(Finished "is" check 06-05-04)

To the executor of my estate or to whom it may concern:

This document contains comments that would have been integrated into a revised edition of causal realism. In the event of my death, I hope that this document can be given in diskette form to someone on the list of names that I gave you. I mean the list of names for the philosophy materials.

Logical Relations, Jul. 21, 95 BIG

The theory of logical relations in Causal Realism is meant to do two things. (A) Imply that if such logical relations occur, some truths cannot not be true. (B) Imply that, when we are aware of some objects, we cannot not know the necessity of those truths. I.e., (A) if there are relations with such and such properties, then truths diversely objectifying things in the following way cannot not be diversely objectifying the same thing. And (B) when we are aware of certain objects, we cannot not be aware of relations with those properties holding between them; so that we cannot not be aware of the necessary truth of the identity of those objects.

One of the last foot notes in my article on contradiction refers to a problem with the way I handle the concept of logical relations in causal realism. Here, I would like to add a few things to that foot note. A definition I give for logical relations makes specific reference to objects of cognition considered as objects of cognition. That definition is okay. But by it neither negation and nor sets are logical. Both the are cognition-dependent objects. But nature of neither of them includes a specific relation to cognition. Of gold Mountain is a cognition -dependent object also, but nothing in the nature of that object involves a specific relation to cognition. But not thing I say about

negation and or sets really requires that they be *logical* in the sense of my definition. My arguments, as far as I know, only require that they be cognition-dependent objects.

Jul. 7, 1999

In the theory of truth all section 3.3.1, I completely forgot to consider sentences with multi--place predicates. Everything that I say there is intended to apply to such sentences. To see how it applies, see my article on Wittgenstein and Maritian. This is the article that first appeared in Italian and then in Roy Varghese's anthology titled Theos.

July 20, 1999

I have decided to include in this document comments on the degrees of knowledge as well as comments on causal realism. I thought of putting the degrees of knowledge comments in a separate file. But there would be too much overlap between them, since causal realism was to such a great extent an attempt to be developed and depend the insights of the degrees of knowledge.

I will be began with comments about Maritian philosophy of science. I believe that Maritian did us the only hope for sanity in the philosophy of science. But a lot of work needs to be done for his philosophy of science to fulfill its promise. One of the most in important thing is that needs to be done is to salt some problems about his philosophy of science that have so far not been solved.

I should be the end by showing that Maritian's theory deserves a much more realistic interpretation then is usually the given it. He is much more of a scientific realist then he often appears to be. And I am thinking even of his theory of mathematical physics. To understand his apparently negative comments about empirical science in general and mathematical physics in particular, we have to understand that when he makes those comments he is contrasting empirical

science to another mold of knowning. He had in mind specific examples of what he calls ontological analysis and his negative comments about science are basically saying that science does not achieve kind of relations to what things are that ontological analysis achieves. He is taking ontological analysis as the standard comparing science's analyses to that standard, and saying that they fall short of that standard.

But to say that a mode of knowning the does not come up to a certain standard is not to say is not to say that if is not await of knowning what things are. The Maritian whole point is that science has await of knowning what things are but a different way of knowning what things are from the gold standard of philosophy. Mary Tans way of speaking does not always make this clear. For example, he speaks of science knowning what things are blindly. He has other such phrases for this that I am not going to look up now. Someplace else he speaks of knowning the by way of not knowning. I don't think he uses that phrase in the context of science but it makes the same point, that is, this example makes the same point that I want to make about his language describing science.

Such phrases are 1/2 of what Simon calls analogical sets. One part of Anna logical sets a the mold affirmation of the common ground. For example, knowning by way of knowning. The other part is an affirmation together with an apparent denial of the common ground. For example, knowning by way of not knowning. Anna logical sets are all over the place in Maritian. Another example that comes to mind now, but there are many others, is practically practical as opposed to speculatively practical. Contrary to Simon, who thought he found Anna logical sets in mathematics, I argue in causal realism that Anna logical sets are specific to ontological analysis. In any case, to say that science knows what things are blindly is a way of denying the common ground, knowledge, at the same time that we affirm it. But the affirmation is still an affirmation that science is a way of knowing what things are.

this is true of the mathematical physical sciences as well as of other physical sciences. But the

await Maritian talks about mathematical physics can make it appear that it is a much more tenuous way of knowing what things are than he thinks it really is. One wait to see this is to come prayer his earlier, more negative, descriptions of physics to those of the degrees of knowledge. The degrees of knowledge marks a definite advance toward a less ambiguous version of scientific realism. I have just do reread his chapter on time in Theonas. So the comparison that I am going to make between his earlier and later position will refer to that chapter and will not go to any other of his earlier works. But I am sure that the same point could be made about them also.

Consider the last sentence on page 99. It contrasts relative measures to the absolute reality is that they presuppose. So the is referring that to the analysis of absolute quantity and time that he has just vivid in that chapter. Those analyses must be examples of what we will later call ontological analysis. If they aren't, what is? At the end of that sentence he says that physics cannot represent that which is directly. Well, by this time in the chapter we know what the means by directly. Been means the kind of knowledge that his analyses of absolute as opposed to relative quantity as illustrated. But he certainly does not mean that scientific measurements of relative quantity's are not truths about what things are. In fact, he clearly means the opposite. But sciences way of knowning is a different way from philosophy's, which he here describes by the word directly. What does the mean by directly? Simply the kind of knowledge of what things are that philosophy gives, here a knowledge of quantity and time, or of what quantity and time are, absolutely as opposed to relatively. (I should have said space instead of quantity.)

So if we keep in mind a concrete example of what he means by directly as opposed to not directly, we see that physics is just a lesser way of knowning what things are but still a way of knowing what things are. He has a standard for what a direct representation of reality is Andy compares the goal that physics of achieves to that standard. Now consider the very negative bounding statements he makes about physics on page 100. The last sentence on the page says that Einstein's theories are the sort of may have with no other purposes than an to offer support for mathematical reasoning. The degrees of knowledge would be more specific, not calling Einstein's

theories a myth, but part of his theory the myth, namely, his idea that space and time make up one continuum.

And the phrase, no other purpose than, does not do justice to what the degrees of knowledge will say about the physicist goal of understanding reality. For example, earlier on page 100 Maritian says that science's powers are more marvelously manifested the less it pins down its symbols on natures and causes really existed in the world. The degrees of knowledge, chapter 4, indicates exactly the opposite. Think of what it said about the varying the degrees in which the theory of the atom can be said to manifest reality. Also I'd do not think that the degrees of knowledge would be as negative to word the laundry list of concepts we find on how page 100.

Finally on page 100 and 1 he considers it to be a logical possibility, though practical impossibility, to harmonize the mathematical interpretation of nature with the philosophical. In the degrees of knowledge he denies this possibility. That denial may appear to be more negative to word science. But really it is more positive. What he is saying later is that physics has its own autonomous value as a way of knowning reality. Physics need to be completed by philosophy but not in its own order. Distinguish to unite. The approach of physics the does not satisfy the human intellect, so the human intellect also need philosophy. But physics the does not need philosophy, except implicitly as I will explain later, to be a valid way of knowning of the real.

Before going Andy further I'd try to give an even clearer example of an ontological analysis. Consider the statement that the human soul is immaterial he subsistent. The word sold is defined as a substantial form. Substance is an ontological concept because it is defined as that which exist in itself or that which does not exist in another. The difficulties with defining ontological analysis is that it requires another Anna logical set. The common ground of the members of the two sets is the inclusion of a concept of being or of that which exist. The concept of being is logically included in all concepts, in one of the senses of logical inclusion that I explain in causal realism. So to find a way of expressing . what and ontological concept is we have to find a way for

a concept to include being that we can affirm of ontological concepts and deny of all others.

Being is included in all concepts as a common elements. That means, for example that it is included in the concepts of red and green in the same way; the concept of red does not distinguish red from green by a weight of being related to the being that the green in does not share. Read is in fact a different way of existing than is the green. But the what a being is included in the concepts of red and green does not objectify red as a different way of existing. The way being is included in the concept of red objectifies a weight in which red is similar to the green, not different from green.

Likewise, being is included in the concepts of substance an accident as it is included in all concepts, namely, as a weight in which substance and accident are similar. But in addition being is included in the concept of substance and accident as a weight in which they differ. That is, the concept of substance distinguishes substance from accident by a way of being related to existence that accident does not share. Not only are substance and accident different ways of existing, and our red and green, but also the definitions of substance and accident objectify them as being different with respect to their relation to existence. Substance is that which does, and accident is that which does not, exist in itself or not exist in another.

So all concepts include existence, that is, a relation to existence, as something common. But ontological concepts also include a relation to existence as something that distinguishes concepts from one another, that is, distinguishes the objects of the concepts from one another.

So one's part of the concept of soul is ontological, namely substance, what about the other part, form? Form is that which causes the result of the change to be what it is. What it is is, by hypothesis, an ontological concept; and so is change. Change is coming into existence out of what already exists. For it is a cessation of existence which leaves something remaining and existence. So the concept of soul is an ontological concept.

Now one of the things that the the arguments for the subsistence of the soul shows is that humans, as opposed to other material things, have abilities that must come from the substantial form, as opposed to coming from some efficient clause other than the efficient clause that brought the substantial form into matter. That is, the ability to think by means of universal concepts cannot be an accident added to us so that it does not derived from our substantial form. If it were added to us and did not derive from our substantial form, our substantial form need not differ from those of animals. The differences between humans and animals could be explain completely by accidents.

The only way it makes sense to speak of two things the being different kinds of substances to saying that one has accidents that the other lax and that these accidents can only be derive from the substantial form. The arguments for the subsistence of the soul shows that in the case of man. And woman. For that argument showss that those things that can think by means of universal concepts must have a substantial for that is capable of its own activities, activities that do not belong directly to the whole but belong to the whole because the substantial form belong to the whole. On the other hand, things in which the ability to think by means of universal concepts is lacking need not have a substantial for capable of its own activities. So ontological analysis revealed that between things that can and things that cannot think by means of universal concepts there is a difference between their having subsistence and nonsubsistence substantial form, substantial forms that do or do not have activities of their own, and so can or cannot exist apart from matter.

This is an example of what Maritian would call Dianoetic intellection as opposed to perinoetic. We don't stop at the surface but penetrate to the substantial essence. But here I want to focus on the fact that Dianoetic intellection requires ontological analysis.

Now let us return to the comparison with science. By way of another Anna logical set, Maritian can speak both of the essences of things being hidden from us and yet saying that all our

knowledge is of what things are. He says we can no essences quidditatively or non-quidditatively. But that amounts to saying that we know quiddities quidditatively or non-quidditatively. And the fact that essences our hidden from us is one of the reasons why science use as fiction and beings of reason. But that raises one of the problems with Maritian account.

The fact that essences our hidden from us is not enough to justify or explain using fictions. Because in the case of physical nature's, why couldn't lead at least guess the truth about essences. The fact that something is hidden from the does not prevent me from at least guessing the truth. Whether Napoleon wept at Waterloo may be forever hidden from my knowledge. But that the does not prevent me from having a 50-50 chance of guessing the true.

Maritian's answer with the that the correct guess would be a guess at an ontological analysis and ontological analysis simply can't descend to the level of details we are talking about. But why can't it? One reason is that ontological concepts are very the general. Concepts like being, existence, essence, clause, substance, accident, act, potency, necessities, contingency, change. The most we can get out of ontological analysis is what we can get out of concepts like that, what we can get working with concepts like that.

At the other end of the conceptual spectrum, concepts immediately derive from sensory experience do not leave the all causal relations sufficiently to allow us to penetrate into the nature of causes ontologically. As the example of the argument for the subsistence of the soul illustrates, it is by way of causal relations that knowledge moves from what is known to what is not yet known. Thus the soul's subsistence is recognized by the soul's ability to produce effects of certain kinds. But empirical concepts are causal he opaque, as I explain on pages 340 to 340 true of causal realism.

So we cannot even guess at the kind of ontological analyses that would be relevant to the objects of our experience. In fact, we only seen to produce adequate ontological analyses that the

specific level where we are aware of causal relations in prospectively. I do not mean to imply, however, that the only true statements we can no using ontological concepts are statements about ourselves. But outside of the details of human nature, ontological analysis must remaining at a very general level. For an example, we can go back to the chapter on the mathematical attenuation of time. The reason there can be no unified space-time continuum can be expressed ontological. Extension is a continuum whose parts coexist, while kind is a continuum whose parts exist successively and so do not co exists.

The fact that the natures of things are not revealed to us is a partial answer, but not a complete answer, to another problem that Maritian's philosophy of physics faces. In chapter 4 of the degrees of knowledge he tries to explain why I it is proper for physics to make use of mathematics. The reason he gives is that quantity is the first accident of physical thing. As a result, all other features of physical things are quantitatively condition. For they all presuppose the first accident, quantity.

But this justification for the role of mathematics in physics is in terms of real quantity. When Maritian talks about quantity being the first accident of physical things, he is talking about the real dimensions of real physical things. How to get from that to the appropriateness of the use of mathematical being of reason in physics? Why does real quantity make fictional quantity relevant? Part of the answer is that though our measurements are real, they still do not revealed the intrinsic nature of physical causes. So we must posit fictional causes to support our mathematical reasoning. But that is only part of the answer.

