraction is directly of things in accordance with what is abstracted and not according to that from which such an abstraction is made. What is attained in mathematical abstraction is still a form, implying matter, in spite of the fact that it has been abstracted from sensible matter.

Quantity as studied by the mathematician is not in reference to what is experienced through sensation. Its intelligibility is reached in another way. It is, nonetheless, a form and, as such, is different from the natural whole by the natural philosopher. The latter, likewise, having been separated in mind from its accidental parts, is still as a whole, whose parts are form and common sensible matter.

As a means of putting the notion of abstraction into relief, St. Thomas points out that while the intellect can abstract form

from sensible matter and whole from parts, the opposite is not true. The intellect cannot abstract a part from the whole. If it be a question of material parts, the part cannot be abstracted because the whole must be included in its definition. If, on the other hand, there be a question of parts of the species, then the part can be without the whole, as line without triangle and letters without syllable. And for things that can be separately, the understanding of one without the other is called separation more properly than abstraction. Again, the intellect cannot abstract matter from form. Form as abstracted from matter, as we have already seen earlier, is the accidental form of quantity. Sensible matter, however, cannot be abstracted from quantity, because the sensible qualities which render matter sensible inhere in material substance through quantity and hence, cannot be understood without it.

Having analyzed the meaning of abstraction in terms of the operations of the intellect and its manner of distinguishing, St. Thomas synthesizes the foregoing by relating it to the sciences under consideration.

We conclude that there are three kinds of distinction in the operation of the intellect. There is one through the operation of the intellect joining and dividing, which is properly called separation; and this belongs to divine science or metaphysics. There is another through the operation by which the quiddities of things are conceived which is the abstraction of form from sensible matter; and this belongs to mathematics. And there is a third through the same operation, which is the abstraction of a universal from a particular; this belongs to physics and to all sciences in general, because science disregards accidental features and treats of necessary matters. And because certain men (e.g., Pythagoreans and the Platonists) did not understand the difference between

the last two kinds of distinction and the first, they fell into error, asserting that the objects of mathematics and universals exist separate from sensible things. (In Boeth. de Trinitate, q.5, a.3, c).

The intellect distinguishes in a threefold manner: a) One, according to the operation by which it composes and divides. This operation, by which the intellect understands that one thing is not in another, is properly called separation. And, St. Thomas tells us, in the above quotation, that this belongs exclusively to metaphysics. In science, distinction is always ordered to separating something from matter in mind, and truth requires that this operation reports things the way they are, which implies a distinction, meaning that some things are separate from all matter, individual and common sensible matter and all intelligible matter as well. If things about which this distinction is asserted are that way, the mind is true; if they are not that way, it is in error.

The intellect distinguishes in a different fashion according to its first operation. b) Sometimes it abstracts a form from sensible matter, though not from all matter. This sort of distinction pertains to mathematics, defining as it does with intelligible matter, but without sensible matter; such definitions are of things which would need sensible matter to form a complete, composite nature, whereas without sensible matter, quantity is taken as a subject that follows merely from our mode of understanding and therefore not outside the mind. c) Finally, a third distinction is accomplished when the intellect, in its first operation, abstracts a universal from the particular. This is

found in natural philosophy, seeing that this science defines, and definitions are of the universal only; but it defines with common sensible matter, abstracting only from individual matter.

The error made by the Pythagoreans and Platonists, St. Thomas observes, is due to their inability to make a clear distinction between abstraction properly so-called and separation. This, of course, is what gave birth to Plato's theory of Forms.

Now, if one compares the text that has just been quoted above with what, St. Thomas, says in his reply to the first objection in S. Theol., Ia, q.85, a.1, it is clear that there is a shift in vocabulary; precisely because separation, which, according to his Commentary on Boethius' De Trinitate, belongs exclusively to metaphysics, is not mentioned. Instead, St. Thomas, uses abstraction to refer to all these operations. The vocabulary in the Summa is rather mild.

Abstraction may occur in two ways: First, by way of composition and division; thus we may understand that one thing does not exist in some other, or that it is separate therefrom. Secondly, by way of simple and absolute consideration; thus we understand one thing without considering the other. Thus for the intellect to abstract one from another things, which are not really abstract from one another, does in the first mode of abstraction imply falsehood. But, in the second mode of abstraction, for the intellect to abstract things which are not really abstract from one another, does not involve falsehood, as clearly appears in the case of senses. (S.Theol., Ia, q.85, a.1, ad1).

It is obvious here that the distinction that has been clearly marked between abstraction and separation in St. Thomas' Commentary on Boethius de Trinitate, is not, as per the above quotation,

underscored. Does this mean that 'separation' is abandoned? It remains to be seen.

3. Separation

St. Thomas does not say much about separation in his Commentary on Boethius' De Trinitate, i.e., he has not written lengthily about it as he has with regard to abstraction properly so-called. But, what we know, which will, perhaps, be of help, is that separation rather than abstraction is employed in metaphysics, which is the third kind of speculative science.

And since, St. Thomas, has devoted an article on this science, this is sufficient, perhaps, to show how this kind of separation is employed. Metaphysics or divine science deals with things that are separate from matter. St. Thomas highlights this issue In Boeth. De Trinitate, q.5, a.4, c:

... for something can exist separate from matter and motion in two distinct ways: first, because by its nature the thing that is called separate in no way can exist in matter and motion, as God and the angels are said to be separate from matter and motion. Second, because by its nature it does not exist in matter and motion; but it can exist without them, though we sometimes find it with them. In this way being, substance, potency and act, are separate from matter and motion, because they do not depend on them for their existence, unlike the objects of mathematics, which can only exist in matter, though they can be understood without sensible matter.

St. Thomas substantiates and clarifies this point in his reply to the fifth objection in the same article as the above:

We say that being and substance are separate from matter and motion not because it is of their nature to be without them, as it is of the nature of ass to be without reason, but because it is not of their nature to be in matter and motion, although sometimes they are in matter

and motion, as animal abstracts from reason, although some animals are rational.

With a view to highlighting and putting our present undertaking into a clear perspective, it is in order here to tacitly bring in the history of the word 'separate' as it appears in Aristotle and St. Thomas Aquinas.

In accordance with Aristotle, 'separate' is contrasted with presence in matter e.g., the notion 'concave' does not involve any particular substrate of its own. Concavity can be found in any type of matter. Snubness, in contrast, requires its own peculiar substrate, a nose.

... whether as akin to 'snub' or rather to 'concave'. For of these the definition of 'snub' includes the matter of the thing, but that of 'concave' is independent of the matter; for snubness is found in a nose, so that we look for its definition without eliminating the nose, for what is snub is a concave nose. (Metaph., XI, 7, 1064a, pp. 23-27).

Nonetheless, the notion of concavity, even though it does not require a particularly constituted bit of matter such as nose, does require matter of some sort because if everything material were eliminated, nothing could be concave. That is, the notion may be separated from specific material entities in the sense that no one definite type rather than a different type is demanded for its presence. But, it is not separate from matter in the sense that no material substance whatsoever is needed for it.

