THE PHILOSOPHY OF NATURE, EMPIRICAL SCIENCE, METAPHYSICS

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[Editorial Introduction: A considerably abridged version of this paper was read at the Conference-Seminar on Jacques Maritain's The Degrees of Knowledge, St. Louis University, May 10, 1980 and published in the proceedings of that conference under the title "Maritain's Views on the Philosophy of Nature." Since then I have made a few improvements in the paper.]

What is the relation of the philosophy of nature to empirical science, on the one hand, and metaphysics, on the other? Concerning the philosophy of nature and empirical science, three schools of thought have predominated among North American realists (I am thinking of those realists who recognized the philosophy of nature as a discipline distinct from metaphysics): the school of Jacques Maritain, the school of Laval under the leadership of Charles DeKoninck, the school of River Forest and Vincent Smith. I will not attempt to summarize this complex dispute. For that you can see John N. Deely's introduction to The Problem of Evolution.[1] Instead, I will explain and defend Maritain's central positions concerning the philosophy of nature, responding to the objections of his critics as I do. Specifically, I will discuss dianoetic and perinoetic intellection, ontological and empiriological analysis and the distinction between the philosophy of nature and empirical science resulting from their diverse ways of abstracting from matter.

Concerning the last point, I propose to demonstrate that, according to the traditional, realist criterion for distinguishing the sciences, the philosophy of nature and empirical science constitute specifically distinct modes of knowing since they have different ways of abstracting from matter. The demonstration will make use of principles agreed to by all sides of the dispute. And some of the same principles will allow us to answer the main question that realists have debated about the relation between the philosophy of nature and metaphysics.

Metaphysics is distinguished from natural philosophy by the fact that its objects are able to exist apart from matter. Therefore, some realists have concluded that in order to do metaphysics we must first prove the actual existence of immaterial beings, the separated soul, or God, in the philosophy of nature. This position has been defended most recently by John Flynn in The Thomism of Etienne Gilson.[2] I intend to show that the opposite position, the position of Maritain, Gilson, and others, is the correct one.

To approach the above issues properly, however, we must first consider some fundamental principles concerning philosophy's method of verifying its assertions, principles that constitute the necessary background for the differences Maritain has pointed out between the philosophy of nature and empirical science.

I. Philosophy's Method of Verification

Is there any knowledge to be gained about the physical world, over and above the knowledge acquired by the methods of empirical science? I am not referring to knowledge about the intentional structures of our experience of nature, about the language we use to communicate concerning nature, or about the structure of our scientific theories; I am referring to knowledge of nature in its extramental existence. Is there any method by which we can arrive at knowledge of truths about nature itself in addition to the truths known by empirical science?

To answer that question, we must first ask in what sense it is using the word "method". For method can be looked at in many different ways. There are methods of concept-formation and definition, methods of theory-construction, methods of investigation, methods of systematization, etc. Here I am referring to the method of verification (via judicii) as opposed to the method of discovery (via inventionis). The method of verification is the method by which we determine that a particular statement is indeed true and the opposite false; it provides the control on our assertions. Why is it necessary to approach the question of a philosophical knowledge of nature from this point of view?

The most important reason is that knowledge of the truth of propositions is the goal of intellectual endeavor, since propositions are the means by which we conform our minds to reality. Therefore it is incumbent upon self-respecting philosophers to be able to give an account of how we manage to separate the true from the false in the torrent of beliefs, some of which seem *o*utrageously paradoxical, which unceasingly pour forth from the minds of humans in general and philosophers in particular. It is for this very reason, in fact, that so many believe there can be no knowledge of the physical world other than the scientific. Empirical scientists alone seem to have reliable methods of controlling which statements are to be assigned the value truth.

Nor has the importance of the question of verification escaped Maritain. In chapter six of Réflexions sur l'intelligence, [3] he distinguishes the philosophy of nature from empirical science precisely in these terms. And in The Degrees of Knowledge the distinction between dianoetic and perinoetic intellection is first mentioned in a discussion of the fact that in science, as opposed to natural philosophy, sensibly experienced facts constitute the "medium of demonstration" which exercises "control".[4]

Well, just how can we separate true assertions from false? One way of showing that a statement is true is by showing that its opposite is impossible. And we show that the opposite is impossible by showing that it violates something's identity with itself, in other words, that the opposite is contradictory.[5] But how can we determine a statement's truth if its opposite is not impossible? Only by reference to what is actually the case. And how do we know which of two not impossible states of affairs is actually the case? Only by the evidence of experience. Statements can be verified, therefore, only by one or the other of these methods or by some combination of both: by appeal to the principles of identity or non-contradiction in the case of necessary truth, by experience of what actually exists in the case of contingent truths.

But can a method of verification relying solely on our experience of contingent states of affairs give us knowledge of truths about the physical world other than those available to empirical science? I do not deny that contingent facts enter philosophical arguments. If philosophy verifies its conclusions solely by reference to experience, however, it is hard to see how its conclusions have escaped the notice of scientists. As far as sense experience is concerned, the scientist is given as much information about the physical world as is anyone else. Therefore, in order to give us knowledge of truths other than those of empirical science, philosophy must verify by appeal to truths whose opposites are impossible.