(Note added later: I now think the answer to this question is more simple and direct then I originally imply. Real quantity is always relevant to the scientific law but not necessarily to the theory that explains the law. Maritian is emphatic that of the connection between science and reality occurred at the level of measurements. So it occurs at the level of the real quantity as expressed by measurements and expressed by the law derive from the measurements.

But note that the empiricists problem of distinguishing fact from theory does not fact by this position of Maritian. Maritian places a burden of proof on himself when he claims that science is using a being of reason up in a particular case. He must satisfy that burden by offering and ontological argument that a particular theory of science postulates something in capable of existence. If his argument works, by that fact he has shown where the being of reason enters the scientific process, and the place where it enters will be at the level of theory by hypothesis.)

Be for getting to the other part, I want to return to defending be realistic character of Maritian philosophy of physics. Now I will focus on the discussions of physics in chapter true of the degrees of knowledge. I have deliberately refrained from re-reading chapter 4 at this time because I believe it gives an even more clear version of a kind of scientific realism than does chapter 2. So if we must attributes a kind of scientific realism to Maritian in chapter 2, we must certainly do it in chapter 4.

On page 43 he refers to to fictive than causal entities whose sole function is to serve as support four mathematical deduction. This is reminiscent of page 100 in the chapter on time. But in the earlier place he had said that the sole function of an entire theory was to provide support for the imagination at the and of the chain of mathematical reasoning. Now he only says that part of a theory has such a purpose. In fact, he goes on to say that those very fictive causal entities come to include a detailed account of empirical he determined real causes or conditions. The English has cases where it should have causes. Of course this raises the question of what the justification Maritian has four referring to real causes here. But let us go on.

On page 40 for he criticizes Duhem saying that physics usually make use of two or mathematical symbols without attempting causal explanation for the constructing of figurative hypotheses. And he adds that the mathematical symbols physicist use are just waiting the chance to leave the realm of pure analytical forms and become explanatory entities. What does the mean by

explanatory entities here? Does the mean fictive causes or real causes?

Before answering that question, I need to comment on his use of the word symbols. In a very important passage on the 164 he says that physical theory is not symbolic as such. There he means by symbols being of reason that he contrasts to real causal entities. So is use of the word symbols need not be in contrast to causal entities of any time, as it is in the passage on Duhem.

As to whether the causal entities that the symbols of page 40 for are waiting to become common are real or fictive, I next want to quote from page 61. There he is talking about physics being formally mathematical and materially physical. He says that physics is oriented towards physical reality and physical causes as the terminus of its investigation. But it does not aim to grasp their inner -ontological nature itself. Note the word ontological. This is a hint that he is contrasting physics to ontological analysis as to different ways of knowning the real, but still ways of knowning the real.

The fact that physical causes are the terminus of science's investigation is another important point. Again, the context is the distinction between being formally mathematical and materially physical. In that context the word terminus refers to that which is known as opposed to that by which is known. See the quote from Aquinas that begins a second paragraph of footnotes to on page 42. So that by which physics knows is mathematical but that which it knows is physical. This is a clear affirmation that that which physics knows is physical reality and physical causes.

It may be that the symbols of page 40 are just waiting to become fictive causal entities. But this referred to what physics is formally. So that by which physics knows real causal entities may include fictive causal entities. But as page 164 said, not all the theoretical entities of physics need be fictive. (But how is it possible to know real causes by way of fictive causes? What does it even mean to say this? Again, the ontological nature is hidden.)

The second paragraph on page 61 parallels discussions of absolute and relative dimensions in the chapter on time. Or I should say that we should have the chapter on time in mind when we read that paragraph. Of significance is the fact that he here uses the word ontological which I do not recall him using in the time chapter. So when he says that it is to the measurable that physics reduces all its concepts, we should think of the contrast of absolute and relative dimensions. Because we should think of concrete examples of the distinction between the way ontological analysis works and the way science works., or between the way ontological analysis knowns and the way science knows. For example when he says that for physics only the measurable has meaning, we should recall what he said about absolute dimensions not having meaning for the physicist.

And when the last sentence says that physics only demands that numerical results coincide with measurements, we have to think that to the discussion of Duhem on page 40 for. Where he says that science can use pure not explanatory symbols. It therefore only demands numerical agreement strictly speaking. But when he says that the mathematical relations that are the formal object of physics undoubtedly need to be completed by a certain hypothetical reconstruction of the real, we have to think that to the remark on page 40 for about symbols just waiting to become fictive explanatory entities.

This reading should give the last sentence on page 61, appropriately, a more realistic cast. The scientist desire to know ontological reality. Its way of knowing, by measurements, does not revealed to it Absolute dimensions as such. But it's measurements are real and are away of knowning that which is a matter-of-fact absolute. Quantitative relations are the formal object of physics, that is, the means by which physics knows that which it knows, its material object, physical causes. And the normal way for its theories to deduce those mathematical relations is by postulating entities that fictively represent real causes.

The final paragraph on page 61 and carrying over to 60 to introduce his another important

analogical set by giving the definition of truth for science that constitutes a secondary analogy of truth to philosophical truth. The last paragraph of footnote 1 on that page, the paragraph that carries over to the next page, makes some crucial comments. The paragraph is about Duhem's theory of saving the appearances. The second sentence of that paragraph states, against Duhem, that theories that save the appearances are true causal explanation. But he goes on to contrast scientific true to metaphysical truth, which he calls absolute. So metaphysical truth is the primary analogate of an analogical set.

Next he says that from that point on it because a secondary question whether the theory has a value of a causal explanation for the scientist. That sounds like a very instrumental list, as opposed to real list, statements. But first, knows that phrase from that point on. What point? The point at which we know that these are causal explanations, contrary to Duhem, in the sense that Maritian has just stated that they are. And that sense is, by the implication of the words secondary question, the primary question. Now the distinction between primary and secondary questions is not very clear here. The secondary question seems to repeat what he said about science being able to use purely symbolic, not explanatory, postulate. But logically why shouldn't that point be primary? For although fictive explanations are normal and purely symbolic the exception, still they are both cases of the general rule that numerical co-incidence is what is most important.

We get some clarification after the long parenthesis. The original sentence continues after a semi colon. The word following the only in is for (I am not checking the French at this time). So what follows the parenthesis is meant to be an explanation of what preceded the parenthesis. The reason why it is secondary whether the scientist considers as causal what has already been identified as causal in the primary question is that what is causal in the sense that is primary for discussion of saving the appearances still the does not have a directly ontological significance.

Again, we find the word directly that we saw in the chapter on time as distinguishing the way the

philosopher looks at the intrinsic nature of things and the way the scientist does. But now the word directly modifies the word ontological which is put in quotation marks. There follows immediately a reference to be pacific discussion of ontological analysis vs. empiriological analysis in chapter 4. So we have here an explicit explanation of what he means by the word directly and an explicit statement that he is not using the word ontological in just a general sense. Rather, he has in mind his owned original theory of ontological analysis.

We have an explicit statement that his negative sounding statements toward scientific realism are to be understood precisely as saying that scientific knowledge does not, to the standard of ontological knowledge. And that is what he as implied in the clause preceding the semi colon, where he calls metaphysical truth absolute and contrasts scientific truth to it.

Going backwards to page 40 for, we find in the middle of the page the statement that science has given up the direct search for real causes in themselves. We should now know that such statements are not intended as outright denial of scientific realism.

Still, I have not explain in what sense the use of fictive entity, or purely symbolic, can be said to be a genuine way of knowning physical reality. To explain that I need to explain why science can use it is quantitative entities if we justification for using mathematics is the real quantity science knows by means of its measurements.

The most detailed example of a mathematical being a reason that Maritian gives us is the space time continuum of relativity. He analyzes time in detailed in the chapter on time, and the analyzes space in detailed in chapter 4 of degrees of knowledge. In the chapter on time he demonstrates the existence of absolute simultaneity just as strongly as Einstein demonstrates the impossibility of measurable simultaneity in his first relativity paper. But the fact that simultaneity could not been known to the physicist is itself something that can be known to the physicist. If Fizeau's experiment is correct, motion must be relative to the observer as far as physical epistemology is

concerned. By physical epistemology I mean that no measurable events can tell us that any motion is absolute. And Einstein shows that it motion is relative for the physicist, absolute simultaneity have existences not knowable to the physicist.

Although Maritian has not developed this point, the fact that ontological analysis reveals of the existence of simultaneity while empiriological analysis does not provide a reason why the physicist must use mathematical being a reason, in particular the space time continuum, in his explanation of nature. For the universe the scientist will be attempting to explain in necessarily simpler than the universe that the philosopher knows to exist. The real universe has at least one characteristic that the physicist universe cannot have, simultaneity.

The upshot is that the physicist explanations of nature must of necessity be simpler than the corresponding ontological explanations, if it were possible for us to come up with it, would be. I tried to show in causal realism that the principle of simplicity, the principle that we should not posit any more causes then are necessary for what we have to explain, does not just Xpress a subjective preference for simplicity. Instead, it is based on objective and necessarily true causal relations, on the one hand, and the necessary final causes of reason, on the other hand. So it is the scientists very responsibility as a rational seeker of causes to postulate theories that have no more explanatory factors then are absolutely necessary for the data available to him.

But the data available to the scientist includes fewer characteristics then are really there. So the scientist must of necessity posit a theory that is out of sync with ontological truth. His theory is not just something other than an ontological analysis. It is something that the complete ontological analysis would show to be impossible.

This may seem to be an even stronger conclusion than Maritian himself reaches. But it not only is consistent with his principles but follows from them. In doing so it shows not only why beings of reason are useful for a but all so why a scientist can be expected to believe that is explanatory

entities are not just mathematical symbols but really existing causes. As far as the scientist as scientist is concerned, the date that he has is all that exist. So when he knows that is data is all that can exist for him, has Einstein shows by showing that absolute simultaneity is on measurable, he will think that the explanation the knows to be the simplest possible has ontological weight.

Maritian principles might explain even more, although he did not go this far. Because simplicity is a standard with an objective basis, it is conceivable that there be such a thing as the only possible being of reason that will explain the data, since any other explanation would be less simple. The insight that started Einstein on the path for the general theory of relativity was that there could not be any data available to physical epistemology other then the kind that could be explain by variations in the geometry of a space time continuum. He knew that no other data concerning the gravity were available. And the may have known that any explanation other than one by variations in space time geometry would automatically be more complex than necessary.

In this case there would be only one correct being of reason, to speak paradoxically, a true being of reason. For the scientist will have to accept as the true theory, true in Maritian sense of scientific truth the appearing to be even more than that to the physicist, the theory that he knows to be the simplest possible explanation of what he knows to be the only possible kind of data available to him.

If this explains why the scientist sometimes must use fictive explanations, how do we justified calling such explanations a way of knowing what physical reality is? Merit and would answer (see for example the paragraph at the bottom of page 163) that the theory of relativity tells us correctly, allows us to known correctly, that what nature is is something that behaves as if there were such a thing as a space time continuum has described by Einstein. What ever else nature is, we know that it is something that behaves as if Einstein's theory were true, true in an ontological sense. It is something that behaves that way as far as the only kind of measurements available to us are concerned. And the fact that those are the only kind of measurements available to us is itself a

fact about the way nature behaves,, and so something covered by Einstein's Theory.

When we know that, we know much more about what nature is than we knew before. We understand nature in a much better way then we would if we did not know that. At least we understand the details of nature in a much better way then we would otherwise. And it might be the best understanding of the details of nature that we could ever get, since an ontological analysis is not available to us.

So our reaction to Maritian should not be that he takes a roundabout route to get us to a place not very profound, a place pretty mundane, and one that it does not take much philosophical ingenuity to think up: the place, namely, of holding that science only lets us know that nature behaves as if a certain picture were true.

Maritian gives a rigorous justification of science. He explains the success of science. The just look at his theory of philosophical true vs. scientific truth. A lot of philosophers today are willing to qualify the notion of true to account for the way they'd perceive science to work. Think of Putnam's internal realism. But since scientific truth is the only truth they recognize, qualifying the notion of truth amounts to qualifying the human ability to know reality.

Maritian can qualify the notion of true in the case of science in the only sane way. For he has a standard against which to compare the results of science. Without such a standard, diminishing our ability to know the true is self refuting.

The following remarks may be a bit more random. Maritian can explain the success of quantum mechanics without making either reality or the human intellect irrational. But to show in this requires more work than Thomists have done and probably more than the there training has made them capable of doing. Somewhere in the degrees of knowledge Maritian asks whether or not workers will be wanting. It turns out that they have been wanting. The reason is that have just

about the time of the degrees of knowledge Thomists graduate schools changed from teaching their students to do philosophy Thomistically to teaching them to do Thomism historically and textually.

In other words, they trained their students to engage in intramural Thomistic debates about what Aquinas said rather than training of them to deal with philosophical problems philosophically. Predictably, this resulted in a lot of not very perceptive interpretations of Aquinas. You can't understand any genuine philosopher unless you're able to read him with a philosophical frame of mind, the same frame of mind that produced his insights. And you won't have a philosophical frame of mind if you're not taught to do philosophy by dealing with philosophical problems. Solving problems is the only way philosophy advances. The discovery of philosophical truth almost always requires philosophical error to prompt the search for the true. There could not have been and Aristotle with out a Plato.