True to Aristotelian requirement of separate objects, St. Thomas insists that metaphysics in its totality has to bear on things separate. But, he argues, this does not mean that it has to have separate substances as its subject, but only as cause of

its subject. That is, metaphysics is specified by common being, which, because it can be found apart from material things, is something that can be regarded as separate from matter. Separate substances are not its subject, but only the principles and causes of its subject.

There is one theology in which we treat of divine things, not as the subject of the science but as principles of the subject, and this is the sort of theology pursued by philosophers and which is called metaphysics. (In Boeth. De Trinitate, V, a.4, c).

But for Aristotle, Metaphysics deals with things separate in the sense of things divine. It is in this way expressly a theological science.

Therefore about that which can exist apart and is unmoveable there is a science different from both of these, if there is the substances of this nature (I mean separable and unmoveable), as we shall try to prove there is. And if there is such a kind of thing in the world, here must surely be the divine, and this must be the first and most dominant principle. Evidently, then there are three kinds of theoretical sciences - physics, mathematics, theology. The class of theoretical sciences is the best, and of these themselves the last named is best; for it deals with the highest of existing things... (Metaph., XI, 7, 1064a 33-65).

As the above quotation unfolds, for Aristotle Metaphysics is separate because it deals with divine things. The concept of a subject that is separate in the sense of something able to be found without matter though in other instances able to be found with matter is a new thing altogether and does not enter into the Aristotelian notion of separate. In the view presented by St. Thomas, the separate substances are treated by metaphysics only because of their casual relation to another subject, common being, as contradistinguished from divine being. This new element, found

in Avicenna and endorsed by St. Thomas holds that under the notion 'separate' may be classed aspects that are common to both sensible and supersensible things.

However, we must remember that even though things which are separate from matter and motion in being and in their intelligible structure belong to the study of first philosophy, still the philosopher not only investigates these but also sensible things inasmuch as they are beings. Unless perhaps we may say, as Avicenna does, that common things of the kind which science considers are said to be separate from matter in being, not because they are always without matter, but because they do not necessarily have being in matter, as the objects of mathematics do. (In VI Metaph., Lect.1, no.1165).

This obviously is the departure from the Aristotelian meaning of 'separate', which is reserved only for divine things. It is Boethius, we may recall, who handed down to Latin readers the Aristotelian tripartite division of speculative sciences, namely, natural, mathematical, and theological (metaphysical). As we have seen in the quotation of Boethius De Trinitate, Chapter 2 cited earlier, natural science and mathematics are said to be non-abstract and, as such, non-separate. But, for Aristotle, mathematics is non-separate but very much abstract.

As the mathematician investigates abstractions (for before beginning his investigation he strips of all the sensible qualities, e.g. weight and lightness, hardness and its contrary ... and leaves only quantitative and continuous, ...) - the same is true with regard to being. (Metaph. XI, 3, 1061a 30-65).

Boethius seems not careful to pay strict attention to Aristotle's regular use of 'abstract' as the characteristic feature of mathematical objects.

Now, going back to the quotation cited earlier from In Boeth. De Trinitate, q.5, a.4, there are two ways in accordance with which

something can be separate from matter: first, that it can never be in matter because 'what it is' renders existence in matter impossible and thus God and angels are said to be without matter, secondly, that it can be without matter although sometimes it does exist in matter. The understanding of substance, for instance, does not include existence with matter. Again, it does not include existence without matter either because otherwise nothing existing in matter would be a substance since this would be contrary to its definition.

Although to be in matter is not of the notion of substance, this notion is predicated also of things that do not exist in matter. In fact, it is of such things, e.g., man, stone, etc., that the meaning of substance is verified first for us. But this meaning is equally verified by that reality, prior to sensible substance, whose existence had to be demonstrated in order to guarantee a mode of defining distinct from that of natural philosophy.

... it must be said that the form of a genus whereof matter is an essential part cannot exist outside the intellect except in matter, like the form "plant", for instance, or the form "metal". But this genus of substance is not the sort of thing whereof matter is an essential part. Otherwise it would not be a metaphysical genus but a natural one. Hence the form of this genus does not depend on matter as regards its own existence but can be also found outside matter. (On Spiritual Creatures, a.1, ad 10)

In the same article as the one above, St. Thomas, in his reply to the twenty third objection, says:

... it must be said that Boethius does not mean to say that it is essential to substance, which is a genus, to be composed of matter and form, since substance comes

within the purview of the metaphysician, not of the natural philosopher. But he does mean to say that, since form and matter do not pertain to the genus of substance as a species thereof, only that substance which is something composite is placed within the genus of substance as a species.

This new manner of defining is thence responsible for a new kind of reasoned immateriality in regard to separate things such as being, substance, potency and act, namely, that of non-dependence upon matter secundum esse which is different again from that of mathematics; even though mathematical objects can be understood without sensible matter they cannot be that way.

When treating sensible substance, metaphysics considers it not as sensible, but as substance. That is, it provides positive knowledge of what pig is as substance without assuming the task, proper to the natural philosopher, of distinguishing pig from dog.

Though it considers as its proper subjects things which are without matter, metaphysics will of necessity treat things which are in matter, but only for the sake of manifestation. It is not possible to know of the existence of some things that are without matter unless material beings are in some way considered. The necessity of this consideration, as we have seen earlier, derives from the manner of human knowing which has its origin in sensation. This necessity does not, however, extend to the term or the judgement in all human knowledge. And for this reason the consideration of things in matter is accidental to metaphysics as such inasmuch as it judges things as they are by the intellect and not as they are apprehended in sensation.

As we have already seen earlier, St. Thomas asserts that separation is characteristic of metaphysics. Separation is a particular kind of judgement. John F. Wippel, in Metaphysical Themes in Thomas Aquinas, p.79, perhaps, analyzes it properly:

To express Thomas' understanding of separatio in other terms, it is the process through which the mind explicitly acknowledges and asserts that, that by reason of which something is recognized as being need not be identified with that by which it is recognized as material being, or changing being, or being of a given kind. One may describe it as a negative judgement in that it denies that, that by reason of which something is described as being is to be identified with that by reason of which it is being of a given kind, for instance, material and changing being, or quantified being, or, for that matter, spiritual being. One may describe it as separatio because by reason of this judgement one distinguishes or separates that intelligibility in virtue of which something is described as being from all lesser and more restrictive intelligibilities that indicate its kind of being. As a result of separatio, therefore, one asserts that in order for something to be or to be real, it need not be material or changing or quantified. Thus one asserts the negative immateriality, the neutral character of being.