But can we expect to have this kind of knowledge about nature? Philosophers like Aristotle, Aquinas, and Maritain thought so. Maritain's position on philosophy's method of verification is well known and is in the background of whatever he says about philosophy as a mode of knowing. Failure to keep the question of verification in mind, however, is the source of some of the criticisms of Maritain's views on the philosophy of nature. In his essay "Does Natural Science Attain Nature or Only the Phenomena?" Benedict Ashley states that in the view

of Maritain philosophic knowledge of nature is to be distinguished from the empirical, because its premises contain "essential definitions which are immediately evident and certain."[6] Taking it for granted that Ashley means to describe as immediately evident, not definitions but the propositions asserting them of their definienda, he could be read as referring to philosophy's method of verification. For "immediately evident" describes the self-evidently necessary truths which provide the principles needed for philosophy's arguments. If Ashley had meant that, he would have made a fair statement of Maritain's views on the difference between the philosophy of nature, and empirical science.

But when Ashley returns to the question of immediacy, it becomes clear that he does not at all have this kind of verification in mind. The descriptive definitions arrived at by scientists, sometimes after "years of patient investigation and extremely complicated experimentation" are not

> seen to be true by some simple process of inspection… They are, said to be "immediately evident," however, in the sense that they rest not on deductive reasoning, but on direct contact with the facts. They are seen by 'the scientist to be true not by a reasoning process but by intelligent observation.
> As for their certitude, this rests on the objectivity of the observations.[7]

But propositions whose verification is made through observation are not immediate in the sense required for the verification of necessary truth: their opposites are not self-evidently impossible.

The reason Ashley appears to ignore this aspect of Maritain's position seems to be that he is little concerned with the problem of methods of verification as opposed to methods of discovery. For the bulk of his excellent descriptions of the scientist's work is from the point of view of discovery. Thus after coming to what he incorrectly calls "the crux of the problem: Can the scientist pass from a descriptive definition to a genuine insight into the nature or essence of a natural unit,"[8] and after extended discussion intended to show that what scientists achieve amounts to what Maritain refers to as dianoetic intellection, he brings up the question of verification almost as an afterthought without even attributing the view he criticizes to Maritain:

> I am sure that there are some philosophers who will still be dissatisfied with this sort of knowledge… Perhaps they are touched with that Cartesian angelicism which Maritain long ago so brilliantly exposed as characteristic of the modern mind. For such a mind knowledge is true only when it has the clarity of mathematics, a clarity sufficient to be the basis of a deductive system.
>
> It is the unconscious influence of Cartesianism on modern scholasticism, I believe, which accounts for the uneasy differences of view on this question found today among Thomists.[9]

But to say that philosophy is able to resolve conclusions into self-evidently necessary principles is not to say that philosophy can do this with the ease, regularity and freedom from mistakes with which it is done in mathematics. And although mistakes with respect to self-evident principles can only occur per accidens, that is, through misunderstanding their terms, I plan to show in a forthcoming work that this kind of misunderstanding is to be expected to occur much more frequently in philosophy than in the other disciplines, mathematics and logic, that deal with self-evident truths. For the analogical concepts out of which philosophy constructs its statements abstract only imperfectly from the differences between their analogates. This creates

the risk of identifying the meaning of the analogical term with the difference that affects the analogue in one of its analogates, rather than understanding the term in its more general sense.

II. Dianoetic and Perinoetic Intellection

Now how does discussing philosophy's method of verification help us understand what Maritain means by dianoetic and perinoetic intellection? To see this, let us go more deeply into realism's analysis of necessary truths. That analysis stands in sharp contrast to the analysis that other schools of thought have derived from Hume, so much so that it is often difficult for those conditioned to post-Humous ways of thinking about necessary truth to comprehend what realists are even <u>trying</u> to say about philosophical method. In the first place, necessary truths can give us information about extramental existents, not simply about our concepts, words, and their logical relations. When it is said that the necessary truth of self-evident propositions can be known solely by understanding how their words are being used, the reference is not to understanding the contingent facts that certain language-forms happen to be used in certain ways. And when self-evident truths are described as known through an understanding of concepts, the reference is not to the mental dispositions by means of which we cognize things. The reference is to our acquaintance with the <u>objects</u> that we cognize by means of mental dispositions, the objects which constitute that which certain language-forms happen, contingently, to be used for. This is traditionally known as the objective as opposed to the formal (meaning mental or psychological) concept. (Henceforth this is what I will have in mind when speaking of concepts.) There is self-evidence when our acquaintance with conceptual objects, which happen to be that for which the words of a statement are used, is sufficient for knowing that if the statement were not true, something would both be and not be what it is.

Among these conceptual objects there are both extramental values like existence and being, that which has existence, and logical relations like negation and alternation. And assertions such as that it is impossible for a thing to be and not be or that a thing either is or is not give us information about being rather than about the words, mental dispositions, or logical relations by means of which we cognize being. That it is either raining or not raining does not tell us anything about the weather that is not also true of all other modes of being. But it does tell us something that is true of the weather insofar as it shares the status of being with everything else.

It can be said that the necessity of these truths derives from the way they employ the logical relations of negation and alternation. Logical relations, however, become objects of knowledge only as the result of making extralogical things objects of knowledge. And what terminate logical relations are not in the first place other logical relations, but the extralogical things that have become known. For logical relations occur in the process of acquiring linguistically expressible knowledge. And the primary objects expressed in language are public and, therefore, extramentally existing objects. A proposition of logic can tell us that other propositions of the form "An F is not a non-F" are necessarily true. That logical proposition gives us information about the truth of other propositions. But what do those other propositions give us information about? Still other propositions? To avoid infinite regress, some proposition of that form must not contain knowledge about the truth of other propositions but about extralogical things. The necessity derives from logical relations, but the truth is not about logical relations.