So we stopped doing the philosophy of nature in favor of talking about the philosophy of nature as an epistemological type. That is, we stopped doing the philosophy of nature, of which there had been previously a considerable amount, in favor of doing a form of epistemology about the philosophy of nature. And most of that epistemology was less than enlightened.

Also, we stopped doing would be philosophy of science other than to state how science allegedly fits into Aquinas his scheme of the sciences, or I should say, some philosophically unenlightened interpretations of Aquinas his scheme of the sciences. As a result we have not even begun to do the kind of work necessary to deal with quantum mechanics.

It might seem that we can apply Maritian's philosophy of science to quantum mechanics in the same way that we applied it to relativity. In the case of relativity I said that science required a theory that was simpler in terms of the number of causal factors and an ontological theory would be. The reason was that the data available to science necessarily left out things that ontological

analysis knows are really there. Can't we see a something is similar about absolute position and absolute speed in quantum mechanics.

That something in motion has an absolute speed or absolute acceleration seems clear. But I am not so sure about absolute position. Does not Aristotle saying someplace in the physics that when something is in motion through point a, we can never say that it is at point a. While it is in motion, it is never have point a or at any other position. And wine can we not have subatomic realities that are always in motion? Imagine a string in the form of a circle. If every part of the string is always undulating, no part of the circumference of the circle, for I should say no point, is ever have this or that positions, since it is always moving through a position.

Notice that we have gone from Aristotle's view that rest was the natural state for things, to Newton's view that things can in differently remained at rest or in motion, to a view that seems to make motion the natural state of the most elemental parts of things. At least I conjecture that contemporary science is doing that. I keep meaning to ask a physicist about whether or motion is the natural state for photons, quarks, and so on. And if motion is not their natural state, what is the cause of that motion in the view of the physicist?

Notice also that if motion is their natural state, that would reinforce Maritian final solution to the problem of project tile motion, namely, that local motion is a state like other state.

Back to absolute position. If there is no such thing in the ontological sense, then the believe that there is must come from our mentally projecting a framework on constantly undulating things. For example, we can unconsciously project a Cartesian coordinate system onto a visual image.

Another apparent problem in quantum mechanics could be handled more directly by Maritian. When you have zero particles, you still have a probability range of energy. And when you have zero energy, you have a probability range of particle. The reason is that when you have a whole

number of one,you have a statistical probability of the other. And zero is a whole number.

Maritian could reply that this paradox is an artifact of a tool used by physics, mathematics. Of course, this tool is an indispensable tool. You can hardly get any place in physics with out it. But while zero is certainly a whole number from the point of view of abstract mathematics, it is certainly not a number in the sense of a measure of real quantity. The zero indicates an absence of real quantity, not a species of it. If the use of the zero does not indicate the absence of quantity, what does?

Another recently there by phenomenon of quantum mechanics seems to require a return to action at a distance. My solution to that would be one that will appear radical to most Thomists. Ever since the pope's science adviser in vented the big bang theory, what has been possible to consider the universe to be one substance, one extended complex substance. If a human being, as an extended and complex as she is, can be one substance, why does the greater size of the universe prevent it from being one substance? If the universe were one substance, a change at point a could immediately produce an effect at distant point be, if the change you're a change in just one accident of the substance, an accident that happens to be spread out.

A one substance universe could also installed the problem that Harre and Madden raised in the last chapter of causal powers: a theory of natural necessity. They ask how to distinct fields, the gravitational field and the electromagnetic field, can exist in the same place. While, why can't a substance have to different accidents existing in the same place as long as the accidents are of different species, that is, as long as they are actuations of different potency of the substance?

We can even preserve the advantages of the one substance theory if we modify it to allow each human being to be a distinct substance, or each animal and plant. Assume that the universe is one substance untold the emergence of animal. If they're really were only one substance, the theory of prime matter and substantial form would not be needed. But it animals are a distinct

kind of substance from the rest of the universe, the emergence of animals requires the emergence of a new kind of substantial for, and also the previous existence of another kind of substantial form making the universe the kind of substance it was prior to animals.

But the new substantial form would contain the old virtually. Every property that the old form could cause to exist in prime matter would be caused by the use form, but the use form would cause additional properties. By seamlessly containing the old form the new form would seamlessly produced the accidents that the old form produced.

Take the action at a distance example. Assume that an action at point a, someplace at a distance from an ovum, instantaneously produces an effect at point be inside the ovum. Now consider the same action after a sperm has entered the ovum, causing a substantial change. Imagine a line from the same point a, outside of the zygotes, to the same point be inside the zygotes. The part of the line outside of the zygotes belong to one substance, the universe, the part inside the zygotes belongs to another substance, the zygotes. In each case the imaginary line represents an accident of its substance. And action at point a the instantaneously causes a change in the whole of the line outside of the zygotes. But if that line is contiguous with the line inside the zygotes, there is no reason why the action at point a would not also instantaneously produce an effect at point be, inside the zygotes. Remember, action and passion are simultaneous. So the action of any cause is simultaneous with the existence of its effect.

August 2, 1999

Some more advantages to the one substance theory. If the universe is one substance, the individuals making it up are really integral parts of the substance. So the spatial relations between those individual are really accidents of the substance. They are not accidents existing between distinct substance. So why is there a problem about the reality of relations? But problem was supposed to be the that in addition to being an ordinary accident that Got its reality by

inhearing in a substance, a relation also has a sword of the between state that is hard to accommodate to the substance accident metaphysics. But if there are no substances for relations to be between, but only one substance who is integral are related, why can't those relations be ordinary accident since they have nothing to be accounted for other than the reality they possess as in hearing in the substance.

And we could still have animals as distinct substances with out having to postulate real relations between the animals and the rest of the universe. The reason you could want real relations despite their problems to begin with is this. Change must bring something new into existence. What does change of place bring into existence except a new relation between things? It seems that with our the reality of spatial relations there is nothing new for change of place to bring into existence. The one substance theory takes care of that problem, but it does the introduction of other substances reintroduce the problem?

Not necessarily. Instead of the troublesome relations somewhere in between substances, we can have the real causal influence of one substance on another. When I moved my finger from one place on the desk to another, the finger is now exerting its causal influence on undue part of the desk, and is being influenced causal he by a new part of the desk. These causal influences our transcendental relations, or material relations, not formal relations. And area of the desk is undergoing a change because my finger is touching it. Another area is no longer undergoing such a change. That change is something real in the desk, not in the finger. But that change has a transcendental relation of dependents on a cause, the finger. When I moved the first finger away and replace it by a second finger in exactly the same area, the area is not undergoing a numerically distinct change with a numerically distinct transcendental relation of dependents on a cause.

Another thought about getting multiple substances into the one substance universe. What about neutrinos and other phenomenon that seemed to pass right through the us with out ever been

coming part of us. Should wait or should lead not a that while they are in us, they are held in existence by our substantial form, and their substantial form is only virtually present? That is certainly one possibility.

Another possibility that may appear attractive is to say that our substantial form only supports those integral parts that have some functional role in us. But while it may be true that neutrinos have no functional role relative to our substantial form, trying to say that could be tricky. They certainly have a functional role relative to the one substance universe. If our substantial form virtually includes the substantial form of the one substance universe, shouldn't what ever role neutrinos have for that universe the virtually present in us? This requires more thought.

10-8-99

Here I continue my comments on Maritian's philosophy of science, with special reference to scientific realism.

In his tax on major logic, p. 6 7 8, top of the page, he describes major logic as dealing with that the general conditions of the materials employed by the mind. This description is reminiscent of his of description of chapter to of the degrees of knowledge, description that appears of the beginning of chapter 4, as being from the point of view of the general theoretician of the sciences. By the general theory of the sciences in must mean major logic. There is another reference to the general theory of science at the end of the first paragraph on p. 684.

P. 682 shows that he has wide this time become familiar with the Vienna Circle, something he had not done at the time of the degrees of knowledge. This explains tone of his statements at the bottom of p. 683 and the top of 684. Taken in isolation those statements could be interpreted very instrumentallisticly. But almost all the other statements in this text reinforce the interpretation of the symbolic character of science from the degrees of knowledge, rather than his occasional later

statements in which she tries to emphasize how close this theory is to that of the Vienna's Circle.

Note the description of nominal definition in the last paragraph on p. 684. Note is actually the use of the verb to fix. That makes his description of nominal definition sound almost exactly like Kripke's description of reference. Note also that a nominal definition doesn't just tell us how the word the new but lets us no what things the word is used for.

With reference to scientific realism, the paragraph that begins on p. 686 and the paragraph following seem to say that modern science sometimes achieved the kind of all applied perfection that he is talking about in that context.

P. 689 of firms the kind of scientific realism. Against positivism he says that science does seek efficient causes. And he says that sciences concept of cause is first of all directly ontological significate, implying that it is not purged of indirect ontological significate.

Very interestingly he goes from this latter statement to an apparent explanation of why science must uses being of reason. Why it must is one of the questions not very well answered in the degrees of knowledge. He gives one answered here.

P. 690 is is to all affirmation that the idea of the cause is always there, even if it is disguised. Note to interesting things the last paragraph. In the first sentence he said his there is is in reality a necessity of which the reason is not given to us. Note us how similar that statement is, that description is, to Kripkes necessary true is that are not epistemically necessary.

And in the last sentence he says that the law is a substitute for the cause. But are not be the end of reason postulated in theories also substitutes for real causes? The answer must be that both are substitutes but in different ways.

In the same paragraph but on the next page, noticed the parenthetical remark about only being able to suppose the reason of being. This phrase reminds me of my questions about why can't we guess the true nature, even if it is hidden from us. Note is also that the example of the law of the gases is the same example that Salmons quotes hemple as citings as a scientific law that is not a causal law.

And for scientific realism see the next paragraph on p. 691. These says that sometimes it is possible to pass with certitude from the law to the cause and gives some examples. He follows this with another statement about our being able to suppose the real cause. Next while he is still talking about laws these says they give us a symbolic knowledge of causes. Is this a third use of the word symbolic, in addition to be to that I discussed above? Next the quotes Leibniz as talking about blind knowledge of the cause. Check out the context of Leibniz statements. Finally noticed the comparison of empirical knowledge of causes to Platos cave. No matter how blurredit is still a way a manner of knowning causes.

On p. 692 noticed the interesting statement in the last sentence of the first paragraph that statistical laws are successors of ontological causes to the second degrees.

In the third paragraph on that p. he says that empirical science participates in the definition of science with a certain dimunation. In other words science constitutes an analogical set as predicated of these two kinds of science. And in the last sentence of that paragraph leave the end uses the word symbolic the way he had used it on p. 691.

At the top of p. 694 the explicitly states that the mathematical formal cause by which a scientist may argue can be a real formal cause. Again, scientific realism. And again he refers to the law of gases in a causal context as the end of that paragraph.

The on p. 695 at the end of sections seven he promises to discuss the important distinction

between common and proper causes. Maybe we should look in Garrigou-Lagrange to see what Maritian might have in mind here.

It might be worth examining what the means by the force of penetration as opposed to the manner of knowning on the top of p. 696.

On the middle of p. 700 he began uses language which an analogical set since in one case the predication is that shading off on an inferior plane of what is predicated in the other case. And the very next sentence strongly resembles Qwine on true in two-ways. First it referred to the effect of one sentence on the whole ensemble of scientific sentences. Second in the first to something that looks very much like Qwines eternal sentence. And the last sentence on that p. makes another strong affirmation relative to scientific realism.

The first paragraph on p. 701 again affirms the genuinely scientific character of modern science.

On p. 702, the first paragraph of section 90, he comes very close to denying that there can be protocol sentences.

At the top of p. 7 0 3 there is the first of many statements relative to problems of quantification and reference in modern logic. What he says here amounts to a denial that the truth of a universal implies that truth of a singular. It only implies that truth of a particular bearing on possible existence, as he says in formal logic.

Concerning the note 1 5 that the bottom of p. 703 when he talks about mathematical existence and then equates it with being mathematically thinkable, that is, when he equates mathematical existence with being mathematically thinkable, he is talking about in intentional existence not the similitude of a real existence or substitute for real existence that we assert when we quantify over mathematical objects. This is a point I make toward the end of chapter 5 of causal realism.

Actually, via mathematically thinkable the means potentially having mathematical existence, where mathematical existence means to exist as the object of a certain kind of knowledge, in other words to have a certain kind of intentional existence. That is the point of his clever argument in that footnotes to the effect that, if it were a matter of being mathematically thinkable, the hypothetical statement would become categorical.

At the bottom of p. 724 and the top of p. 725 he again were rooms that modern science is a manner, a way, of knowning these intelligible structure is in things. So the fact that modern science uses substitutes for essence and cause does not mean that it is not a way of knowning essence and cause. And note again his use of the word symbolic. At the bottom of p. 725 uses the word Sign as he often does when speaking of modern science. What kind of sign does you have in mind? He must mean a an instrumental sign that is also a natural sign as smoke is a natural sign of fire.

In the middle of p. 726 uses Newton's law of gravity as an example of how science knows causes. This is a very interesting example deep cause he describes it as a way of knowning by means of the formal cause or a formal cause. The scientist a chain's the mathematical formal cause of the appearances whose regularity he has established. But before the law of gravity their already was a kind of knowledge by formal cause of the motions of the planets. Kepler had established that. But that knowledge was knowledge of an effect, not of the cause, described by a mathematical formal cause. The law of gravity as another kind of knowledge by mathematical formal cause, knowledge of the cause of that effect. This second kind of knowledge consists of more than knowledge of that mathematical formal cause which is the inverse square relations. The law of gravity also refers to the mass. So it makes a reference to something not mathematical, mass. The mass here is described quantitatively. Is this kind of quantitative description description by mathematical formal cause?