So, separation rightly so-called involves distinction in the second operation of the intellect, wherein things are considered not merely separately but as actually separate. On the other hand, abstraction properly so-called pertains to the first operation of the intellect and it supposes the union of things, one of which is understood without the other. It likewise presupposes that the one so understood is notionally independent from the other. Now, how are abstraction and separation employed by speculative sciences? This leads to our fourth chapter.

CHAPTER IV - EPISTEMOLOGY

1. Abstraction and Separation as employed by speculative sciences.

Given the differences between separation and abstraction properly so called, the original difficulty, viz., how abstraction and/or separation determines the division of speculative sciences, is not thereby solved. Yet the direction of its resolution has already been indicated.

The role of distinction in science is to aid the intellect in attaining the intelligible aspect of things. In our attempt to know reality the first contact with it takes place in sense experience, whose objects are mixed with matter and its conditions. But matter and its conditions are the causes or the roots of unintelligibility. When the mathematician considers without sensible matter he abstracts. Actually what is thus understood is inside the intellect in a way different from what it is in sensible matter. In spite of this difference, the mathematician is exempt from falsity since in abstracting he does not affirm that what is abstracted is still that way outside the mind. He restricts his consideration to what is abstracted and neglects that from which it has been abstracted. The natural philosopher also abstracts, for in his consideration he disregards the individuating conditions that attend the nature as it actually exists. He does not assert that man, as defined with common sensible matter, is that way outside the mind.

Now a nature-say, human nature, - which can be thought of universally, has two modes of existence: one material, in the matter supplied by nature; the other immaterial,

in the intellect. As in the material mode of existence it cannot be represented in a universal notion, for in that mode it is individuated by its matter; this notion only applies to it, therefore, as abstracted from individuating matter. But it cannot, as so abstracted, have a real existence, as the Platonists thought; man in reality only exists (as is proved in *Metaphysics*, Book VII) in this flesh and these bones. Therefore it is only in the intellect that human nature has any being apart from the principles which individuate it. Nevertheless, there is no deception when the mind apprehends a common nature apart from its individuating principles; for in this apprehension the mind does not judge that the nature exists apart; it merely apprehends this nature without apprehending the individuating principles; and in this there is no falsehood. The alternative would indeed be false - as though I were so to discriminate whiteness from a white man as to understand him not to be white. This would be false; but not if I discriminate the two in such wise as to think of the man without giving a thought to his whiteness. For the truth of our conceptions does not require that, merely apprehending anything, we apprehend everything in it. Hence the mind abstracts, without falsehood, a genus from a species when it understands the generic nature without considering the differences; or it may abstract the species from individuals when it understands the specific nature without considering the individuating principles. (In II De Anima, Lect. 12, nn. 378-379).

Both the mathematician and the natural philosopher avail themselves of this ability of the mind to abstract. In this they are similar. But that does not mean that mathematical abstraction and that of natural philosophy are identical. It is true that in each of these sciences certain objects are apart from certain other objects to which they are actually conjoined. But that which is is not at all the same in both cases. In one, objects so understood are defined with sensible matter, whereas in the other, they are without sensible matter. This difference on the part of what is stems from a difference on the part of the intelligible

species which render the intellect in act, similar to the thing to be.

consequently, in the act of understanding, the intelligible species received into the possible intellect functions as the thing by which one understands, and not as that which is understood, even as the species of colour in the eye is not that which is seen, but that by which we see. And that which is understood is the very intelligible essence of things existing outside the soul, just as things outside the soul are seen by corporeal sight. (SCG, II, ch. 75).

Sometimes the species is a similitude of something as existing outside the mind, and sometimes a similitude of that which is the result of the intellect's leaving aside of the thing that is outside the mind.

So, too, the intellect understands, apart from sensible matter, a line existing in sensible matter, although it can also understand it with sensible matter. Now, this diversity comes about as a result of the diversity of intelligible species being sometimes a likeness of quantitative sensible substances. Similarly, although the generic nature and the specific nature never exist except in individual things, the intellect nevertheless understands those natures without understanding the individuating principles; and to do this is to understand universals. (Ibid).

That there is a question here of radically different abstractions is borne out by the fact already noted that the definitions of natural philosophy, which are universals, are applicable to the things from which they have been abstracted, whereas mathematical definitions are not. Natural definitions are applicable to existent singulars known through sense experience.

The absence of any such verification in experience seems to undermine the very foundation of mathematics. One is tempted to ask: Do mathematical subjects exist? If the question refers to

the way natural things exist, the answer is negative. Are they pure fictions? The answer is again negative. What then is the value of its alleged definitions? Are its assertions true?

When the natural philosopher defines man as "a rational animal", with all that this implies, he can point to an actual man in reality to illustrate what he is talking about. His definition is of something that has individual instances in nature and what he demonstrates of man in virtue of his definition will be true of every instance. And if we started from centaur, i.e., half-man, half-horse, we would have to ascertain that there is or is not, could be or not, such a thing in nature. But for the mathematician defining circle as "a closed plane curve such that its circumference is at every point equidistant from the point within called its centre," there is no need to show that there are instances of that figure in nature.

Although the mathematician cannot and need not enlist the aid of experience to verify the kind of subject he is talking about, he does not improvise since he does guarantee, through construction, that there are such things in abstraction; this he does, for example, when from some elements of his science given in abstraction, he demonstrates that there is such a thing as an equilateral triangle. When this subject, and not merely the meaning of its name, is thus positively known, then and then only, can he proceed to demonstrate its properties.

.....In these cases the demonstrations are said to be, as it were, operational, as when it is required to construct an equilateral triangle on a given straight line. But once it has been constructed, certain proper

attributes are proved about it; for example, that its angles are equal, or something of that sort." (In I Post. Anal., Lect.2).

But in what sense does that geometer prove that there is a triangle with three equal sides? What "is", in relation to the subjects of mathematics, does not have the same meaning that it has in regard to this man when it is said "John Khasoane is". In this latter case "is" signifies that an individual called John Khasoane exists in nature. Though this latter meaning is the one which we are first inclined to think of, it is not, fortunately, the only one. In evidence of this, it need only be recalled that "animal is a genus" and that this is true even though neither animal nor genus as such exists in nature. Here "is" signifies the truth of a composition made by the intellect, i.e., "is" means that the proposition is true. "Is" or "to be", meaning that something is true, is a sense that is subsequent to the same words understood of what is or can be in nature.

....in as much as the terms being and is signify composition of a proposition which the intellect makes when it combines and separates.....being signifies that some statement is true. Thus the truth of a thing can be said to determine the truth of a proposition after the manner of a cause; for by reason of the fact that a thing is or is not, a discourse is true or false. For when we say that something is, we signify that a proposition is true; and when we say that something is not, we signify that it is not true. And this applies both to affirmation and to negation.....For from the fact that something is in reality it follows that there is truth and falsity in a proposition, and the intellect signifies this by the term is taken as a verb copula. But since the intellect considers as a kind of being something which is in itself a non-being, such as a negation and the like, therefore sometimes being is predicated of something in this second way and not in the first. For blindness is said to be in the second way on the grounds that the proposition in which

something is said to be blind is true. However, it is not said to be true in the first way; for blindness does not have any being in reality but is rather a privation of some being. (In V Metaph., Lect. 9, nn. 895-896).