Consequently, the impossibility prohibited by the principle of non-contradiction is primarily the impossibility of something's being and not being and only secondarily the impossibility of a proposition's being both true and false. The goal of forming propositions is conformity with what exists. Contradictory propositions cannot be true because they cannot achieve that goal. They cannot achieve that goal because things cannot both exist and not exist. In other words, the cause of the impossibility of simultaneous truth and falsity is the impossibility of simultaneous being and non-being. For it is conformity with what exists that causes the truth of propositions, not the truth of propositions that causes what exists.

Another difference between the realist and post-Humous accounts of necessity is that realists recognize truths whose necessity derives not from logical relations but from causal relations. Events in nature must be caused to occur, and natural causes must behave in certain ways in certain circumstances. This is where knowledge of essence comes in. When Maritain describes essence as a locus of intelligible necessities,[10] we should read: a locus of necessary connections, relations of effects to their necessary causes and of causes to their necessary effects.[11] Causal necessity is the key to what he says about dianoetic and perinoetic understanding of essence because causal necessity is the key to our knowledge of essence in general. In the traditional formula, the natures of things are known from their activities. Why? Because a thing behaves according to the dispositions for behavior that its makes-up gives it; its behavior, in other words, is determined by its mode of being. The nature of a thing, therefore, is a principle of activity, a locus of dispositions to act in certain ways (relations of a cause to its effects) or to be acted on in certain ways (relations of effects to their causes). That is what a nature is: a transcendental causal relation which is the basis for predicamental causal relations. And as we will see shortly, we learn the natures of things by rising from knowledge of sensible effects to knowledge of what things must be in order to cause those effects through the application to experience of necessarily true causal principles.

This is true of both dianoetic and perinoetic knowledge of natures. To understand the distinction between them, consider that realists recognize a category of truths they describe as self-evident in themselves but not to us.[12] Actually, it is misleading to describe them in terms of self-evidence rather than in terms of necessity. For the whole point is to distinguish what is incapable of being false, which is ultimately an ontological consideration, from what we are able to recognize as incapable of being false by acquaintance with the meanings of words, an epistemological consideration. When we describe a truth as self-evident or derivable from the self-evident, we are referring to the causal process by which we come to know its truth. When we describe a truth as necessary, we say something about the truth itself, not about our knowledge of it. We are saying that its opposite would be impossible. And from the first difference between the realist and post-Humous accounts of necessity it follows that impossibility here does not mean that the truth of the opposite would require us to affirm and deny the same thing but that it would require the same thing to be and not be what it is. If necessary truths were concerned only with the logic of our words and thought processes, contradiction would exclusively be a matter of affirming and denying the same thing. But if necessary truths can be about extralogical things, contradiction refers, primarily, to a thing's both being and not being what it is, and the necessary need not be co-extensive with what is self-evident or derivable from the self-evident.

In the perspective of causal necessity, for instance, it might well be the case that for heat to exist and yet not have the ability to expand solids, heat would have to both be and not be heat.

For the nature of heat on this hypothesis would be a transcendental causal relation such that, in the absence of any interfering cause (which would be such only through the transcendental causal relation which constitutes its nature), heat will produce this effect as long as it is what it is. And if there are necessary connections, it may be the case that water could fail to freeze at 32°F under standard atmospheric pressure if and only if water were not water, atmospheric pressure were not atmospheric pressure or heat were not heat. In general, to say that what a thing is is equivalent to a locus of necessary causal relations is to say that if these relations did not hold for a thing of a certain nature then the thing would also not be of that nature.

But the ontological contradictions that would follow if these connections did not hold need not be graspable by us through our understanding of the meanings of words like "heat", "expands", "solids", "water", "freezes", "pressure" or of any other words. In such a case, we could only have what Maritain calls perinoetic knowledge of a locus of necessary causal relations, that is, an essence. As I have argued in a forthcoming work, there follow from self-evident principles necessary truths telling us that events, like the expansion of solids and the freezing of water, must be brought about by the presence of causes sufficient for the events to occur and that if a change has not always been occurring, it can occur only if previous changes have brought sufficient causes for it into existence and that if two successive circumstances are similar with respect to causal factors which were sufficient to cause an event of kind E in the first circumstance, then an event of kind E must occur in the second circumstance provided no interfering causal factors are present. But these truths do not tell us which specific effects in our experience are necessarily related to which specific causes. For our knowledge of these truths is extraneous to our acquaintance with the objects I refer to by words like "heat", "expands", "water", etc.

These principles do, however, license us to look for connections between experienced events by noting what changes do or do not follow previous changes. The certitude arising from such investigations is the certitude that it is unreasonable to be1ieve the opposite of some causal hypothesis. For example, derivation from the self-evident does not tell us that it is impossible for there to be a fourth causal factor, in addition to the natures of water, temperature and pressure, in the freezing of water. But we can know that it is unreasonable to believe in the existence of such a factor since the only reasonable bases for belief in the existence of something are experience and principles concerning things without which what is experienced would not exist, in other words, necessary causal principles. But no amount of varying, the circumstances we experience nor any necessary truth points to another factor in the freezing of water.