On p. 730 the first paragraph noticed the reason he is why people mistake history for a science. It

is that history is capable of causing agreement among minds in so many cases. Where in causal realism by saying or imply that fact of causing long-standing agreement among experts is the only empirical evidence for the fallacy that scientific methods are the only methods that can lead us to truth. It is that empirical that that empiricists are thinking of and relying on when they divinize modern science. I believe place where I refer to this is in the last section of chapter 6. But the fact of causing long-standing agreement among experts is evidence for no more than that, as Maritian implies. To the fact of causing long-standing agreement among experts we might add the fact of being able to cause experts to change their views in the same ways. This would respond to the objection that sometimes theologians appear to be able to achieve long-standing agreement, although actually this is only an appearance.

On p. 731 the last paragraph noticed that essence is the reason of being of stable relations science deals with both in the sense of the stable relations science formulates between the elements of phenomena a and the stable relations formulated by science in the sense of the stable relations in what it constructs on the foundation of the phenomena, on the foundation of the stable relations between phenomena.

On p. 732 the last paragraph noticed how he uses the things object distinction to express the difference between the necessities that science deals with and the contingencies of existing singulars. This is another confirmation of my way of defending Maritian, in my things object article, about metaphysics dealing with possible existence. When you are talking about the necessary truths that science deals with, you are talking about things as object of science, not about things as things.

On p. 7 to be for the second paragraph he gives an example of what he would call Dianoetic knowledge. The Jim is fallible because jim is the human being. This example, like many of the other examples he gives, man is political, man as free choice, human beings are more tool, human beings are risible, etc., is not explicitly ontological. So perhaps I put too much weight on

ontological analysis when I tried to explain why we cannot guess at the truth about the natures of things when the those in natures are hidden from us. One of the reasons ideas is that the guess would have to consist of an ontological analysis, and ontological concepts cannot get as close to the details of things. But perhaps I do not what too much weight on ontological analysis here. To defend any of these examples by argument, you would immediately or vary very soon have to get into ontological analysis.

At the bottom of p. 7 3 5 noticed the difference between scientific explanation by causes and historical explanation by causes. Relate this to the analysts discussions of the historical explanation, especially the discussions surrounding Carl hemples work on this subject.

P. 736 where the full fledged discussions of existence in relation to knowledge begins. There are several things to keep in my to appreciate what he's doing here. Consider the problem of so-called quantification in modern logic. In my article on contradictions, I show that the use of formal methods is a tool of logic but does not constitute logical knowledge. That statement applies to the way modern logic handles existence, although the contradiction article does not develop this point. It is developed implicitly in the article on Wittgenstein and Maritian and in chapter flies of causal realism.

The way a modern logic uses existential quantification and universal but dictation, or rather than way it uses the symbols for these things, is an intrinsic feature of a tool that modern logic uses, but not an intrinsic feature of logical knowledge. For example, in her book on the Tractatus, Anscombe makes the absolute claim that the argument function analysis gives the essence of proposition. But in methods of logic, at least the fourth edition, Quine just as easily denies this claim. Furthermore paradoxes occur in modern logic that do not arise from the nature of existence or the nature of our knowledge of existence but from quantification as a means of symbolizing that knowledge. I am not just thinking of the paradoxes associated with the theory of tights or of Platonism and nominalism in the modern, misleading senses of those terms. I am also

thinking of the paradox that appears on p. 184 of the fourth edition of methods of logic, a paradox which is strictly an artifact of a tool of logic, namely, the rules of quantification.

Another problem to keep in mind is Geach's critique of supposition in reference and the generality. That critique is based on interpreting sentences using a quantification in terms of sentences using proper names of individuals. Maritian's theory of supposition, a theory which he in effect develops further here, the does not fit that interpretation. Not only does he interprets quantification in terms of a vauge individual, but that individual being only be a possibly existing individual, as Maritian says in formal logic.

On p. 738 there is good material for a reply to those who, probably influenced by Gilson, like to quote where Maritian talks about the metaphysian chasing essences. The Joe Evans was point out that in those sentences Maritian was hardly speaking formalissime. In any case the statement about the bytes of Platonism about two-thirds of the way down the p. 738 should silence the critics. In the same spirit see footnote 5 0 on p. 7 3 9 where he talks about the equivocal character of calling necessary truths about existence essential. It is almost as if he was replying to the Gilson in advance. And see the second paragraph on p. 740.

Note that in the last sentence of that second paragraph he uses the word constanter in the sense of to verify. This becomes important in a few pages.

At the top of p. 7 for 1 he described the possible existence attained in scientific judgment about existence has atemporal. That is exactly what I imply in my things object article where I've used the example of whether or not a statement will still be true next Tuesday.

The statements at the bottom of p. 741 and the top of p. 742 bear directly on the geach's critique of supposition. If he seems to saying the herer that the existence of the vague the individual is actual rather than possible existence, don't forget the section in formal logic, after the discussions

of the syllogism, where he replies to problems concerning existence. The reason he wants to call that existence actual here is that he is a leading up to a discussion of two problems from Aquinas. Each problem is other than the problem of supposition. It is not the problem of supposition that requires actual existence here. The first It is a problem which he describes in the middle of p. 742 as concerning the integrity of human knowledge, citing some proof texts from Aquinas. The argument Aquinas gives their, at least as cited by Maritian here, I mean the argument concerning sleep, concerns the psychological conditions for human knowledge, not its logical properties, like supposition.

He looks to those texts of Aquinas for aid in solving the second problem. Those texts gave him an idea he needed to solve a problem that he dodged in the Degrees of Knowledge. This is the problem I described in the note 2 of my article Maritian s views on the philosophy of nature, on p. 216 of Henley's edition of the conference seminar on Jacques Maritian s the degrees of knowledge. Maritian found a phrase in Aquinas that he felt obligated to account for. But the foregoing any further notice that the phrase occurs in Aquinas only because he found it in boethius and so felt obligated to account for it. It is very hard to do philosophy. It is even harder if you try to do it by way of commenting on a text. But here Maritian is trying to do philosophy by commenting on a text that is itself a commentary on another text. The difficulty is compounded geometric.

As I point out in the footnote, Maritians solution in the degrees of knowledge leaves something to be desired. P.s 744 and following of the essay on major logic is proof that Maritian thought so to. These pages amount to the analysis he should have given in the degrees of knowledge. And the only reason we spend so much time on this otherwise secondary point must be that the realizes he has to do something about the way he left the problem in the degrees of knowledge.

I am also pleased to point out that the solution I suggest in the footnote is basically the solution Maritian himself came up with here.

At the bottom of p. 744 in makes reference to following the remarks that had just been recalled. The context shows that the remarks sees referring to our the remarks about Aquinas on the integrity of human knowledge required in sensory awareness of actual existence. On the top of p. 745 be the first to the existential verification of scientific judgment. This distinguishes his views of verification here from the strange use he makes og it in those sections of the degrees of knowledge that my footnote refers to. He has already said on p. 741 and I think elsewhere that the existential aspect of scientific judgment is secondary and material relative to what a scientific judgment is of itself and formally, namely, bearing on the necessary, the universal, and the possibly existing. So it is only that secondary and material aspect that he means his use of verification to apply to.

Next in the middle of p. 745 he referred to the place of the verification of judgment saying that it is the place where by means proper to science the truth of the judgment is demonstrate. So he is not talking about the means of demonstrating, in other words the means of scientifically verifying. He is talking about the existential place of verification. In the last sentence on p. 7 4 5 he says that By the verification or the realization of judgment in the sensible or imaginable the does not mean the method of demonstration but a limit or they are ear of the universe in the guide to these two times of knowledge. Perhaps the best way to understand this is by contrasting these two kinds of knowledge to metaphysics, which he also has in mind here. The truths of metaphysics, or I should say the you of the truths that metaphysics knowns is not limited to the sensible moral or the world of imagination. The sensible world constitutes a barrier be on which the judgment of physical knowledge have no value. The directly or indirectly imaginable constitutes a limit be on which the proposition of mathematics have no value.

Perhaps another way of saying it is that propositions of physical knowledge are verified for the sensible or physical world only. The propositions of mathematics are verified for the world of the directly or indirectly imaginable. The place of demonstration, in other words, is the zoned of reality for which a proposition is true. And that is what I mean by the ontological aspect of the judgment

in my footnote, namely, the zone of reality to which a proposition conforms.

On p. 746 you may seem to fall back into the problem that he had in the degrees knowledge. About a quarter of the weight down the says that the affirmation of metaphysics do not rely on the "constations" of experience. That word must mean what we ordinarily mean by verification. In the next sentence he says that it is by means of the fax of experience that metaphysics there applies for demonstrates its conclusions. There may be a mess print or words missing from second sentence since its two clauses seem to be intended to contrast with one another, even though there is no adv. warning us of that fact. But we do not need to postulate a printing their to resolve the apparent contradiction. It is clear from the context, both here and on the following pages, that the verification he is talking about in the second sentence is verification of the existential judgment which is included in scientific knowledge in a secondary way and by super abundance.

Starting on p. 751 he says some very interesting things about the relation of empirical science to existence. I believe that one way to appreciate what he is saying is to consider the theory of the philosophy of nature that comes from the river forest school and from Vincent's Smith. They claim that the most essential difference between the philosophy of nature and empirical science is simply that the philosophy of nature is more general. But in what sense are the truths of it takes last general than those of the philosophy of nature? Are not the fundamental laws of physics true of everything in the universe? And if so how conveyed the last general than the truths of philosophy?

The answer is that the truths of philosophy apply to any possible universe, not just this universe. So the truths of philosophy are not more general because of the way they referred to the actual universe, but only in the sense that they apply to all possible universe is while the truths of physics do not. And that is just another way of expressing was Maritian is saying in these pages.

Contrary to initial appearances however Maritian is saying the same things about the truths of

science that Kripke says. Opposite appearance may be given by Kripke's idiosyncratic way of speaking about possible world. The says for instance that the gold is a metal is true in all possible worlds. That many of pure to contradict what Maritian says about the truths of science holding for the actual world but not necessarily for all possible world's. But all Kripke means is that, since the gold is a rigid designated or, any universe in which that which we call gold would exist would be a universe in which the gold is a metal is true. And Maritian would agree completely. Kripke is not saying that the gold must exist in all possible universes. But Maritian would say that substance must exist in any possible universe, and that since any limited essence does not contain its own perfection, accident must exist in any possible created universe.

To take another example the laws of motion and that physics fines true of this universe need not be true in every universe in which motion exist. But in every universe in which motion exist it would be true that what ever is moved is moved by another, that motion is the act of what exist in potency in so far as it is still in potency, and so on.

This concludes my comments on Maritain's draft on Major Logic.

10-13-00

Here I resume my comments on jacques maritain's philosophy of science. These comments come after re-reading chapter 4 of the degrees of knowledge, up to the section on the philosophy of nature, and beginning to re-read chapter sets of reflections on intelligence. On p. 182 of the latter, he makes a very important statement about what he means by the knowledge of" what things are" that the scientists cannot obtain but that the philosophy where would like obtain. He says that physics of stains by definition from considering in things anything other than on what mathematics sitters, and therefore it ceases to seek directly the knowledge of that which it is and by consequence of true principles of sensible reality. What does the mean by directly?
He immediately notes that all speculation on the nature of the would be for such a science an

auxiliary hypothesis. A more or less convenient auxiliary, arbitrary, and accessory hypothesis designed to hold the imagination. He could not say in a much stronger way that the kind of philosophical analysis of what things are that he would like to have, the kind he describes as knowing the nature in itself when he states that science cannot know the nature in itself, is not something that science would like to have but cannot get. That is, it is not something that the scientists as such would like to have but cannot get.

So examples of that kind of knowledge would be scientifically irrelevant. Such would be the answer to the question of whether there is more than one substance in the universe. The scientists could not care less. Knowing that there was would not help the scientists at all. One implication of this is that philosophical truths is not going to affect the scientist on our use of beings of reason at all. Knowing a philosophical true will not change the need for being of reason A as opposed to being of reason B.

So when he sounds as if he is disparaging science because science does not know nature in itself, we must keep in mind these kinds of examples. He is only saying that science cannot obtain that kind of knowledge. And when we look at the kind of knowledge he is talking about, we see that there is nothing at all wrong with the fact that science does not obtain that kind of knowledge. There is nothing at all wrong with that fact especially from the point of view of science. The kind of knowledge of what things are attained by philosophy or commonsense is not a better scientific answer to the question what things are.

Still is crucially important that Maritain has this other kind of knowledge for his philosophy of science. In fact, as compared to other contemporary philosophies of science which have no standards other than the empirical and a logical, Maritain's philosophy of science must seem to them to be and hypothesis that is at best auxiliary, accessory, arbitrary, and having value only for the imagination.

Consider the issue of scientific realism. If the science is our only kind of knowledge, if there is no other kind of knowledge that put fro by a standard for questions about what is realism and what is not, how can there even be an issue about scientific realism? Must not what ever science says about anything in the only standard for what is real and what is not? Or, if someone does not want to talk about scientific realism, is into the most they can say something to the effect that there is no such thing as realism? Or they do not want to use the only possible standard for realism as a standard for realism.