Yet this in no way diminishes its validity, nor does it prevent its having a wider application than does the prior signification. Taken in the sense of what is true, being can be said of anything about which a true proposition can be formulated. In this sense it is opposed, not to what is in nature, but to what is false. Propositions can be formed not only about things which are in nature, but also in regard to the relations discovered in knowing beings in the first sense, privations and negations, or even fiction or anything that the intellect can in some way consider.

While truth is in the intellect, the intellect does not cause it. The intellect alone is not responsible for the truth of the propositions that it can form. Their truth is caused by things (in the wide sense of the term) that the intellect knows in so far as it is conformed to them. What the intellect apprehends of blindness is obviously quite different from what it understands of something which is a mere fiction of the imagination. Hence, when it is said, and truly, that "blindness is a privation" and that "golden mountain is a fiction", the truth of these propositions is not of the same kind.

In virtue of a demonstration the geometer proves that there is an equilateral triangle. The force of his proof lies in the fact that he actually constructs such a triangle. This construction is a technique which derives from the nature of the

human intellect and the way things are in the intellect. The geometer is not concerned with construction for the sake of constructing, but for the sake of producing a subject about which he can demonstrate properties. Granted that without such a construction the nature would not be known, the existence in the intellect is not therefore part of the definition of a triangle. The intellect does not form the nature of equilateral triangle"...the subject-matter of the speculative sciences must be things that cannot be made or done by us...." (In Boeth. de Trinitate, q.5, a.1,c).

Starting from particulars, existing in individual and common sensible matter, as from a remote principle, the intellect is able by abstraction, to attain abstract quantity from whence it effects its construction, as in the example, used here, of triangle. Triangle thus revealed as a definable nature has actuality, but actuality that follows upon the way it is known and which is impossible of verification in sensible experience.

But it is impossible that universals be known scientifically without induction. this is quite obvious in sensible things, because we receive the universal aspect in them through the experience which we have in regard to sensible things, as is explained in Metaphysics I. But this might be doubted in things which are abstract, as in mathematics. For although experience begins from sense, as it is stated in Metaphysics I, it seems that this plays no role in studying things already isolated or abstracted from sensible matter. (In I Post. Anal., Lect.30).

Though both mathematics and natural philosophy abstract, to appreciate the essentially different ways in which these abstractions are made or performed is to recognize how mathematics

can consider without sensible matter things which are in matter in such a way that a mathematician is not obliged to maintain that what is so separated in mind can, or should, be also separated in reality. Since abstraction properly so-called refers to things which are conjoined the difference in the two modes of abstraction corresponds to the two different modes of union mentioned earlier, viz., the union of whole and part and the union of matter and form. Abstractio totius and abstractio formae respectively. Hence the distinction, previously alluded to, between the abstraction of the universal from the particular and the abstraction of form from matter. Apropos of the abstraction of form from matter, St. Thomas observes that the intellect can consider form separately from matter only in so far as this matter is not required for the definition of such a form. Again the terms 'matter' and 'form', as we have seen in Chapter two, can be a source of an uncalled for confusion unless it be realized that they are used analogously. What St. Thomas is saying is that form can be abstracted from some matter but it cannot be abstracted from all matter. This is what warranted the distinction between sensible matter and intelligible matter already manifested earlier in this discussion.

After showing how abstraction and separation are employed by the speculative sciences, we shall recall that science should be universal and unchanging. While it is not our immediate and present concern to get into 'the problem of Universals' as it was controversially discussed in medieval epoch, we certainly have to

say something about universals because they have a direct bearing on our present deliberation, viz., abstraction and/or separation.

2. Universals

Simply put, a Universal means the object of a universal idea or concept, e.g., when one has the universal idea of man without taking into consideration the individual things it represents. This is the representation in the intellect and it represents the essence as found verified in each and every individual human being that exists, has existed, will exist or could exist. The individuating elements, which distinguish one human being from another like age, sex, size etc., have no part in the essential representation, in the intellect, which is called a universal idea.

Human nature itself exists in the intellect in abstraction from all individual conditions, and it thus has a uniform relation to all individual men outside the intellect, being equally the likeness of all and leading to the knowledge of all in so far as they are men. And from the fact that the nature has such a relation to all individual men, the intellect forms the notion of species and attributes it to the nature. That is why the commentator asserts, in his exposition on the first book of De Anima, that it is the intellect which causes universality in things. (On Being and Essence, p. 41)

The idea is called universal precisely because it can represent each and every member of a given class universally, without exception. In other words, it is a single representation in the intellect which can represent many in an essential manner. The many which the universal represents are called its inferiors and make up what is called the extension of the universal. If the universal represents its inferiors completely, it is called the

Species of its inferiors, which are the individuals that are represented by the idea man. But, if the universal represents only an essential part which its inferiors have in common, though they differ essentially in other points it is called a Genus of its inferiors.

Now, the question that immediately comes to mind is whether Genera and Species are things, even more so, whether they represent things as they are outside the mind? As F. Copleston points out in A History of Philosophy v. II, p. 393:

The first movement of the intellect is thus towards being, not towards sensible being in particular, and the intellect can know the essence of a material thing only in so far as it is being: ... owing to its embodied state and the necessity of the *conversio ad phantasma* the human intellect has, in its embodied state, the sensible object as the natural and 'proper' object of its apprehension, but it does not lose its orientation towards being in general. As human intellect it must start from sense, from material beings, but as human intellect it can proceed beyond sense, not being confined to the material essences, though it can do this only in so far as the immaterial objects are manifested in and through the sensible world in so far as the material things have a relation to immaterial objects.

This means that though the human intellect grasps what is immaterial hence universal, the idea that it grasps has to have a relation to whatever it represents in the order of extramental reality. Perhaps this will be best illustrated by mentioning some of the theories that surfaced in Medieval era concerning Universals. The main focus of controversy, as it were, was whether the human intellect knows the essences of particular beings as particular or whether these essences have a different mode of existence in the intellect. This issue of universals is, of

course, very important because it touches upon the cardinal basis of all rational knowledge. This is why the issue turned into one of the hot philosophical potatoes and a bone of contention in Medieval thought.

There were many theories that were advanced as solutions to the problem of universals, but, in the interests of brevity, and most importantly, precision, only four theories merit attention and consideration here.

(a) The first view is the one entertained by ULTRA-REALISTS, perhaps, so labelled because they somehow go over the edge. For them, in the world of extramental reality there exist universal essences. Thus there is a universal human essence, for instance, and human individuals merely participate this universal essence. Universals, they continue, are things in the order of reality outside the mind. This position chimes in with Plato's theory of Forms discussed earlier in this dissertation.