On the other hand, experiential investigations regulated by causal principles derivable from the self-evident do make it unreasonable to believe that necessary connections do not hold between heat and the expansion of solids, between temperature and pressure and the freezing of water. In knowing that these necessary causal relations hold, we also know something of what these necessary causal relations are and, hence, something of what these natural essences are. (The nature of water is, among other things, a readiness to freeze in certain specific circumstances.) Ashley is incorrect in suggesting that for Maritain "Perinoetic knowledge ought to be described as an understanding that a nature exists without knowing what it is."[13] As Maritain recognizes,[14] we cannot know that a thing exists without in some manner knowing what it is; otherwise our knowledge would be vacuous.

When I know that there is a necessary connection between heat and the expansion of solids, I know something of what heat is, namely, a transcendental relation to the production of

this effect, and something of what solids are, namely, a transcendental relation to behave thus as a result of the causality of heat. Natures, again, are sources of activity, and to know them as such is to know them as they are. In discussing perinoetic intellection, Maritain even goes so far as to say that primitive men "have an intellectual discernment... very precise and very exact, of 'what are' the beings of nature with which they have to deal."[15] The difference between dianoetic and perinoetic intellection, as he repeatedly tries to make clear, is not a question of knowing or not knowing essence. What else would there be to know other than bare, unspecified, existence? But there happen to be different <u>ways</u> of knowing essence. One of them he calls dianoetic, the other perinoetic.

What, then, is the difference between these ways of knowing essence? To know <u>that</u> a necessary causal relation holds between the things for which we use the words "A" and "B" is not the same as knowing that necessary causal relation <u>in itself</u>. To know a <u>necessary</u> relation in itself we must know that its opposite is excluded from possibility. That requires knowing from our acquaintance with what are referred to by "A" and "B", and perhaps other words, that if this relation did not hold, something referred to by one of these words would both be and not be what it is. And when we know that denying a causal relation would require the referent of some word to both be and not be what it is, then our acquaintance with the referent of that word is acquaintance with it precisely as a predicamental or transcendental causal relation. On the other hand, just knowing that it is unreasonable to believe that a necessary connection does not hold is not the same as knowing that this connection's not being what it is is excluded from possibility. (Nor is it understanding the meanings of terms precisely as transcendental or predicamental causal relations, as will be explained in the next section.) In short, to know a necessary causal relation in itself is to be able to verify it by resolution to truths known from an understanding of their terms. That is dianoetic intellection. Knowledge of essence which falls short of that is perinoetic intellection.

Denying that heat expands solids would not force us to deny any self-evident causal principles. But denying that man (meaning a being that performs activities like talking and walking) is a rational animal (meaning a being with the ability to perform activities like talking and walking)[16] would require us to deny that a being which performs a certain activity is a being whose nature gives it the ability to perform that activity. And that is a self-evident causal principle since given that the objective concepts for which we use phrases like "performs an activity" and "ability to perform an activity" are what they are, to deny that something has the ability to perform an activity is to deny that it performs the activity. Another self-evident principle is that nothing becomes an F which does not have the potentiality for becoming an F. As long as the meanings of the phrases "becomes an F" and "potentiality for becoming an F" are what they are, the assertion of the first is contradicted by the denial of the second. Likewise it follows from the self-evident that an extended magnitude cannot be composed (material causality) of extensionless parts. Given that for which we happen to use the phrases "something with no extension" and "add (efficient causality) no extension" it would be contradictory to add no extension to something with no extension and get something with extension. In cases such as these, if the causal principle in question were not true, something would both be and not be what it is.

I have argued that Maritain's distinction between dianoetic and perinoetic intellection follows from the difference between the methods of verification in philosophy and empirical science.[17] But there is more to Maritain's account of these modes of intellection than we have so

far discussed. In order to show how the rest follows from the difference in methods of verification, I now turn to a consideration of another distinction, the distinction between ontological and empiriological analysis.

III. Ontological and Empiriological Analysis

To see the connection between these two distinctions, let us begin by asking why we cannot have dianoetic knowledge of phenomena. Well, what are phenomena? We can define them, consistently with Maritain's definition,[18] as objects which are distinguishable from one another by sense knowledge alone. The senses alone, for example, are able to distinguish the blue color of one piece of litmus paper from the red color of another piece; but it is not by means of sensory operation alone that we distinguish alkalis from acids. Sensory operation alone can distinguish the third mark from the second mark on a calibrated scale; but the senses alone do not reveal the significance of any measurement. Now to the extent that our terms are defined by reference to such sensibly distinguishable objects, acquaintance with the meanings of our terms is not sufficient for us to know that the opposite of a causal hypothesis is impossible. Why?

For two reasons, one of which is mentioned by Maritain himself, while the other follows from principles he recognizes. First, the occurrence of any event characterized by sensibly distinguishable features will be multiply caused.[19] Any number of causes must cooperate to bring about the event of my seeing a red line coinciding with the third black mark on a white scale. Therefore my understanding of words whose meanings are sensibly distinguishable objects is in no way sufficient for me to assign a cause of a specific nature to a specific effect or an effect of a specific nature to a specific cause. Only considerable experience viewed in the light of general causal principles can license me to do that. The second reason is a consequence of the existence of chance, something Maritain along with the rest of the realist tradition is aware of.[20] It is a necessary truth that, assuming the qualifications mentioned in the last section are kept in mind, similar causes have similar effects. But the converse is not necessarily true. The effects of causes acting according to necessities inscribed in their natures can have chance characteristics not traceable to the natures of the causes taken individually. And among such chance characteristics of the effects of a cause can be the fact that its effects are similar in some way to the effects of another cause. The same litmus paper presently perceived as pink can be perceived as red either as a result of being dipped in acid or as a result of being in a red light. Now human knowledge advances by moving from data the senses are aware of to an understanding of the causes of that data. But the fact that similar effects can have dissimilar causes makes it impossible to assign specific causes to specific sensible effects solely from the acquaintance with those effects that allows me to make them objects of concepts.