The following is not an adequate reply to this objection: we define scientific realism as the affirmative answer to questions like does science require us to believe in the truth of statements like "atoms exist." Can compare" atoms exist" to "En-lil's roar occurred". But truth of the latter would imply that En-lil exists. But compare "En-lil exists" to "Peter Pan exists". Neither En-lil more Peter Pan exists. But when we say that En-lil's roar occurred, we do have knowledge of the existence of something, something other than day and En-lil whose existence En-lil is postulated to explain. So even though we have an incorrect answer to the question "what is it?" For this "something", we know that the senses give us evidence for an affirmative answer to the question "is it?" Or the question "does something exist?" So that we need an explanation of the kind that En-lil's existence was meant to provide us.

So En-lil's existence provides us an example of what Maritain means when he talks about our knowledge not being symbolic as to the existence of atoms but symbolic as to the nature of that which exists when atoms exist. If we do not have, still we certainly are correct in thinking that our concepts of atoms is an attempt to describe something that does actually exist, like our concepts of En-lil's war and unlike our concept of Peter Pan. What could an analytic philosopher of science make this kind of distinction and so save his defense of calling his inquiry and examination of scientific realism? Without the kind of alternative standard that Maritain has for knowledge of what exists I do not think so.

We cannot have knowledge that some saying and hearing to some word, whether a name or

predicates,, or pronoun, exists unless we have at least some true knowledge of what it is that exists. We cannot know bare unspecified existence; we can only know the existence of something. What can someone like Quine make the kind of distinction that Maritain makes between knowing whether En-lil exists and Peter Pan exists? Both of these assertions are false. And they are false because of what it is that is asserted to exist. And since all kinds of knowledge for combining are really forms of the same kind of knowledge, namely, empirical knowledge, falsehood in this respect would leave no room for truth in the other respect.

So Maritain's "unrealism" is almost the antithesis of, for example, rorty and von Frassen. Compared to them he is almost a complete scientific realist. Moreover, the default positioned for him, that is the default condition of science, is not the use of beings of reason. Nor is a theory-ladeness of meaning as a universal proposition a problem for Maritain. Maritain has standards for arguing that something is in this soluble believe being of reason in in this soluble believe particular case. And his statements about the relations between fax, Law, and theory need only be verified by the relative position in science of particular propositions.

In the degrees of knowledge, p. 164, and about the middle of the p., he precisely affirms that the reason he can recognize the real estate value of scientific knowledge is that he has another way of knowing, namely, the philosophical way that there are substances and natures in the physical world.

On p. 163, near the bottom, he says that in science symbolism and realism are indissolubly united. This distinguishes him clearly from traditional analytic Instrumentalism. On p. 160, he explains why he is more realistic Eddington. He goes on from there are to explain how his theory is a realism even though it talks about symbolism at the same time.

But perhaps most basically and most to the point is the fact that he distinguishes different meanings for the word "real" in philosophy, mathematics and science. In making this distinction,

he is an effect is saying to Quine go ahead and quantify over any entities you want. For the scientist to assert the existence of, for example, a four dimensional continuum does not commit the philosopher to asserting its existence.

Shifting to another topic: on p. 183 of reflections on intelligence, he states that science occupies itself with causal relations in order to establish mathematical functions to which science tends and which indicate simply how one quantity varies when another quantity varies. He goes on to speak as if this is the only thing that science deals with. But in this book and elsewhere is clear that he knows that science does not deal with pure quantities away mathematics does would always deals with a quantity of something.

But his point about mathematical law considered as such is important. The angles of a triangle vary with the likes of its lines and vice versa. The relation between the lengths and the angles are not relations of efficient causality. So Maritain is obviously write about that point. But he does not imply, in fact be everywhere shows that he knows the opposite, that quantitative relations cannot reveal true about causal relations, or that quantitative relations cannot be helpful in learning something about causal relations. He emphatically affirms that the reason why quantity and quantitative analysis is helpful in science is that physical causality is conditioned by the first accident of matter, quantity.

There are millions of examples where a variation in the kind of quantity that conditions that affect cause produces a proportionate, that is either an exactly equal change or at least a specifiable change, in the quantitative conditions of the effect. Changing the number of volts, of pounds, etc. produces a change in the number of amps, watts, etc. But the reason why variations in quantity can be informative and is causal way is that we are always dealing with quantities of something or other, not pure quantities. Still, knowledge of these quantitative variations alone does not

necessarily get us any closer to knowing what the inner nature of these some things are. We still don't know what electricity is or what gravity is.

However, point about the variations in quantity not being directly causal leads to an obvious answer to the very first problem I had about Maritain's theory about the appropriateness of using mathematical beings of reason in physics. The first thing he says in trying to explain why this is appropriate is that quantity is the first accident of physical thing, and as a result all of their causal interactions are quantitatively conditioned. But if that is the reason why it is appropriate to use mathematics to study physical things, then the basis for the appropriateness is real quantity, quantity that is not a being of reason. Why is it that this real being provides a reason for being use of nonreal beings?

The answer that I did not see clearly before it simply that no matter how real quantity is, quantitative variations are not causal explanations. But the physicist wants explanations, not just numerical data unexplained. Where does she get these explanations? Real quantity cannot provide them. As such, there is nothing efficiently causal about the variation of one quantity in connection with the variation of another. On the other hand, the physicist needs an explanation that will yield numerical results. Where she going to get that? Only from some sort of quantitative explanation. But the explanation In terms of real quantity; so it must be in terms of nonreal quantity.

However, it is possible that the argument of the preceding paragraph proves too much, if it proves that mathematical science must always use beings of reason, since Maritain rightfully denies it must always use being of reason.

In the degrees of knowledge p. 170, he says that the physical space of science depends on the measurable properties of bodies. But we can know those properties only insofar as we are capable of taking the physical measurements that reveal them. So the physical space of science

depends on measurable properties of bodies, and those properties depend on the physical causal conditions that determine what our measurements are able and are not able to tell us. Because measurements are themselves physical events subject to physical causal laws. So if physical causal conditions prevent us from making measurements that are reconstructable in Euclidean fashion, then....

Such "non-Euclidean" limitations to our ability to measure would be, for example, the variations in measurements of distance in tying due to the relative motion of the coordinate systems, non-simultaneity, etc.. Here the causal conditions, however, need not be efficient causal conditions, at least not in a mechanical sense of efficient causality. But we certainly should not strict efficient causality to its mechanical meaning.

Considering physical causes in themselves amounts to considering them "in their qualitative reality." And since science must fall short of complete geometrization, science must fall short of complete elimination of quality. In other words, science is always dealing with quantities of something.

My problem was how does the fact that quantity is the first real property of real physical beings justify the use of beings of reason in physics. Another answer that I ignored appears immediately after Maritain that statement about real quantity. He immediately adds on p. 143 that quantity can be considered in a different way, namely, the mathematical way which abstracts from its conditions of real existence. The implication is that when we apply mathematics to the study of physical things and even physical quantity, we are by hypothesis fueling physical reality from a point of you who that abstracts from the conditions under which quantity exists, conditions necessary for the possibility of quantity's existence.

The following remarks concern mathematics itself: is Euclidean space the basic kind of space that all other kinds of space depend on? When I say that my straight line is shorter than your geodesic,

you reply by asking what kind of space my straight line is embedded in. So the question is does three-dimensional space come before two-dimensional or one-dimensional .

But the Euclidean starts with a point. He need not start by saying that the point has one particular position rather than another. If he said that he would be assuming that the point is embedded in the space as characteristics are already determined. Instead, he can generate by asserting that the point begins to move. (But when we say that point begins to move, are we making the implicit assumption that appointed does have position relative to which the motion takes place? Or can we say that the motion creates relative positions by creating one-dimensional lines?)

I want to say that as point moves from A to B, a line is generated; a line comes into existence for the first time. So a dimension, a single dimension, comes into existence for the first time. Now there are an infinite number of ways for the point to move between A and B. I now want to say that the shortest of these ways of moving is what I will call a straight line. Can I say that without implicitly presupposing some background space, at least two-dimensional, to provide some sort of standard for measuring whether one distance is shorter than another? Perhaps not. Can I, for example, assuming that in all of these different panel this appointed is moving at the same speed? Then the path that takes the police to is the shortest distance. But am I not assuming a concept of distance already given when I speak of speed?

Maritain and wants to say that the dispute between intuitionism and formalism can be solved by just considering the fact that certain objects of mathematics are representable in the imagination; therefore, he claims, these objects must not contained in the contradiction. Perhaps that claim can be defended in the following way.

Possibility is best proved by actuality. The actuality where the objects mathematics first exists is in sensible things. But the quantities found in sensible things precede the qualities of sensible things. So quantity that exists in the sensible world is objectifiable in abstraction from the sensible

qualities without which they cannot actually exist. Still, the possibility of these quantities existing is proving by their actual sensible existence. So if we can connect to some construct in capable of sensible existence with the imaginable quantities abstracted from sensible existence, we can connect it with possible quantity, that is, some quantity whose internal lack of contradiction is already known. So if we can represent this unreal space by way of an imaginary space, we have shown that the unreal space does not contain any internal contradiction.

But notice that, as Simon says in his article on mathematical abstraction, the square root of the negative one is a contradictory idea. Still, still mathematics successfully makes use of it.

1-1-01

In more than one place, Maritain opposes knowledge of the nature of something, or of causal relations in nature, to knowledge of how one quantity varies with another quantity. What does he mean? As such, the occurrence of one quantity dairying with another does not express an efficient causal relation. For example, as the science of a triangle very in length, the angles of the triangle very in size. Yet there is no causal relations between them. But Maritain does not say that this prevents the scientist from knowing that the quantitative relations reflect and indicate a causal relation and so are a tool for knowing truths about causal relations.

Perhaps one way to express the import of Maritain's into the role of mathematics in physics is this. Mathematics is our most powerfully precise discipline. But because of the fact that it cannot reveal causal relations as such, together with all the other natural limitations on our ability to know the natures of things that we can become aware of root sense experience, that is, all the nonmathematical limitations on these things, we can only get a fuzzy, blurry picture of the inner nature of things through our most precise discipline.

He claims that there is such a thing as the epistemological species he calls" biology," in which

mathematical method will always be subordinate. He does not say that in what is biology is sociologically mathematics will always be subordinate. He says the opposite on p. 198 of DOK.

Scientists do not need an ontological/dianoetic understanding of causes to solve their problems and explain their facts. But where schematic sciences can explain their facts proximately without ever using beings of reason, metric sciences cannot. Why? The mere fact that the ontological natures hidden is not a sufficient answer, because it is hidden from the schematic sciences as well. Maybe it's that the explanations of the metric sciences are more remote, not relative to their own facts, but to the facts of the schematic sciences. More remote and hence deeper. And as deeper, closer to the unattainable area that would be needed to know the ontological explanation of schematic facts.

3-5-01

Mathematics is the most precise knowledge humanly possible. But relative to the intrinsic natures of things, the use of mathematical conceptualization can give us only a fuzzy, blurry, through a glass darkly, picture of thing's. So the most powerfully precise discipline gives us a blurry picture.

On the incommensurability between "abstract" as set of metaphysics, on the one hand, and as set of mathematics in logic on the other. When referring to metaphysics, we are talking about the abstract as of the content, not the absence of content as in the case of systems for calculation. The content in our knowledge of how to calculate is extremely concrete, not abstract in the metaphysical sense. That is why calculational methods are so certain and so helpful, namely, because the content that we need to know about is so concrete.

In mathematical abstraction week in view a quantity, for example, 2, not as the number of, for example, human eyes or human ears, but as the object of an algorithmic operation, the target, the result, of operations on symbols. Metaphysical abstraction is the opposite. Precisely because of

the content that remains in metaphysical abstraction, calculational methods are irrelevant, indeed impertinent, to metaphysics.

August 3rd, 2002

Is there any evidence for Maritain's claim that we have an intellectual desire for a philosophy of nature, not just an empirical science of nature? Yes, that evidence is a constant tendency to make science into a philosophy of nature, for example, quantum mechanics's Cats Problem (I can't remember the guys name right Now); that proves Maritain's claim.

In the mathematics of quantum mechanics, there is nothing to give the article this actual position aware that, this actual speed or that, until we intervene to measure it. But in reality it has either this position or that, either this speed or that.

xxx April 15, 2005

The following comments are prompted by reading or rereading essays of Sikora on the philosophy of science.

The article "the "problem" of induction": reading from the margin on page 30: the process of induction in empirical science is not that of multiplying instances until we convince ourselves that a universal connection holds. Consider the proposition "what is combustible." We multiply instances of burning what to answer such questions as "is loaded combustible as such, or is only a particular kind of wood, or word in a certain condition and combustible?" The question induction answers is this universal causal connection between universal objective concepts. So we do not multiplied instances for the sake of increasing are certitude. We multiply kinds; we very the circumstances; to determine which features of a given situation to order not have causal connections with others. Sometimes we need only a very few variations to make that connection.

Page 30: physical theory "approaches the natures symbolically, through the use of constructions which bear some analogy to the real nature, although they themselves are irreducibly perinoetic."