(b) The second view is CONCEPTUALISM, which purports that outside the mind there are only individual things and no universal essences. For the conceptualists, the individual things are grouped by the mind, and each group is represented by a universal idea or concept. This grouping is due to the mind's mode of conceiving things, i.e., of forming concepts of things. There is no essential basis in reality for such grouping. The mind may, indeed, use the mere relation of material resemblance in things as a basis for its grouping them and forming concepts or universal ideas of them; but such a relation is accidental and not essential

in things so grouped. Universals, they conclude, are not things in the order of extramental reality, but they are modes of the mind's concept-forming, and are based on no essential extramental reality.

(c) the third view is that held by the NOMINALISTS. For them also, outside the mind there are only individual things and no universal essences. But, they contend, it is clearly impossible to have a separate mental representation of each and every individual thing. Hence, the mind arbitrarily groups individual things into mental names. Thus, universals are merely mentally applied names, the value of which is wholly subjective; they represent nothing whatsoever in the objective groups of things for which they stand. So, for the nominalists, universals are not things in the order of extramental reality.

(d) The fourth view is the one held by MODERATE REALISTS. They agree, in a sense, with both the nominalists and the conceptualists in that outside the mind there are no universal essences; there are only individual things. The individual things are conceived by the mind to be groups of beings of the same essence, and the mind represents each group by a single representation of that essence. In other words, the mind can represent by a universal that essence which is found in each of the members of the group. But, the moderate realists argue, there is a foundation or basis in extramental reality for the universality of the idea in the mind. This basis is seen in the fact that the universal can be verified in each and every member

of the group called its inferiors. So, for moderate realists, universals are not things in the order of extramental reality, but, they are verifiable in multiplicity of things in the order of reality outside the mind.

St. Thomas, as it is clear from the quotation from On Being and Essence, aligns himself with the moderate realists, because, for him, the human intellect forms universals by abstraction after sensation of extramental realities, and the essence represented in the mind by the universal is found verified in each of its inferiors outside the mind.

CHAPTER V - CONTEMPORARY VIEWS ON ABSTRACTION AND/OR SEPARATION

A lot of contemporary views about abstraction and separation have been mainly inspired by the traditional interpretation of the theory of abstraction in accordance with Cajetan and John of St. Thomas.

We have seen that in his Commentary on Boethius De Trinitate, St. Thomas Aquinas distinguishes between abstraction and separation properly so called. Nonetheless, in the Summa, St. Thomas does not make a sharp distinction between abstraction and separation, instead he distinguishes between abstraction, generally taken, according to simple apprehension and in accordance with judgment.

When trying to interpret St. Thomas' doctrine of abstraction, Cajetan in his Commentary on Being and Essence, pp. 45-47, brings in his distinction of abstractio totalis and abstractio formalis. The former is the abstraction of a logical whole from its

subjective parts, and like St. Thomas' abstractio totius, Cajetan contends, is common to all sciences. The latter, i.e., abstractio formalis, is the abstraction of an intelligible form or object of thought from the matter that shrouds its intelligibility. And since there are three different degrees of matter form which objects of thought can be respectively abstracted, Cajetan observes, there are three degrees of formal abstraction. Furthermore, since speculative sciences are differentiated on the grounds of the differences in the intelligibility of objects involved, each of these degrees of formal abstraction specifies a distinct type of speculative science.

F.G. Connolly, in the New Scholasticism, v. 27, pp. 72-90, proposes the combination of substance and accident as the basis for the first degree of abstraction. This composition, though superficial, helps set the scene for the abstraction leading to the attainment of the object of mathematical science. In other words, for Connolly, Mathematics belongs to the first degree of abstraction. He further proposes the composition of substantial form and prime matter as the basis of the second degree of abstraction, which leads to the attainment of the object of natural philosophy. And thirdly, he proposes the composition of essence and existence as the basis founding the object of Metaphysics.

And thus we have three ascending orders of abstraction from matter, each of which has an objective basis in sensible reality, as the doctrine of moderate realism demands. The real composition of substance and accident is the objective basis of the first degree of abstraction: of the second, it is the real composition of prime matter and substantial form; of the third, it

is the real composition of essence and existence (The New Scholasticism, v. 27, pp. 76-77).

Connolly charges that the traditional hierarchization of the three orders of abstraction is in error. And he points out that in accordance with the demands of the Thomistic doctrine of moderate realism which requires an objective basis for the abstractive process of the intellect, mathematical abstraction and not physical abstraction, should be first, then physical abstraction, and last but not least, metaphysical abstraction. Physical abstraction, for Connolly, involves a higher degree of immateriality, a greater remotion from sensible matter, than does mathematical abstraction, because, he continues, in physical abstraction the intellect penetrates beyond the screen of sensible qualities, beyond quantity, to the inner constitution of sensible substance. It discovers that every corporeal substance is intrinsically constituted of two principles, one passive, called prime matter and the other active, called substantial form.

Though Connolly departs from the traditional hierarchization of the three orders of abstraction, he agrees that abstractio totius of St. Thomas must be identified with Cajetan's abstractio totalis on the level of physical knowledge; for, he argues, this abstractive ability enables the mind not only to grasp mobile being in general but also to hierarchize the different kinds of mobile beings in accordance with their different degrees of mobility, from the inorganic substance which moves itself passively according to the execution of its actions, up to man, who moves himself actively

not only as to the execution of his actions but also as to their form and as to their end.

J. Maritain, in his book the Philosophy of Nature, pp. 17-18, maintains that the difference between St. Thomas' theory of abstraction and Cajetan's is terminological rather than doctrinal. He entirely agrees that this two doctrines should be married.

As a matter of fact, what we have here is a simple difference of vocabulary, not a difference of doctrine. For St. Thomas the first order of abstraction considers the nature of a thing separately according to its essential ratio, disengaging it from the parts which are only accidental in respect to the specific essence. Now such a process constitutes an "abstractio formalis" in Cajetan's sense of the term, the only difference being that in the first order of abstraction the form considered separately is the very nature itself, the specific essence; whereas in mathematical abstraction the form is an accidental one separated from the subject: not the human nature of Peter, Paul and John, but the accidental form of quantity, separated from corporeal substance. It is this difference between the first and the second orders of abstraction that St. Thomas was stressing in the text of his Commentary on the Trinity of Boethius ... , but both cases are instances of "abstractio formalis" in Cajetan's sense of the term.

Again, Maritain in the Degrees of Knowledge, p. 37, underscores the point that there are ascending degrees in the process of abstraction:

The speculative sciences differ from one another according to the degrees of this abstractio formalis, the objects of the higher science being, as it were, a form or regulating type, with respect to the objects of the lower science. The objects of Metaphysics are undoubtedly more universal than those of physics, but it is not on this score, that is, as more common notions on the same level, that the metaphysician considers them, but in virtue of an intelligible form or type on a higher level. The metaphysician considers an object of knowing of a specifically higher nature and intelligibility, and from it he acquires a proper knowledge, a scientific

knowledge, by means that absolutely transcend those of the physicist or mathematician.