Hence dianoetic intellection of necessary connections is not possible in the case of sensibly distinguishable objects, the details of phenomena, or in the case of theoretical terms defined by reference to such objects. No truth known from its terms alone, nor any set of such truths, connects the theory of heat as the energy of moving molecules with such sensible objects as the feeling of warmth or the coincidence of a colored line with one of the series of marks on what we call a thermometer. (By a truth known from its terms alone, incidentally, I do not mean a sentence stipulating how a term is to be used, an entirely contingent matter. Necessity derives

from that which a term is used for, not from the contingent fact that a particular term is so used.) But if there is nothing in the intellect that is not first in the senses, how is dianoetic intellection of connections in nature ever possible?

My answer will have two parts. First, in dealing with the problem of how our intellectual knowledge derives from sense experience, realists have failed to grasp the implications of their own doctrine that the genus is only logically distinct from its species. This means that the generic and specific concepts are ways of articulating a datum of experience which differ from one another with respect to their logical properties but not with respect to the extralogical reality which they articulate. Thus from any experience from which we can derive specific concepts like red, green or blue, we can also derive the generic concept color, and anything we can describe as canine, equine or human we can also describe as animal. As these examples illustrate, the difference between generic and specific concepts is only one of such logical characteristics as greater and lesser explicitness and vagueness. Whatever information is conveyed by "color" is conveyed by "red", but "red" conveys more information than does "color". I will describe this logical relation between generic and specific objective concepts as the genus' being logically included in the species. And since the genus and species differ only logically, the same experience from which we derive a specific concept allows us to derive the generic concept.

How does this help us solve the problem of achieving dianoetic intellection of natural connections? From the experience of a particular change, for example, litmus paper changing color in solution, we can derive the meanings of many words. Awareness of none of these meanings will be sufficient for us to assign the details of this effect their specific causes; we cannot verify by resolution to the self-evident what causes the change in color. But logically included in, and therefore derivable from the same experience as, the concept of any particular change is the general concept of change. Logically included in the concept of any particular subject of change, here the paper, is the general concept of subject of change or material cause of change. And logically included in the concept of material cause is the general concept of cause which embraces other types of causality as well. Although we cannot verify by resolution to the self-evident what efficient causes make litmus paper change color, from our acquaintance with more universal objects such as change, subject of change and cause in general, we can verify by resolution to the self-evident that whatever undergoes a change does so only because something other than itself, the efficient cause, exists. In other words, insofar as they make reference to sensibly distinguishable objects, concepts cannot reveal necessary connections. But logically included in such concepts are more universal concepts, derived from the same data of experience, which can reveal necessary connections, but only very general, not specific, connections.

We have already seen why the more specific concepts cannot reveal necessary connections; now let us ask what it is that enables more general concepts to do it. The answer to this question is the second part of the explanation of how dianoetic intellection derives from sense experience. When terms are defined by reference to sensibly distinguishable objects, we have what Maritain calls empiriological analysis. Those general concepts which reveal necessary connections are not empiriological but ontological concepts. What does this mean?

From the senses we not only acquire our awareness of sensibly distinguishable objects, we also acquire our awareness of the real, as opposed to merely imagined or conceived, existence of things. Existence is not something the senses can distinguish from other objects in our perceptual fields; nor is it just a less explicit way of articulating one sensibly distinguishable

object as opposed to another. But sensibly experiencing an object, as opposed to merely imagining it or conceptualizing it, allows us to <u>judge</u> that the object is in that state which is the ultimate presupposition (on the part of the cause) and ultimate term (on the part of the effect) of all causal relations: real existence. (In particular, it is the status of real existence that gives the objects of sense experience and the primary objects referred to in language causal priority – efficient, formal and final – over our knowledge of them.)

Once existence has entered our intellectual knowledge by means of judgment, we can construct definitions, not by reference to sensibly distinguishable objects, but explicitly in terms of relations of various kinds to the objective value: existence. For example, "being" means <u>that which</u> exists; its meaning is a function of that of "exists". "Essence" means the answer to the question "What is it?" with respect to that which exists; in other words, it refers to a way of existing, a form which existence can take. "Accident" means that which exists in another (another existent); "substance" means that which does not exist in another. A "necessary connection" holds when we have really distinct beings, one of which would not exist without the other. These concepts illustrate what Maritain means by ontological analyses: definitions which distinguish things from one another by diverse relations to existence.[21] Compare the distinction between substance and accident to that between male and female. As defined above, the distinction between substance and accident pertains to beings as beings, that is, as existents, while the distinction between male and female pertains to beings not as beings but as sexual. Sexuality is itself a mode of being. But when we construct concepts telling us what distinguishes sexual from non-sexual beings we do not do so by reference to existence or concepts derived from it.