Page 32: "if there is no abstractive intuition of the phenomenon, there can be no possibility of relating the abstract theoretical constructions of modern science to the concrete observable to which they are meant to refer."

In "the Christian intellect and the mystery of being," page 134, after talking about the obstacle to dianoetic knowledge that contingency presents, Sikora goes on to say "this obstacle cannot be overcome unless we abstract further, this time from all the sensible determinations of mobile being, from all that by which we may distinguish mobile beings from each other individually and specifically. Only by eliminating the multiple determinations of matter and looking at a common determination, that is, extension or quantity, can we hope to reduce material being to a completely intelligible in necessary unity. But to do this, to rise to the second level of abstraction, we must leave one of the necessary presuppositions of mobility -- the very is determinations which the ultimate principle of mobility, matter, can have. But this means that we have left the sphere of the mobile as such altogether; for matter can be a principle of mobility only as long as there are contrary forms to determine it. At the second level of abstraction we can achieve more unity, a more complete science, but only by renouncing our original aim, which was to unify the mobile precisely as mobile."

On page 136, he adds that when we can succeed in constructing a mathematical theory of nature, through measurements which connect mathematical concepts to experimental concepts, "we have the ideal type of phenomenal science; for in a we have succeeded in substituting mathematical conceptions, with their complete intelligibility imperfect unity and necessity, for schemes which have intrinsic reference to the sensible precisely as qualitatively sensible, with its radical multiplicity, contingency, and unintelligibility."

On page 135, "we can pierce through phenomena to the general nature of mobile reality, but for more detailed scientific knowledge we are safer to remain on the level of the phenomena themselves, which could tell us something about essences But do not clearly revealed their intrinsic intelligibility. The phenomenon are signs of the essence but cannot lead us to the fullness of the specific essence itself. The intellect may attempt to surround the essence as well as possible, but cannot often breakthrough the barriers of phenomena to completely grasp the essence itself."

I add in the margin that the phenomenon always does tell us something about essence. For example something red is necessarily something whose essence permits it to manifest itself as red. But that fact does not distinguish the thing from other red things: nor does it put them in the same genus except very, very remotely. Red things can be substances whose only similarity is a common, contingent accident of being red.

Continuing on page 135, Sikora says, phenomenal knowledge begins in the multiplicity and contingency of phenomena; and because it cannot clearly attain the real unities and necessity's behind the phenomena, it seeks unity is and necessity's of a logical kind in conceptual schemes -- "constructs" and "hypotheses." It seeks for phenomenal consistencies and postulates conceptual necessity's to account for them. It will construct unitary logical essences since it cannot grasp the real essences; and it will postulate necessary general laws since it cannot see through the contingency of the real world to the really necessary law's. Yet these logical essences and laws are not without relation to the real essences and laws; for this knowledge begins in phenomena, which govern the intellect in its formation of these logical beings, and the latter are resolved again into the phenomena themselves. Thus they are "second level signs " of the real essences and laws.

By "logical" in this last paragraph and elsewhere in Sikora must mean on the level of being of reason in general, not on the level of logic in the strict sense of knowledge of objects as objects. In

the margin I say, logical abstraction, that is, abstraction from subjective parts, that is, abstraction covering many instances as opposed to the other kind of abstraction described by Simmons, abstraction from material contingencies, that is, from dispositions of matter contingent relative to the abstracted nature.

Page 136, "beings of reason with a foundation in reality": "foundation in reality". You must be able to replace statements using the beings of reason with statements, perhaps many and complex, not using the beings of reason.

Page 137. There are two levels at which science may be used by the philosophy of nature to extend the philosophy of nature's knowledge of the real. The two levels are facts and theories. Sikora gives the following as "scientific facts from which philosophical facts might be extracted". The conservation of energy, the conservation of mass, and the merging of these two in the conservation of mass-energy, the Einsteinian conception of time, the laws of motion, the law of gravitation, etc.

Page 138: the movement of philosophical knowledge is toward real unity, necessity, and intelligibility, and the movement of scientific knowledge is not precisely away from but rather around the real unity, necessity, and intelligibility.

If primitive man knows "what are" the things of his experience, but not quidditatively, how and why does science's nonquidditative knowledge of nature's succeed where primitive man's does not? It is not just that science knows more detail, although it certainly does, but science knows more controlled detail. That is, science screens out false causes by controlled experience governed by regulative principles. And a science can apply mathematics and measurement. Then why is the knowledge of achieved by science still perinoetic? Because science cannot exclude the opposite from possibility.

On page 139: science does not concern mobile being as such but mobile being as manifested in observable phenomena. "It is the very nature of mobile being that it presents these two aspects, a consequence of its composition from matter form. There is not merely a difference of methods in the philosophy of nature and the natural sciences. The different modes of conceptualization and reasoning employed in each are ultimately dictated by this polarity of matter form in the very heart of mobile being, and through these different methods we attain quite distinct aspects of reality."

Page 144: "1 then is the set of laws of falling bodies as laid down by Galileo. 2 two is the set of laws of planetary motion laid down by Kepler. Both 1 and 2 are beyond the phenomena themselves. They represent a theoretical interpretation of the phenomena. The actual laws of the phenomena are not 1 and 2; these are only abstract idealizations and i nterpretations. Finally, L is the Newtonian law of gravitation which links 1 and 2 together. Again that this is not itself in observable; it is only a construction of the mind."

Page 145: positivism ends "by simply distinguishing between the phenomena and the intellectual constructions (themselves confused with their symbolic and imaginative expressions) which unify the phenomena." So here Sikora seems to use the word "symbolic" with reference to science in away that does not seem to refer precisely to sciences theories.

Page 146: "science does not seek to penetrate beyond the observable phenomena in the formation of its concepts."

Page 147: the "theoretical structures of science do not constitute the essence of reality; in their construction we are not looking into the ontological dimensions of the real." Does this statement mean anything more than the fact that the theoretical structures of science do not objectify by means of ontological concepts?

Page 148: "I say "myths," not in any derogatory sense but rather in the sense of "likely stories"."

See also the good footnote 10 on this page.

See Sikora's good comments on organicity on page 149.

On page 151: "modern science of itself is not concerned with the real causes of phenomena." No, modern science knows real causes but does not know them quidditatively.

On page 155: "actually do enable us to discover new laws in accordance with their predictions! This is a sign that such constructions, however much the result of human art, nevertheless do have a foundation in reality."

Page 156: "on the theoretical level there is no direct knowledge of reality; the theory serves merely as a logical principle of unity." But the adjective "direct" in the first statement does not justify the adverb "merely" in the second statement. The theory is not merely a logical principle of unity, as opposed to a way of knowing nature. It does not know nature directly but does know it nonquidditatively.

"And yet these phenomena are a feeble kind of being, after all. They do have in themselves some of the being which can satisfy the intellect were ever it is found."

Page 157: "the physical theory does imply the very same order of phenomena as the real natures in fact produce. Hence the theoretical structure must be said to have an analogical resemblance to the real natures of thing's. . . . . moreover, the very fact that physical theory does imply an order which is actually found in phenomena, and the very fact that there is any order at all there, point out to the philosopher that physical science is studying only the surface of an ontological depth. The revelation of the reign of mathematical intelligible laws in the phenomena universe points beyond the merely phenomenal universe." Physical science "points beyond itself to higher knowledges of beings which are in a fuller way than the phenomena are."

Page 159: what the physical scientist "is looking at is not just appearance but rather being-appearing. his only choice is between an uncritical philosophy and a critical philosophy. Thus, the physical scientist in the concrete is never engaged in that pure minimum of speculative activity in viewing the phenomena alone, that we spoke of earlier. he himself is using, whether confusingly or unconfusedly, his phenomenal data to arrive at some knowledge of the nature of thing's."

Page 160: "as Whitehead has pointed out, the physical theory itself seems to suggest that physical reality is organic in its structure. . . . hylomorphism can account for organic bodies as well as homogeneous bodies, while simple mechanism could never account for organic structure."

Page 101: "Aristotelian analysis, when directed toward sensible being, is an analysis of the being-which-appears rather than of its very appearances; in this it stands in sharp contrast with positivistic analysis of the very appearances themselves."

From Sikora's "the scientific knowledge of physical nature" page 91: "forsaking the possibility of a scientifically philosophical knowledge of the individual in its individuality, we abstract from individual sensible matter. . . . but common sensible matter is also a principle of specific multiplicity and blocks a reduction to complete unity even on this abstract level. It is only in the determinations of matter which are common either to the entire realm of mobile being or too large segments of it that we ourselves can discover sufficient unity and intelligibility to constitute science. It is possible for us to know of prime matter and substantial form in general; the potency of matters infinite, so that the possible determinations of matter are infinite -- thus the full intelligible depths of substantial form are found to be refracted in countless ways through the prism of prime matter. The unity and intelligibility which we find are broken into innumerable fragments."

Page 93: "we do possess an obscure Dianoetic knowledge of these things. Through any sensible manifestation we come to know the trains phenomenal intelligible principles, however obscure is

this knowledge." . . .

Page 94: "a strict correspondence between the science and the actually real natures of things would be purely in simply accidental." So he seems to be saying that strict correspondence is possible, even though it would be accidental, is he saying that we could guess the real nature but not know that it is the real nature?

Page 96: "the theory itself gives no insight into the real world (not even the real world of phenomena), but only a logical insight to necessary connections which it itself has constituted between concepts and laws through construction of complex logical entities." No, that is not Maritain's position. Theories do give some insight into nature.

Page 97: the theory "although removed from intuition of realities quote nevertheless plays in physics a role not unlike that the philosophical definition in philosophy." No, as a Sikora himself says elsewhere, the possibility of being expressed by the philosophical definition corresponds to the possibility of observation is expressed, not by theories per se but by scientific definitions.

Page 98: "it is impossible for any physical concept to be purely quantitative. Even measurement presupposes a qualitative diversity between the measuring and the measure. Otherwise, how would we even though their duality? Even if such measurement were possible, or measurements would all be of the same; we would not be measuring diverse properties of things. We would not know the difference between types of phenomena to be measured; we would not draw distinctions between gravitational an electrical phenomena, between magnetic and thermodynamic phenomena.

"Clearly then, while the physical concept must exhibit a quantitative structure, this must be seen against a qualitative background. The observable to which physical concept refer is both qualified and quantified. Physics seeks the quantities here contain, but can only do so by excepting what is, for it, and irrational element, the explanation of which is outside its province --

the so-called "secondary qualities." . . . "we should also note that even here in physics it is impossible to avoid some knowledge of being and substance, which lies at the bottom all or intellectual life. Even the conception of the "observable," there must be included a vague notion of the trans-phenomenal "thing." But there is here no clear penetration of its nature -- we behold the reality but not in its intrinsic essential intelligibility. We always, even considering phenomena, abstractly visualize the subject of change in the world, we never confront a pure flux; yet here we do not see clearly the transphenomenal nature."

And see the next two good paragraphs on pages 99 and 100 on how substance is obscurely grasped by the scientist.

Page 106: "we may note that the concept of mass is actually a plurality of concepts, corresponding to the diverse modes of determining the mass. These concepts are all linked together under one general concept in and through the physical theory."

Page 17: "these concepts do carry an obscure reference to substance. Mass is not conceived as an aspect of a pure flux; it is an attribute a vague "thing." Similarly, gold is here the name of a vague "thing" which manifests itself in definite ways under definite conditions."

From the margins starting on page 110: Theories basically provide higher (more universal -- think Humean causality, think ideas logically unifying data without new insight into reality) from which both previously known laws and new laws can be deduced. But insofar as new laws can be deduced, there must be some new insight, but what kind of new insight should we call it? When (ideally) all previously unknown phenomenal laws are deduced, they are deduced from higher laws governing newly postulated entities or properties of entities, that is, entities and properties whose "behavior" is described by the higher laws. These are quantitative descriptions, that is, descriptions of how quantities very with each other. From them, more laws describing quantitative variations follow. But all we know about "what" electricity and gravitation are is how some postulated entities (gravity waves, Mass. as "cause" of -- time curvature) quantitatively behave.

And not only do mere quantitative descriptions not give us Dianoetic knowledge or ontological objective concepts of those entities and properties, but those entities and properties will be fewer then the ontologically necessary ones, that is, than the real entities and properties. So those quantitative descriptions at the theoretical level will not even be direct descriptions of real ontological entities. Rather they are descriptions of certain effects of real entities and properties that are more complex entities and properties than those of the theory. But those natures are the ontological source of the necessities on which the true simple scientific theory bases its good, successful, predictions. So the reason the theory can predict correctly is that it does postulate new necessary (quantitative) connections from which new phenomenal laws can be deduced. The theory does not reveal the ontological bases of these connections dianoetically. But the theory is based on those non-dianoetically known ontological entities because those entities are the basis of the new universal laws that the theory postulate. Those entities are the basis of the universality of the universal truth of the deduced phenomenal laws. The ontological necessities make the newly deduced phenomenal laws universally true (as the theory claims). But the merely postulated theoretical universal laws do not directly reveal the ontological necessities on which the success of the new theoretical universal laws in predicting new phenomenal laws is based.