L. Ferrari, in the Thomist, v. 24, pp. 72-79, charges that a lot of philosophers have squandered a lot of precious time trying to reconcile St. Thomas' and Cajetan's notions of abstraction. To reconcile these two notions, he objects, is futile and is like, so to speak, looking for a needle in a haystack. Cajetan's whole, he says, is not a real whole, but a mental one with a foundation in reality - ens rationis cum fundamento in re. Whereas, St. Thomas' whole does exist essentially in reality. The parts from which the whole is abstracted are non-essential parts of that whole. The whole of Cajetan, Ferrari observes, is posterior; that of St. Thomas is prior and it is an ens reale, i.e., something really existing together with the accidental parts from which the intellect abstracts in understanding it.

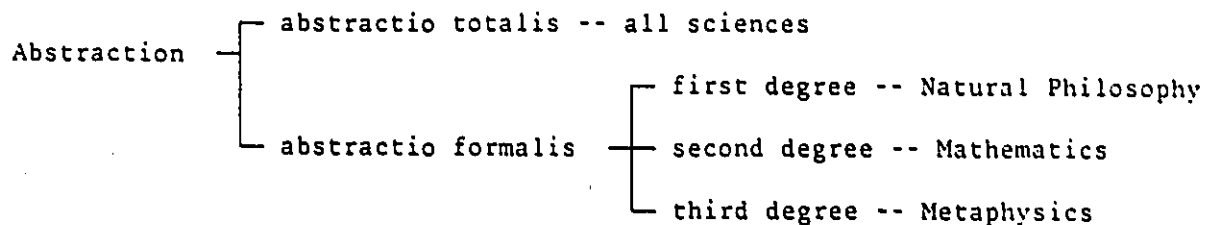
St. Thomas' abstractio totius consists, Ferrari continues, in separation from individual matter and its conditions; while Cajetan's abstractio totalis consists in abstracting more universal concepts from less universal ones. Therefore, Ferrari concludes, Cajetan's abstractio totalis is not an abstraction exercised by the mind on reality, as is abstractio totius, but it is rather an abstraction by the intellect on the concepts by which it understands reality. In Cajetan, he points out, there are four different modes of abstraction, viz., abstractio totalis and the division of abstractio formalis into three. But, in St. Thomas, there are only two abstractions, viz., abstractio totius and abstractio formae plus separatio.

A.G. Van Melsen, comes up with another version with regard to the degrees of abstraction. He objects that natural philosophy should be placed at the level of the first degree of abstraction like physical sciences. Instead it should be placed at the level of the third degree of abstraction because, unlike modern science, which does not only start with sense experience, but also ends with it, natural philosophy has its terminus of cognition in the intellect alone. But, he charges that it is a bit confusing the way St. Thomas addresses this issue in his Commentary on the Trinity of Boethius:

the truth of physical judgments must be established by sense-experience; mathematical judgments must conform with certain axioms; and philosophical judgments can be proved true or false only by an intellectual analysis which shows the inevitableness of these judgments. This clear-cut distinction between science, mathematics, and philosophy leaves, as has been repeatedly said, no doubt as to where to place the philosophy of nature. It belongs to the third degree of abstraction. This conclusion remains inescapable, even if it should be true that St. Thomas' exposition, based upon the dependence of matter of the objects which the intellect can consider, leads to another conclusion. Meanwhile, it is St. Thomas who forces his followers, in that exposition, to place the philosophy of nature in the first degree of abstraction. This exposition can easily be understood in such a way that there is no opposition to what is said in Q. VI. The only thing to do is to read carefully St. Thomas' answer to certain objections which can be made against his doctrine. (Van Melsen, the Philosophy of Nature, pp. 100-101)

To substantiate his claim, Van Melsen maintains that it is also possible to argue that the philosophy of nature utilizes such concepts as substance, potency, act, quality, etc., which St. Thomas listed under the third degree of abstraction.

Cajetan's Commentary on St. Thomas Aquinas' On Being and Essence



As it is clear from what appears in St. Thomas' Commentary on the Trinity of Boethius, a distinction is clearly made between abstraction and separation, and abstraction is further divided into abstractio totius and abstractio formae. These belong to natural philosophy and mathematics respectively. And separation belongs exclusively to metaphysics. It is obvious here that there are no degrees of abstraction; instead, a line of demarcation is drawn between the abstraction employed by natural philosophy and that utilized by mathematics. And there is no mention of one abstraction being higher than the other. It is also true that St. Thomas designates the abstraction of a universal from a particular as belonging to natural philosophy and all the sciences in general, 'because science disregards accidental features and treats necessary matters'. But, natural philosophy employs it in a distinctive fashion.

In the Summa Theologiae, St. Thomas is not as strict as he is in his Commentary on Boethius de Trinitate. In the Summa, he uses abstraction to cover both operations of the intellect. The word 'separation' does not appear here. Nonetheless, he still draws a noticeable line between simple apprehension and judgement. And

simple apprehension is further divided into the abstraction of a whole and that of a form.

There is surely a difference of vocabulary in both these cases. As we have already seen, separation does not appear in the Summa. Now why would St. Thomas be so strict in one treatise and yet be mild in another? It seems (to me at least) that the reason for the strict distinction between abstraction and separation in St. Thomas' Commentary on Boethius de Trinitate, was prompted by what St. Thomas considered to be a failure, on the part of the Platonists and Pythagoreans, to realize the distinction that obtains between the two operations of the intellect, viz., abstraction and separation. And this failure to grasp the difference, St. Thomas charges, is responsible for the Platonic error of positing the real existence of abstract forms and universals. In S. Theol., I, q.85, a.1 ad:1, St. Thomas, we have seen, uses abstraction to cover both operations of the intellect. Although he is not as strict as he was in his Commentary on Boethius de Trinitate, here again, St. Thomas refers to the error of the Platonists. It is clear that there is a change of terminology in both expositions, but there is no trace of a doctrinal change. In other words, the doctrine in both the Summa and Boet. de Trinitate, is the same, despite the fact that in the former the distinction is not as sharp as in the latter.

Now, abstraction, properly so-called, is something that takes place only in simple apprehension. It is the apprehension of quiddities, or natures. And it includes both knowledge, by way of

universality - abstractio totius, and abstraction of a formal characteristics of a thing aside from the subject - abstractio formae. The point that St. Thomas brings home to us here is that both universals and the mathematical objects are the work of abstraction and not separation properly understood. The act of existing is attained on the basis of separation that takes place in synthesizing and dividing cognition of judgement.