Among the concepts logically included in our concepts of sensible objects are ontological concepts. We could not recognize this without the judgment of existence, but once having made existence our object, we are able to see that concepts like something existing, something existing in another, and even something without which another thing would not exist articulate the same data of experience as do concepts of sensibly distinguishable objects though with less detail. For the same sense experiences that allow us to distinguish sensible objects allow us to make judgments of existence. The senses are able, for example, to distinguish things in motion and rest relative to one another. And when something is observed going from rest to motion, we who are able to conceptualize things in relation to existence can articulate both the motion and the thing undergoing the motion as existents, as other than one another (since the thing was observed to exist without the motion), as related such that the motion exists by existing in that which undergoes it and, therefore, as related such that the thing undergoing the motion is something without which the motion would not exist, a necessary cause of the motion.

Thus the ontological character of these concepts enables them to reveal necessary connections. Recall that the impossibility of the opposite in the ontological sense means that the opposite would require the same thing to both be and not be. In other words, the contradictory is impossible because it is excluded from the possibility of existing. And the understanding of ontological terms allows us to recognize this because these terms are "existence" itself or are terms whose meanings are explicit relations to existence. In particular, causality and its cognates are ontological concepts. A thing is a cause only if it provides some other thing either with existence itself or with some condition necessary for existence. To recognize a necessary connection <u>as such</u>, therefore, is to employ ontological concepts. <u>That which</u> empiriological science knows are necessary connections, but empiriological analysis cannot recognize them as

such because the meanings of empirical terms do not reveal them, as we have seen.[22] It is the philosopher of science (and all scientists should also be philosophers of science to this extent) who by means of ontological concepts recognizes that what the scientist knows are necessary connections.

That the concepts employed by dianoetic intellection are ontological explains why Maritain can describe its manner of knowing essence as knowing an essence in itself [23] or knowing a quiddity quidditatively.[24] To know an essence in itself is to know it as a capacity for existence, a possible way of existing, since that is what essence is. And that kind of knowledge is achieved by verification through the impossibility of the opposite, dianoetic knowledge. For this manner of verifying reveals that the opposite excludes the possibility of existing by requiring something not to be what it is. In other words, where knowledge verified in this manner concerns essences, we have knowledge of essences precisely as capacities for existence, ontological knowledge.

Perinoetic intellection also gives us knowledge of essences. But since it does not distinguish things from one another by different relations to existence, it does not conceptualize essences precisely as diverse capacities for existence. Thus Maritain is right in saying both that the phenomena in terms of which empiriological analysis distinguishes things are beings[25] and that perinoetic intellection does not attain "differences of being".[26] Perinoetic intellection does not conceptualize by diverse relations to existence because it verifies by means of contingently occurring observable events rather than by the impossibility of the opposite. Therefore it must define its terms by reference to objects the senses are able to distinguish. That is what Maritain means by saying that the possibility of observation takes the place of essence in empiriological definitions:[27] ontological analysis constructs concepts of objects as possible existents in order to verify by the fact that the opposite is excluded from the possibility of existing; empiriological analysis constructs concepts by reference to objects distinguishable by possible observations in order to verify by the contingent occurrence of observable events.

Since we must rely on sense experience for information, about natures other than our own, our ontological and dianoetic knowledge of them is confined to their most general features. We have only empiriological and perinoetic knowledge of their specific differences. So let us return to the example of rational animal as the definition of man; how does it illustrate the ontological character of dianoetic knowledge? As we saw above, the self-evident necessity in question derives from the necessary connection between activities, like talking and walking, and the ability to perform them. But the concepts of activity and ability are ontological; their differentiation from other concepts consists of distinctive relations to existence rather than to any sensible object. In the physical sphere, activities are motions, and motion is a sensibly distinguishable object. The concept of activity, however, adds to the concept of motion a relation to the cause(s) of the motion, and we have already seen that causality is an ontological concept. And an ability is itself a causal relation. An ability is either an ability to bring something into existence, efficient causality, or to become (to come to exist as) something, material causality.

But this does not tell us why rationality makes man a substance of a different kind from irrational animals or why rationality is what Maritain calls a property of man "in the philosophical sense".[28] First, what does it mean to say the difference between rational and irrational animals is substantial while the difference between those humans that can whistle "Dixie" and those that cannot is only accidental? Let us not be satisfied by vague talk about the relative profundity of attributes. Since substance and accident are ontological concepts, the

question can be given a precise meaning in terms of necessary connections conceptualized ontologically and makes no sense otherwise. The accidents of a substance must have their ultimate source either in the substance's substantial form or in some efficient cause exterior to the substance, for instance, an efficient cause which disposed the matter that received the substantial form. In saying that the difference between people who are and people who are not able to whistle "Dixie" is only accidental, we are saying that it can be accounted for, not by powers caused by their substantial forms, but by modifications of those powers traceable to exterior agents. Where such a difference is not traceable to an exterior agent, we have different kinds of substantial form. And in saying that the difference between animals that can and cannot reason is substantial, we are saying that behind the differences between the uses we make of reason, differences that may be accounted for by accidents received from exterior sources, there is an underlying ability that cannot be so accounted for.

  Thus the concepts needed to make sense of the claim of a substantial difference are ontological, functions of existence. Form is the only one we have not already discussed. Since form is that by which something that potentially exists in a certain way comes to actually exist in that way, its ontological character is apparent. The same conclusion follows from the analysis of dianoetic knowledge of accidental essences, for example, the knowledge that intellect and will are distinct faculties and art and prudence distinct habits rather than just different operations of the same faculties and habits respectively. In each case, the argument appeals to ontological concepts such as the specification, a relation of formal causality, of acts by their objects and of faculties and habits by their acts.