Big digression: why do we accept theories on the basis of predicted results when the fact that the consequence of a hypothetical proposition is true does not prove that the antecedent is true? There is a causal reasoning involved in this acceptance. The causal reasoning does not involve nature directly But involves the reason why the theory successfully predicts the phenomena. There must be a reason why the newly postulated theoretical laws succeed in predicting phenomena that were not known before. The question is how likely is it that the connection between the new laws and the successful predictions is entirely accidental. That is how likely is it that there is no causal connection between what actually produces those phenomena and what nature is as expressed by those laws. The more successful predictions we make, the less likely it is that the successful predictions are not based on the fact that the new universal laws actually describe something going on in nature. The better the theory predicts new results, the less likely it

is that the prediction is not based on a grasp of what is going on behind those results in nature. At some point it becomes unreasonable to believe the opposite of the assertion that the theory is true, that is, is a true description of nature.

Page 111: check the reference to Maritian, French edition, page 111. Does Maritian really speak as apparently an instrumentalist the way Sikora quotes him here? "But these intelligible principles of phenomena in their phenomenality pertain entirely to the sphere of formal causality." No, no, no. See Yves Simon on efficient causality in science in "foresight and knowledge." That is, the section on proper causality in science.

See the good pages on structure of physical science beginning on page 116. Newton's laws of motion and at the law of gravitation "are not laws in the ordinary sense of physical law as a description of the regularity of phenomena. We cannot observe that Newton's laws hold. For they are not a simple description of our experience; they represent an idealization, and abstraction, and interpretation. As Poincare has pointed out, they are conventions; that is to say that they exist on the level of physical theory rather than of physical law.

With these fundamental axioms, together with the accompanying Mathematical rules of manipulation and the operational interpretations of the symbols, it is already possible to predict and unify many phenomena of a relatively simple order. For a more complete unification of phenomena, it is necessary to develop, by mathematical construction and deduction, more complex "second-level axioms," or theorems, such as those concerning the rate of change of momentum and of kinetic energy, and more complex concepts such as this momentum and kinetic energy. Note that these theories are not observational laws; they do not immediately refer to observable phenomena. In themselves they are only part of the symbolic structure. . . .

"because physical theory becomes physical law precisely at the point where the operational definitions of the symbols are added to give a phenomenal interpretation, the law has an ambivalent character. Its symbolic expression may be assimilated to the theoretical symbolic structure, while its phenomenal interpretations may not be so assimilated."

It page 118: "the mathematical structures are at times regarded as somehow in correspondence with the stable natures of concrete realities. This is the mistake which Whitehead has labeled a "fallacy of misplaced concreteness"." The reference is two page 52 of "science and the modern world."

"Why has this fallacy persisted? There are two fundamental reasons. The first reason: the real nature is the real principle of the operations we observe. Especially if there are a number of such operations, the constructed mathematical essence which itself also, though in the line of "logical causality," Principiates these operations (in their quantitative aspects) would seem necessarily to bear some similarity to the substantial essence. We have here an analogy between the two essences, the natural and the artificial (mathematical), in that they both have intrinsic reference to the same set of operations."

The second reason: although the mathematical structures in physics are logical entities (beings of reason), "they are always conceived after the manner of being, after the manner of the substantial being. And those structures are always conceived with intrinsic reference to physical concepts and physical laws. But, at these lower levels of concept and law, a notion of substance is it securely contained in every item of knowledge. This notion of substance may easily pass out of its proper place into this higher theoretical level of science. There takes place here a simple confusion regarding the location by the intellect of what was only grasped most of securely in the first place -- material substance. Such "misplaced concreteness" can easily occur where the philosophical significance of real substance and of logical entities as not been clearly seen."

Page 119: "the real specific nature can only be manifested through qualitative differences in its operations. Quantity is not principle of differentiation but only of divisibility. Therefore, the quantitative structures of scientific theory do not, in themselves, reveal specific nature's. Second, if the structures predict the phenomena, they do so as a whole. The whole structure predicts the totality of (quantitative) phenomena." There is a reference here to pages 199 and 200 of "the aim and structure of physical theory" by Duhem. Continuing from Sikora: "therefore, it is not possible to set up rigid correspondences between discrete parts of the structure and discrete parts of the

phenomenal real which would be necessary if we were to learn something of the substantial natures through the structures. Finally, the mode of insight in physical science is entirely different from that in the philosophical study of substantial natures." He goes on to describe the mode of insight in science as nonontological on page 120.

On page 120 he says that the theoretical structure does not "formally represent" the nature as it really is; but is "symbolic" of that nature.

Further on page 120 he says that the tendency toward "realistic substantialism" within physics can result in great advances in physics with respect to the prediction of new phenomena, even though it would lead to philosophical error ("it" being realistic substantialism) when elevated to the status of a philosophical principle. We could regard this tendency to realistic substantialism as a methodological principle in physics which does not reflect any philosophical opinion concerning the nature of things at all. (But we must explain why such a methodological principle can be truth producing.)

Marginal comment on the top page 123: a comment comparing the two distinctions, ontological versus empiriological, and Dianoetic versus perinoetic. The first distinction is a distinction between kinds of concept formation. What do we call the second distinction in contrast to concept formation? Is it a distinction between kinds of propositions, kinds of verification, or what?

On page 124, he says that scientific theories "cannot be representative of the nature of reality." "Representative" is ambiguous. Does he mean that the theory does not express, objectify, what is "behind" the phenomena? But we are always postulating unobserved entities to explain the observed, for example, atoms. But postulating the existence of atoms differs from postulating the existence of a substance, of the nature. But does it differ from postulating the existence of substantial form and prime matter? I cannot imagine prime matter and substantial form, but I can imagine Dalton's atoms. But I can't imagine Bohr atoms. Maritain says modern Atoms are

privatively unimaginable since they are defined by reference to sensibly distinguishable phenomena, while prime matter and substantial form are defined by reference to possibilities of existing, not possibilities of the observation of sensibly distinguishable phenomena existing. Substance does not distinguish one sense object from another. Distinguishing existence from nonexistence comes through judgment based on sense and memory or sense and imagination.

What is the difference between "representing" the nature and "symbolizing" it? The objective concept expressed by "man" is not a sign of the nature; it is the nature itself. The objective concept expressed by "mass" (measurable resistance to change, the measure of resistance to change, a quantity of resistance to change) is or may be an effect of a specific nature and so a natural sign of specific nature. But if it is a common natural sign shared by diverse natures, as affects of these diverse natures, it does not reveal what differentiates these natures. "Amount" of resistance to change is already one step away from the nature of "resistance to change." And "resistance to change" is at least one step away from the substantial nature as an effect of the substantial nature. But so is "rational" one step away insofar is reason is an effect of substance. But "rational" describes substance, not reason, as having reason as a necessary effect. (So in empiriometric concepts can only give perinoetic knowledge?)

Page 130: "the formal object in this body of knowledge, therefore, is expressed in the formula "mobile being as manifesting itself through measurable phenomena." We are no longer concerned with being, except obliquely; it is the sphere of phenomena which we study, with the purpose of learning its quantitative determinations. And yet the being of mobile being is not altogether missed even here. It is impossible to conceive phenomena without reference to the substantial existent of which they are the phenomena. Substance remains obscurely even in the perinoetic conceptions of physics, by right on the levels of concept and law, through a methodological fiction on the level of theory. We may say that it is explicitly present with respect to its character as a substantial extended continuum, and implicitly present with respect to its nature, in the explicit conceptions of phenomena. Thus the formal object of physical science contains the trans-phenomenal nature of

mobile being only implicitly and the phenomenal manifestations of mobile being explicitly."

Page 132: "in physical science we are no longer explicitly concerned with the nature of these immobile principles of mobile being But with its manifestation through motion itself." He has just said that the philosophy of nature is concerned with the immobile principles of mobile being.

Page 135: "physical science is confronted with substantial existence the nature of which it does not know, and with a qualitative diversity which it cannot penetrate but only note and measure."

In the margin of page 137: logic studies being as in the intellect, that is, not thoughts of being (that is psychological entities -- one kind of being) but being under the characteristics it possesses as in the intellect, in apprehension. Thus "p" represents a proposition because being in the intellect is expressed through propositions.

Mathematics is Dianoetic knowledge. So dianoetic knowledge is not coextensive with ontological concept formation. For the Dianoetic knowledge of mathematics ignores (abstract from) real existence as such and so from real existence as a means of objectifying quantity.

Page 142: "if any such imagined data and patterns are later found to correspond to the actually observable data and patterns, the corresponding hypothetical natures acquire a much more immediate reference (though still mainly hypothetical) to the real nature of things." He is here commenting on the relation of models to reality as opposed to the theories on which the models are based.

Page 144: the hope for scientific knowledge of this phenomenal world, for the eventual understanding of an order in the phenomena, can be aroused only if some other source of knowledge about the physical real can be found. It is not sufficient to appeal to a purely subjective conviction, to a purely a priori attitude; for our actual hope of finding such order in the phenomenal

world is not merely subjective. It is forced upon us willy-nilly by the world itself."

Page 149: "physical science can achieve much greater clarity over much wider areas and can the philosophy of nature. But this is in great part due to the fact that it does not penetrate the being of the physical universe in as profound a manner as does the philosophy of nature -- the price of profound penetration is often a degree of obscurity in knowledge."

XxxMaritain - T/O - BIG- AA 7-10-91

Qoute Simon on the difference between the correspondence between thought and thing and the correspondence between object and thing. That is the point Maritain learned from Noel's article on the Intelligence and the Real! To know the truth requires knowing the relation between the objects thought about, not the relation between thought and the objects thought about. If we know the relation between the objects thought about, the relation of our thought to those objects follows!

So Maritain starts with a definition of truth in terms of a conformity between thought (i.e., a construct of thought, a proposition) and things. But then how do we know truth? He realized between Reflexions and DOK that knowing the truth required knowing that the object thought about, not the thought, was identical with a thing. So that is why, in DOK, he says a new problem, the problem of thing and object, confronts us. Why does it confront us? Because that is how the truth is KNOWN! This interpretation is confirmed by Simon's treatment.

But of course, objects are not always identical with things, because propositions are not always true. But the next sections of DOK look at this from different angles. First, from the angle of what is "analytically" first in intellectual knowledge. Objects are not always identical with things. But in the case of the principle of non-contradiction, there is no possibility of lack of truth, i.e., of lack of identity of objects with things. Likewise, there is no possibility of our primary

concept, being, not being identical with things, at least with possible things.

Next, if and when sensation occurs, there is identity between the object and an actual thing.

Next, the argument can be extended to intellectual knowledge in general, not just our "analytically first" intellectual knowledge. Every concept represents a possible being. And every judgment requires identity between object and things. So the end of that section goes to prove the assertion made at the beginning, namely, that truth requires thing/object identity.

In all these cases, he is saying that there is a formal object attained. If not, the consciousness to be evaluated in terms of the goal it reaches would not even exist to be evaluated. But in each case, analysis of the formal object and the way it is attained will show that the formal object is attained as a feature of a material object. We can distinguish the formal object only as a means by which something more than itself is attained.

But also note that when Maritain justifies his claim that the t/o problem is the nub of the critical problem, he does not make use of the f/m object aspect of the t/o distinction. He only makes use of the more-than-an-object aspect of the distinction. That is more basic than the f/m object aspect, because it is presupposed to calling f/m objects objects. But the f/m object distinction is itself a case, an instance, of what is an object being more than an object. For what is describable in relation to a mode of consciousness as "formally attained by that consciousness" is never attained by that consciousness in isolation so that what is attained by that consciousness is solely what is formally attained by that consciousness. It is never attained as it is described when called "what is formally attained." For as so described, it is distinguished from what is more than so attained. And the formal object is always more than what is describable as formally attained; for the formal object is always attained as an aspect of a thing, a more-than- formal-object.

It's almost as if Maritain saw the importance of the t/o distinction from Noel and then looked for a traditional "justification" for using the distinction. He found that justification in the f/m object distinction. But the latter distinction had gone beyond Aquinas by the time of Cajetan and Poinsot. Poinsot, in particular, emphasized the "logical" character of the abstraction that distinguishes the sciences. That is, by Poinsot, the logical nature of the characteristics objects acquire as objects was recognized. So the t/o distinction was the one Maritain needed to express Noel's insights, and the t/o distinction developed, historically, out of the f/m object distinction. But he t/o distinction went beyond the latter distinction, even by the time of the commentators.

Try this: what is objectified must be more than an object. But is it the whole thing? Yes and no. What is attained as object need not be described as the whole thing, if and when we are describing it as object. Blue or a patch of blue cannot exist separately from a blue thing. But it can be considered separately and described separately without distortion, when we are describing it as object *in specific opposition to describing what is true of it as a feature of a thing. But even the preceding statement needs the qualification that one of the things true of blue or a patch of blue as as object is that it is objectified as a feature of a thing.

The object must be more than an object, but can it be less than a thing? Only in the sense in which the formal object is less than a thing, but the formal object is never the whole object. The whole object is always more than an object. But the formal object is that about it by means of which it becomes an object, by means of which it is term of a knowledge relation.

Maritain - T/O - AA 7-9-91

Another approach. Maritain gets behind the f/m object distinction to what it presupposes, ie, what it means to call something an object. How do we get from

what it means to call something an object to the f/m object distinction? To be an object is to be term of a knowledge relation. If we assume something is an object, we are assuming it is term of a knowledge relation. Or, if we assume there is a knowledge relation, we are assuming it has a term. Now go from this abstract description to a concrete knowledge relation, like seeing. For a relation of seeing to exist, there must be a term for this relation, something must be attained by the relation. But certain things are true of this term that are not true of other terms (epistemology evaluates what is attained by different knowledge relations and compares them), e.g., it is individual and colored. What is attained by conception, on the other hand, is univesal and need not be colored. But in both cases, what is attained must be more than an object. So what is attained cannot include features, like universality, defined solely by reference to objects as objects.