After saying all this, it is interesting to note that in On Being and Essence, chapter two (which is a treatise earlier than Commentary on Boethius de Trinitate), St. Thomas speaks of abstraction with precision and abstraction without precision. And it seems to me that, if this is anything to go by, there can be abstraction of the form at the first level of abstraction, for instance, humanity from man, whiteness from white man, etc. Again it seems that there can even be abstractio totius and abstractio formae at the third level of abstract objects, e.g., cause and causality, act and actuality, etc.

Now let us contrast the doctrine of abstraction as found in St. Thomas and Cajetan's version of the degrees of abstraction. Cajetan's abstractio totalis yields an object of thought precisely as more universal than that from which it has been abstracted. On the other hand, St. Thomas' abstractio totius yields an object of thought precisely as an intelligible nature freed by abstraction from the matter which shrouds its intelligibility. The relationship between a whole and a part on which Cajetan's abstractio totalis is based is the relation of a logical whole to

its subjective parts. Whereas, the whole-part relationship on which St. Thomas' abstractio totius is founded is the relationship that obtains between an essential whole to its unessential parts. Moreover, the relationship between form and matter on which Cajetan bases his abstractio formalis is the relationship between intelligible form and unintelligible matter. But, St. Thomas' matter-form relationship on which his abstractio formae is based is the relationship of mathematical form to sensible matter. Obviously, there is an ocean of difference between Cajetan's distinction of total and formal abstractions and St. Thomas' abstraction of a whole and that of a form. And it is, as far as I am concerned, an error to unqualifiedly equate them.

It is of cardinal importance to acknowledge that the phrase "degrees of abstraction" is in itself misleading. They are not degrees, as if the second would follow the first, and the third the second. They are 'degrees' only insofar as they are more or less far removed from corporal matter. But the abstraction of the second degree, viz., mathematical abstraction, does not make use of the products of the first as its material, nor does the third stand in such a relation to the second. And when St. Thomas speaks of these 'degrees', it seems he does not consider them as relative in the manner of successive steps; the particular name he uses for the third degree, namely, "separatio" is thereof indicative. Unfortunately, it has become customary to view these degrees as degrees of "formal abstraction" wherein the authors follow the ideas of Cajetan and John of St. Thomas.

In chapter two of this paper we have talked at length about matter and form, essence and existence. We have indicated that the relationship that obtains between each of these pairs is that of potency and act, because any two elements whatsoever, if one of them completes the other, then the relation between them is that of potentiality and act. In other words, whatever participates in something is related to that which is participated as potentiality to act; and the participated is limited by the receptive capacity of the participator -- quicquid recipitur, secundum modum recipientis recipitur. Nonetheless, the composition of matter and form is not of the same nature as that of essence and existence, though both compositions are of potentiality and act. The composition of matter and form or, as it is sometimes called, the physical composition serves to explain change of movement; and that of essence and the act of existing or metaphysical composition accounts for finitude or participation, because in this kind of composition the act of existing is received by the essence and it is always exercised within the limits of that essence.

One aspect that should be added here is that St. Thomas never says "essence is totally distinct from esse." As we have seen, no potency can be apart from its act. Even when it is distinguished, potency is distinguished by means of its act. He distinguishes one act from another act, but he does not distinguish a potency, e.g., essence, apart from its own act, esse. Essence is a potency which cannot even be so named save in terms of its act, esse. "Essence means that through which and in which a being

has its act of existing" (On Being and Essence, p.28). This proves the essential unity of essence and esse. Therefore, when St. Thomas distinguishes between essence and existence of a thing, he is not making a total distinction - that is, he is not saying that a thing's essence, in distinction from its existence, is totally other than, and independent of the existence of a thing. Rather, a thing's essence must be dependent upon thing's existence, even in distinction from it. That is, essence must always have existence, even though essence is other than existence. But that is just to say that essence is not totally other than existence.

Concerning the operations of the intellect, we have seen that, in his Commentary on Boethius' de Trinitate, St. Thomas talks explicitly about two operations of the intellect, viz., simple apprehension and judgement; and the third operation, viz., reasoning, is merely implied. Although these operations are distinct, they are undoubtedly interdependent in one way or another. Another element that St. Thomas has introduced later, in the development of his doctrine of abstraction, is the question of the intelligible species, which is something by which we know the intelligible object - obiectum quo.

Concerning the contemporary views on abstraction and the division of speculative sciences, the confusion arises from many sources, some of which are merely verbal, while others are real, St. Thomas, as we have seen, says that some philosophers, meaning the Platonists and the Pythagoreans, did not understand the difference between abstraction and separation, and so they fell

into the error of admitting that mathematical and universal things exist apart from sensory things, because they supposed that the manner of being must correspond exactly to the manner of being .

St. Thomas says that the natural philosopher considers the whole, whereas the mathematician is not interested in the natural whole, but in certain forms and parts, and so employs the abstraction of the form. He says that the speculative sciences are distinguished according to the order of removal or separation of intelligible objects from sensory matter and motion. In natural philosophy we leave aside only the singular and the incidental as such, in order to consider the universal and essential aspects of natural things both in general and in specific detail. In mathematics we set aside sensory matter and consider quantity, not without its subject, and with its own basic principles through which its determinations, parts and relations are intelligible. He says that the metaphysical object is not attained by abstraction, but by separation, because it presupposes the knowledge of immaterial beings, which are not immediately evident to us.

The position presented by F.G. Connolly is not acceptable because St. Thomas does not propose the real composition of prime matter and substantial form as the basis for the abstraction which he attributes to natural philosophy. We can and do attain some valid knowledge of natural things before we know what the proper principles of these things are. Hence St. Thomas looks for a more evident basis for the abstraction which is employed in natural

philosophy and which enables us to attain a full and complete knowledge of natural things.

St. Thomas places the proximate foundation for any valid abstraction not merely in the real distinction of one principle from another, but also in the lack of essential order or dependence of one upon another. We can abstract some things which are not really separated from each other, and can understand some apart from others, but not all. We can understand some things separately, but not everything. Things which depend upon one another, or which have an essential order to each other, can neither be nor be understood separately.

The abstraction of the whole depends on the composition of the essential nature with its material parts. In the case of man the essential whole includes the organic body and the rational soul as the essential physical parts. It includes also, at least in a general way, all the integral parts and powers without which a man cannot be or be understood.

The abstraction of the form is based on the composition of the subject or matter with the form. A form can be understood without a certain matter if its essential nature does not depend upon that matter. An accidental form cannot be abstracted from all substance, nor can any accident be abstracted from its proper subject on which it has an essential dependence. Yet the common accident such as heat can be abstracted from a special subject such as iron, and motion can be abstracted from a special subject, but not from the mobile as such.

A substantial form is essentially the act of its proper matter, and cannot be abstracted from its matter, although both matter and form can be considered in common, not as this or that matter or form. Moreover, the complete substantial nature or essence is realized in distinct individuals, and does not depend essentially on this or that individual.