  When a difference in abilities is recognizable as a sign of distinct kinds of substantial form, moreover, the ability is a property in the philosophical sense, and it can be said that we know the substantial nature in itself though _through_ the property. An ability which is caused by the substantial form is a necessary effect of that form, that is, a property. Were it not a necessary effect, the reason why a particular thing has that ability would have to be found outside its substantial form since the form alone would not be sufficient to cause it. And when we know that an ability is a necessary effect of a substantial form we have knowledge of that form in itself since that form is, by its identity with itself, a transcendental causal relation to this effect. On the other hand, since phenomena do not reveal necessary connections, they cannot give us knowledge of properties in the strict sense or of the substantial forms from which they emanate. Rather phenomenal regularity, which verifies our empirical knowledge of necessary connections, _takes_ _the_ _place_ _of_ knowledge of natures _in_ _themselves_. In other words, the nature is known not only by its effects, which are signs of it, but _in_ _its_ _effects_,[29] in the regularities which make it unreasonable to believe the opposite of a particular connection. Such knowledge is "circumferential"[30] to essences as that without which the existence of their effects would not be possible.[31]

[1] Ed. Deely and Raymond J. Nogar (New York: Appleton-Century-Crofts, 1973) pp. 29-74.

[2] (Philadelphia: Villanova University Press, 1971) and see the defense of Flynn by John D. Beech, "Another Look at the Thomism of Etienne Gilson," The New Scholasticism 50 (Autumn, 1976): 522-528.

[3] Réflexions sur l'intelligence et sur sa vie propre, 2nd ed. (Paris: Nouvelle Librairie Nationale, 1924) pp. 177-179 (hereafter cited as Réflexions).

[4] Distinguish to Unite or the Degrees of Knowledge, trans. Gerald B. Phelan (New York: Scribner's, 1959), p. 55 (hereafter cited as Degrees). Do not be misled by a difference between Maritain's terminology and mine. On the page cited, immediately after he says experience does not "formally constitute the medium of demonstration" for natural philosophy, Maritain speaks of natural philosophy "verifying" its conclusions in sensible fact. By "method of verification," I mean what Maritain calls the "medium of demonstration." The same distinction occurs on p. 53, where Maritain says natural philosophy "verifies" in experience but "rises, through formal resolution to first intelligible truths known in themselves, to a consideration of essences and the necessities they imply". (Translation corrected.) Here formal resolution to first principle constitute what I am calling the method of verification.

My use of "verify" is, of course, the common one. What Maritain means by it in this context (he uses it in the standard sense elsewhere) is not entirely clear. The situation is complicated by the fact that this use is based on his interpretation of a difficult phrase in Aquinas ("deduci ad", In. Boet. de Trin., q. VI, a. 2) which Aquinas in turn got from Boethius. And although it is related to verification in the ordinary sense, what Aquinas appears to mean by that phrase is not identical with it. He is discussing judgment. Regarding judgment, there are two things to be considered: an ontological aspect which is the conformity with things that makes the proposition we are judging true, and an epistemological aspect which is the way we are made aware of the conformity (verification in the ordinary sense). The question of conformity seems to be what Aquinas had in mind, not simpliciter, but with respect to the sphere in which that to which a proposition conforms is found to exist, the sphere of things knowable by the senses or intellect or representable in the imagination.

For some reason, this reading seems not to have occurred to Maritain, and he is left with the epistemological aspect of judgment. Then, when he comes to discuss methods of demonstrating in such non-experimental sciences as philosophy and mathematics, because he wishes to be consistent with what he has interpreted Aquinas to be saying, he is forced to invent a distinction between the " medium of demonstration" and the method of "verifying the conclusions". (A synonym for verification in the ordinary sense is "control" used on p. 55 to translate "règle" on p. 178 for "réglateur" and on p. 197 for "contrôle".)

[2008 Note: In the important unpublished text "La Grande Logique", in v. V of the complete works, pp. 675-763, Maritain recognizes and addresses precisely the problem I raise in this footnote. See especially pp. 745 ff. And I am pleased that what he says there is entirely consistent with what I have said in this note. See my unpublished remarks, "Maritain and Vienna, Quine, Geach and Kripke: Comments on Maritain's Unpublished Text on Major Logic."
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[5] I am refraining from entering the realists' dispute about the relative primacy of the principle of non-contradiction vis-à-vis the principle of identity.

[6] In The Philosophy of Physics, ed. Vincent Edward Smith, St. John's University Studies (Jamaica, New York: St. John's University Press, 1961), p.65.

[7] Ashley, p. 74.

[8] Ashley, p. 75.