Abstraction is a valid way of knowing things, and contains no falsity. There are two kinds of abstraction, that of the whole and that of the form. In abstraction of the form an essential nature is understood apart from the subject in which it is realized materially. A substantial form cannot be abstracted from its proper matter, but a substantial nature or essence can be abstracted from the suppositum or person, e.g., man from Romeo and Juliet or animal from cats and dogs. An accidental form can be abstracted from other accidents on which it has no essential dependence, but not from its proper subject. A common accident can also be abstracted from a special subject on which it does not essentially depend, but not from every subject.

Another interesting view of abstraction is the one held by A.G. Van Melsen:

Thomas Aquinas especially, while following the trend of thought of Aristotle, gives us in a treatise on the different degrees of abstraction a surprisingly clear description of what we today call science, and also of its difference from philosophy. Naturally, the fact that in the Aristotelian system science and philosophy were de facto not kept clearly apart caused confusion in the use of St. Thomas' terminology. In particular, the position of the philosophy of nature is not entirely clear on account of the fact that in the Aristotelian system no difference is made between science and the philosophy of nature. Yet, a careful study of the whole

treatise of St. Thomas does not leave us in doubt as to the differences between science and the philosophy of nature insofar as their different levels of abstraction are concerned. As a matter of fact, we think St. Thomas' expositions so clear that they serve as a guide through the following analysis of the degrees of abstraction. (Van Melsen, *Philosophy of Nature*, p. 91).

It is important to note, once again that St. Thomas, in his Commentary on the Trinity of Boethius, does not speak of the degrees of abstraction, but, he distinguishes between abstraction of the whole and that of the form.

The relation between philosophy of nature and the physical sciences is beyond the limits envisioned by this dissertation. There can be no doubt that today the word "science" has acquired a meaning somewhat removed from what Aristotle understood by epistème and St. Thomas by scientia. And this new meaning is not without grounds. Nor can it be denied that the aim of what is thus called science can be speculative as well as practical. But in exposing what Van Melsen holds to be the connection between ancient and modern science the reason is not to discuss or to dispute his position. Rather the intention is to show, from our investigation, that the doctrine of the Boet. de Trinitate does not permit the interpretation given to it by Van Melsen when enlisting it in support of his position.

Basic to the distinction that he makes between science and the philosophy of nature is a difference in the level or degree of abstraction at which each conducts its proper investigation. And it is this difference that he would ascribe to St. Thomas. the reason he gives is based on his assumption that Q.5, a.1 and Q.6,

a.2 in St. Thomas' Commentary on Boethius De Trinitate are different approaches to an exposition of three degrees of abstraction, and he sets about resolving a problem that is of his own making, viz., to determine to what degree of abstraction the philosophy of nature belongs. The first exposition suggests to him that natural philosophy belongs to the first degree. But in the exposition of Q.6, a.2, he finds the description of the first degree to correspond perfectly with features of modern science. Since, however, science and natural philosophy cannot belong to the same degree of abstraction, Van Melsen contends, there is no choice but to locate the latter together with metaphysics in the third degree. He is discussing this issue in his Philosophy of Nature, pp. 96-97.

One is justified in asking on what Van Melsen bases his assumption that Q.5, a.1 and Q.6, a.2 are two separate expositions of the degrees of abstraction, and this for several reasons. The mode of a science depends upon its subject matter and can only be determined when it has been established what the subject is. Now after the thorough analysis of abstraction that was involved in establishing the subjects of each of the sciences, what reason would there be to take this up again when discussing their respective modes?

A second and more serious doubt as to the validity of Van Melsen's assumption concerns his understanding of abstraction itself as explained by St. Thomas. From the explanation of St. Thomas one thing should be quite clear: the expression "three

degrees of abstraction" must be used with extreme caution against the likelihood of thinking of them as degrees of a progressive dematerialization wherein the intellect would simply manipulate some original sense data, rendering them, little by little, completely immaterial. It is true that the intellect, by different abstractions or distinctions attains things that are actually intelligible in the measure that in themselves they are more and more removed from matter. But abstraction itself does not constitute an uninterrupted progression, like a stairway, in which each step upwards is simply a prolongation of the same process.

It is not easy to determine what Van Melsen means by degrees of abstraction since he provides no explicit criterion for distinguishing them one from another. Affirming that abstraction gives incomplete but true knowledge, he states that there are three levels or degrees at which this can be accomplished and points to the terminus of scientific, mathematical and philosophical knowledge as a kind of confirmation. Yet, in maintaining that science and philosophy of nature each constitutes an autonomous approach to nature, the former specific, the latter generic, and that as a result, the philosophy of nature is to be considered properly as a special metaphysics considering matter and motion as being, there seems to be little doubt but that he views the three degrees of abstraction as degrees of generality. Now for St. Thomas, different levels of generality do not account for the formal distinction of the sciences discussed in the Boet. de Trinitate or elsewhere.

One point that is worth mentioning is that Van Melsen considers natural philosophy as a special metaphysics because for either one of these sciences the term of knowledge is the intellect. To exemplify this he cites Aristotle's teaching on matter and form. The concepts of primary matter and substantial form, he tells us, are concepts which offer no possibility of confirmation by sense experience. Judgements about them can be proved true or false only by an intellectual analysis. (see, Van Melsen, p. 96). By the third degree of abstraction, of course, he means that of metaphysics. As he says later on, pp. 102-103. "The philosophy of nature, however, studies material being with the same concepts as are used in metaphysics and, therefore, 'it can be said to be a phase of the science of metaphysics'."

What Van Melsen calls the "doctrine of hylomorphism" is not a part of the philosophy of nature in the sense that St. Thomas understood it. Aristotle treats of matter and form in the first book of the Physics. This first book, together with the second, forms an introduction to the science of nature, which actually begins only in book three with the definition of motion. The first book is given to a consideration for the subject of the science, that is to say, it considers those things about which scientific knowledge will subsequently be sought. The defence of the given subject of a particular science does not pertain to that science but to metaphysics and to logic as St. Thomas himself says in lesson two of his commentary on this book.

To crown it all, just as there is some interdependence between essence and existence, matter and form, there is also some interdependence between abstraction and separation. Abstraction or simple apprehension knows the essences of things whereas the act of existing is through separation or judgement. The object of intellectual knowledge is Being; and as St. Thomas explains in On Being and Essence, being embraces both essence and the act of existing.

Though speculative sciences are distinct, there is a close relationship amongst them. This is manifested by the fact that Metaphysics, as a science of being qua being, explains the principles of the other sciences. This should not be construed as suggesting that metaphysics is an embracing science that swallows up the objects of the other sciences. The other sciences have their own points of departure and they pursue their own independent objects. Nonetheless, the intimacy between them is hard to resist, let alone, ignore. They all study being, but of course, from different angles. There are three speculative sciences, viz., natural philosophy, mathematics and metaphysics, and each is marked by the process and method it employs to pursue its object. Hence, abstractio totius for natural philosophy, abstractio formae for mathematics and separatio for metaphysics.

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