[9] Ashley, p. 79. The source of his confusion here, in addition to his apparent disinterest in the question of verification, may be Aquinas' remarks about the superior certitude attainable in mathematics than in natural philosophy. But Aquinas in no way means to imply that his repeated statements that science is achieved by demonstrating from self-evidently necessary truths apply only to mathematics. As a matter of fact, in one of the places where he discusses the superior certitude of mathematics, he also affirms explicitly that natural philosophy demonstrates from self-evident principles. (In. Boet. de Trin., q. V, a. 1).
To understand what Aquinas means by the superior certitude of mathematics, consider the reasons he gives for it. (See, for example, In Boet. de Trin., q. VI, a. 1.) One is that the objects of natural philosophy, which do not abstract from sensible matter, are more complex than those of mathematics. Clearly, this reason does not altogether rule out verification by the impossibility of the opposite in our knowledge of nature. Greater complexity only makes the required arguments more difficult and creates more opportunities for per accidens error. Another reason given by Aquinas bears more directly on the dispute between Ashley and Maritain: unlike mathematics, natural philosophy deals with things that happen for the most part but which sometimes happen differently. Aquinas does not mean, however, that natural philosophy deals only with what is true for the most part to the exclusion of what cannot fail to be true. That interpretation would contradict too many of Aquinas' texts on science and demonstration including the text just cited about demonstrating from the self-evident in natural philosophy. (Many relevant texts are collected by L. M. Regis, O.P. in Epistemology, trans. Imelda Choquette Byrne, Christian Wisdom Series [New York: Macmillan, 1959], pp. 369-465.) Moreover, Aquinas can hardly be accused of holding that it is only for the most part that substantial change requires a featureless subject, that chance presupposes finality, that the soul is in each part of the body, etc. But Aquinas believed that in addition to dealing with necessities, natural philosophy also deals with things that happen for the most part. And that constitutes no objection to Maritain since he is perfectly willing to concede that Aquinas did not make distinctions that need to be made between the philosophical and the empirical ways of knowing nature.

[10] The Philosophy of Nature, trans. Imelda Choquette Byrne (New York: Philosophical Library, 1951) p. 19 (hereafter cited as Nature) cf. Degrees, p. 25.

[11] See Degrees, pp. 23—211, passim; and A Preface to Metaphysics (New York: Sheed and Ward, 1939), pp. 107-125 (hereafter cited as Preface).

[12] See Aquinas, I—I, q. 2, a. 1.

[13] Ashley, p. 76.

[14] See Degrees, p. 424, where he is quoting Aquinas, In Boet. de Trin., q. 6, a. 3.

[15] Degrees, p. 208.

[16] This constitutes a revision of the common explanation of how we know definitions like "rational animal", namely, that we analyze the concept of man and find the concepts of rationality and animality included therein. That explanation is inconsistent with the fact that we learn the natures of things from their activities. Nor can it escape the Kantian difficulty that analysis of concepts alone cannot advance our knowledge of what is the case. Moving from knowing that a thing performs certain activities to knowing that it has the ability to perform those activities does not advance our kniw1edge very far. But the necessity of such connections is the foundation for all the knowledge of the natures of things that further experience and reasoning give us.

[17] One exception must be made to the statement that when necessary connections are known by reduction to the self-evident, we have dianoetic intellection, knowledge a locus of necessary causal relations in itself. The existence of God as the first cause of motion can be demonstrated by impossibility of motion's existing in the absence of an uncaused cause of motion. We have dianoetic intellection of the objective concepts making up the self-evident truths employed in the demonstration of God's existence. But we cannot have dianoetic intellection of God as the cause of His effects as we can have dianoetic intellection of a natural agent as the cause of its effects. In each case, a cause is made known through its effects. But here again, we find a difference in the manner in which the nature of the cause is known. The mode of being of natural causes is commensurate with that of their effects since natural causes are, in their own turn, effects of causes prior in being to them. And the necessary causal principles which allow us to move from knowledge of the effect to knowledge of the cause apply just as much to natural causes as they do to natural effects. Therefore the mode of being of natural causes does not exceed our manner of knowing them.

The uncaused cause is not an effect, nor does He come under principles telling us to account for the existence of things in known terms of prior causes. Therefore effects cannot make His nature known to us in a manner commensurate with His mode of being. From necessary causal principles we learn that the objects of certain concepts, like goodness, power, unity, intelligence, do belong intrinsically to God's nature. But this is now knowledge of God's nature in itself since the uncaused manner in which they exist in God exceeds the manner in which we come to know that they exist in God.

[18] "Phenomena are not special things; a phenomenon is not… a certain stratum of knowable reality distinct from something else which is the thing in itself… Phenomena are simply the aspect in the formal object of primary determination, in the sphere of fundamental intelligibility proper to the first degree of abstractive visualization, which meets with a mode of defining and conceptualizing, an objective light that proceeds by resolution into sensory operation." Nature, p.137.

[19] See Réflexions, p. 179

[20] See Degrees, pp. 25-30; Preface, pp. 133-141.

[21] "Existence is the term as a function of which metaphysics knows everything that it does know." Existence and the Existent, trans. Lewis Galantiere and Gerald B. Phelan (New York: Pantheon Books, 1948), p. 31. What Maritain says here about metaphysics is true of ontological

analysis in general.

[22] See Degrees, pp. 25-34, 138-165, passim.

[23] Degrees, p. 33.

[24] Degrees, p. 208.

[25] Degrees, p. 160; Nature, p. 137.

[26] Degrees, p. 206.

[27] Degrees, p. 149.

[28] Degrees, p. 206.

[29] See Degrees, p. 207.

[30] Degrees, p. 205.

[31] Ashley uses the word "ontological" but appears to take no notice of the distinctive character of ontological concepts, that of being relations to existence. He even equates the term "ontological" with "dianoetic". (p. 75) Likewise, what he says about "natural units" (p. 66 ff.) can be verified by experience. But whether all such natural units satisfy the ontological concept of substance (that to whose essence it belongs not to exist in another) is a different question.