Also, the fact that seeing requires color to be attained does not mean color is the sole thing attained. For a knowledge relation to exist, something must become an object in some way, by some means, through some feature. But the intrinsic causes of that feature may require that, if it is attained, other aspects causally related to it are attained at the same time. And the causal structure of the act of sensation requires that the real existence of the object be attained.

Maritain transforms the t/o distinction the way Aquinas transformed the act/potency distinction. In Aquinas, t/o may be equivalent to the f/m object distinction. In Maritain, the latter is subordinate to the former. I.e., when there is an object of a certain kind of knowledge relation, the object must possess certain properties to be the object of that kind of relation. I.e., that kind of relation needs a certain kind of object as its extrinsic formal cause.

Thing/object

Maritain tells us that by "thing" and "object" he means the material and formal

objects of knowledge, respectively. That statement is true, but does not reveal Maritain's contribution. He asks us to consider what it means to call something an object of knowledge and what conditions are necessary for us recognize an object of knowledge as such. "Object of knowledge" is a relative concept; it describes something as term of a knowledge relation. But if what is first known about something is that it is an object of knowledge, the term of the first knowledge relation is another knowledge relation, since that is what it is to know that something is an object of knowledge. And what is the term of this other knowledge relation? Short of infinite regress, therefore, what is first known must be known as something other than "an object of knowledge."

Recognizing that something is an object, therefore, is a reflective act bearing on a prior act that recognizes something that is more than an object, i.e., recognizes it as a thing. After we reflect, we can call what is first known an extra-objective or metalogical thing, to distinguish what we first know about it from what is known on reflection. But that which is first known and that which is reflectively known as a object are identically the same thing. To be a thing and to be an object are really distinct. But that which is a thing is only logically distinct from that which is an object.

And when a thing is known, predicates accrue to it describing its status as object that are other than the predicates that describe its status as a thing. For example, the same human nature is universal in its status as object of conceptual consciousness and individual in its status as the nature of Socrates. This distinction between what is known to be true of something as a thing and what becomes true of it as an object when it is so known is necessary for understanding what Maritain's description of the object of metaphysics as possible and abstract and as belonging to the "degrees of abstraction.

Thing-object, material and formal objects, Nov. 20, 94

Maritain wants to argue that the object is a feature, an aspect, of something more than an object, of something that is more than an object. But that it is a feature is given. He argues that by this feature something more than an object is given or is reached. So at least it is a feature of something that potentially has more features, because it, that which is so objectified, is a possible possesser, exercizer, of an exitence that is more than being an object, and hence more than what is objectified in this way, and hence potentially has more features.

Maritain, truth, thing-object, formal objects and material objects, Aug. 21, 94

Maritain seems to immediately identify the thing-object distinction with the material object/formal object distinction and to take the latter for granted. As I point out in "The Problem of Thing and Object in Maritain," what he is really doing, when he introduces the concepts of material and formal objects is to begin an argument(s) that concludes to the identity of formal objects with material objects. Taking a cue from that footnote in The Material Logic of John of St. Thomas, that I quote in TPTOIM: maybe the argument goes this way:

First, truth requires that objects be identical with things that are more than objects. But that means that objects are not, or need not be, the whole of things. In fact, in human knowledge, our objects could not be the whole of things. If an object were the whole of a thing, we could not identify it with another object, which is what humans must do in order to know the truth. So human knowledge of truth requires what the Scholastics expressed by the doctrine of formal and material objects. The formal object must never be alone; it is always known as an aspect of something more than an object and so something (at least potentially) more that the way it is objectified by the formal object.

Formal and material objects: diverse objects can be identical as things only if each object is an aspect (formal object) of something more than an object. (Maybe put in a footnote to Possenti how to justify the link between thing/object identity and material objects and formal objects.) So the question at the end of the first paragraph of the thing/object section, namely, how is it possible for us to know the identity of thing and object, which is required if we are to know the truth, links immediately with the material object/formal object analysis. Knowledge of thing object identity is not even possible unless objects are what the scholastics called formal objects and things are what they called material objects.

From there Maritain goes onto argue that formal objects do in fact present material objects and that formal objects are unthinkable except as doing so for a variety of reasons, reasons which differ somewhat for intellectual and sensory objects. E.g., merely contemplating the truth of a statement requires understanding each object as presenting something potentially more than an what is objectified in this way, and hence potentially identical with another object.

May. 31, 95

Maritain introduces the thing/object distinction immediately following his discussion of the nature of truth. Now he is talking about whether we can know the truth. In effect, he is saying: If (hypothetical) we can know truths about <u>things</u>, we certainly can't do it if we have to know things completely; for we can't know things completely. So if we can know any truths about things, our <u>objects</u> must be objectified as, knowable as, aspects of possible things. The question of actuality does not arise yet. All we have to know at first is that this object is presented as an aspect of a possible thing. Hence our formal objects are presented as aspects of possible material objects.

Thing/object, formal and material objects, 3-17-95

How get to formal and material objects from the strict definition of "object": The mind has objects. Idealism is not skepticism; so the object is a potential thing, a potential real existent. But a thing, even a potential thing, is never objectified by the whole of itself, and so it is objectified by means of features which consitute formal objects through which a material object is made known.

Thing/object

7-25--91

When I attribute "man" to an individual, universality is a characteristic attaching to what I attribute but not entering into what I attribute. For it attaches to what I attribute from a persepctive that differs from the perspective in which I am attributing it. Universality is a logical relation describing what is known from the point of view of the knowledge relation by which it is known, describing the term of a knowledge relation from the point of view of the knowledge relation, not describing what the term must be in itself in order to be the term of a knowledge relation.

Universality is a logical relation attaching to what is known in order that it may be what is known, but it does not belong to what the term of the knowledge relation is prior to being known. It does not enter into what the term is known to be in itself. Abstraction is a logical relation characterizing being as term of a knowledge relation, but it does not enter into what the term of the knowledge relation is nonreflectively known to be, what it is known to be in itself. Therefore it is not in contradiction to the concreteness that we know being necessarily possesses whenever it is actualy exercised. Abstraction is a logical relation attaching to what is known in order that it may be what is known, but abstaction does not enter into what the term of the knowledge relation is known to be when it is so known, i.e,

when it is known in the way characterized by abstraction. Otherwise, the term would never be the term, for it would be altered by the knowledge relation; and the term of the knowledge relation would be something else, the result of the alteration.

Abstraction and universality do not enter into what is FIRST known about the term of the knowledge relation that endows the term with abstaction or universality. For if they entered into what is first known, there would be an infinite regress, since they are logical relations resulting from a knowledge relation. So if they are first known, there is another knowledge relation preceding the first.

They are features we can attribute to the known resulting from its being the term of a knowledge relation. But what is first known does not result from its being the term of a knowledge relation. So they do not enter into what is first known. They do not enter into what it must be in order that it become the term of a knowldge relation, namely, something other than what is described by "a term of a knowledge relation."

Maritain - t/o - AA 8-6-91

There is a view that anything expressed in language (concepts) reflects an interpretation imposed on what we are trying to express by the background features of the language. It is possible for a language to illegitimately impose an interpretation on things. But that is something that must be shown in particular cases. For language is a means of making things terms of cognitional relations. As such, different languages necessarily impose on objects diverse features pertaining to them as objects. For example, one language might use verbs of action where another uses adjectives and the copula exclusively. But characteristics pertaining to objects as objects are not, or need not be, what we attribute to things when we use language to communicate about things. And if our statements do attribute to things as things characteristics with which they are associated only as a result of being

objects, those statements are false.

It may be claimed that we cannot distinguish between what features we attribute to things as things, when we use language, and what features accrue to them as our objects as a result of our using language. But if the evidence for the truth of statements from different languages is the same, there is no reason to assume those statement differ in what they attribute to things as things. The opponent reply that her intent is to impeach the very notion of evidence as something capable of adjudicating between conflicting opinions.

But to establish that statements are genuinely in conflict, one must do more than point to differences betweent them that derive from language. In fact, statements cannot be in conflict unless there words mean the same thing. And sameness of meaning seems ruled out if words from different languages attribute to things features unique to each language. The only way to show a genuine conflict between statements is to show that the evidence for the truth of one rules out the truth of the other.

The opponent will reply that it is the realist who is in the vicious circle. To count as evidence for or against a statement, experience must be expressed in language; as soon as it is expressed in language, it is no longer raw experience but experience interpreted through concepts. Maritain would reply that we can adjudicate between (genuinely) conflicting interpretations of experience on the basis of necessary truths that constitute nonKantian regulatory principles for our empirical beliefs. For example, we know as a necesary truth that when a change occurs we can look for a cause. And we can identify the cause through investigation because we know as a necessary truth that similar causes have similar effects.

Such regulatory principles are nonKantian because they are ontological in the sense that they express, not conditions for the possibility of experience, but conditions for the possibility of existence, that is, conditions of possibility, period. As

employing the concept of existence, they are, when necessarily true, true of whatever satisfies the object of the concept of existence, so there is no danger of their falsely interpreting reality. Where the evidence of neither necessary truths nor experience can distinguish between two statements, the differences between the statements belong to the category of what belongs to objects as objects, not to what is asserted about objects as things.

So ontological necessary truths enable us to use the thing/object distinction in response to the relativist. There is room for all sorts of relativity pertaining to objects as objects without implying any relativity in what we believe true about things as things. It does not matter whether all languages can express ontological truths, that is, whether they can express existence as an object of concept. It only matters that at least one language can. Einstein was able to introduce relativity into scientific theory by situating the elements of relativity properly with respect to something absolute, the combined spatial-temporal interval between events. But Einstein only succeeded in that project by using a specific language, the language of tensorial calculus.

Similarly, Maritain needs a spefiic language, ontological language to be able to situate the elements of relativity in language on the side of objects as objects while preserving the absoluteness of what is true of things as things. But as a result, where Kant gave us an idealistic Copernican revolution, Maritain makes possible a realist Einsteinian revolution doing justice to the relative without foresaking the absolute.

Thing/Object - AA - BIG 11-12-91

See the handwritten note of this weekend (11-9 or 10) about the relation between the thing/object and material object/formal object distinctions. What I say there about how the relation is developed in Maritain and Simon is correct, but the relation

can be put even more simply.

Idealists and Skeptics grant that our awareness has objects. So the only question is the (known or knowable) relation of those objects to extramental things. To as that question amounts to the same thing as asking, in Scholastic language, whether we know material objects by means of knowing formal objects. Why? because to ask the relation of objects to extramental things is to ask whether they are identical, in whole or part, with what extramental things are, whether they are identical with one of an extrmental thing's ways of being a thing. It is to ask whether they are aspects of what a thing is, in whole or part. And when we translate those ways of asking the question into scholastic language, the "aspects of things" become "formal objects" and the things become "material objects."

Still, that is not to say that the scholastic language is helpful in the sense of providing the logical foundations for refuting idealism and skepticism. It is really only helpful in the sense of relating the question to issues that Maritain's scholastic readers would be familiar with as issues in their tradtion.

So Maritain is saying, in effect, look, when I am asking (dialectically) about the relation of objects to things, and when I am arguing about the identity of objects to things, I am talking about something you should be familiar with even though what I am talking about may *seem* unfamiliar. To start from the fact that skeptics and idealists grant that we have objects and to argue that these objects are known to be identical with ways of being extramental things (actually or possibly) is in effect to ask and argue whether the formal objects of our acts of knowledge, which the opponents admit that we have, reveal material objects because they, formal objects, are always knowns as identical with what actual and possible existents are.

And those existents are extramental existents, because existence is the primary element in "more than objects" making them more than objects. ACtual or possible existence is a feature they possess as more than objects, because every

other feature of that kind they possess includes a relation to existence, a capacity for existence, as part of its identity, as part of what constitutes its being more than an object.

[I'm not at all sure about the following:

Maritain - AA 12-2-91

The question wether a perceptual object is real or phenomenal is not the question whether the object is a aspect (formal object) of a thing (material object). It is the question whether the perceived object as a whole, the perceived thing, has an existence that is other than being known.

Maybe the strict idealist's problem, the problem of Berkeley and Husserl, should not be stated in the material object/formal object vocabulary. Maybe only the skeptic's problem should be so stated. The idealist does not deny that the immediate object attained is an aspect of a larger thing; she denies that the existence of this thing is other than being-an-object. She denies that its existence is other than being-attained. But Maritain would say that what is attained, strictly and formally, is always less than what the "thing" is alleged or believed or hypothesized to be. So maybe Maritain is saying that the idealist denies in fact, whether or not intentionally, that we attain a material object when we attain a formal object.]

Maritain - Thobj Article - Class idea - AA 1-13-92

What if someone were to challenge my claim that the lines following the "Crux of the problem" statement are explanations of it. What if they said that the explanation of that statement came in the preceding section, that statement merely summarizes the preceding, and what follows is a new thought?

My answer: OK, delete that statement from the beginning of the new section and

read the new section. Is the new section or is it not explaining the thing/ object distinction (problem) and why it refutes idealism. You do not have to read very far, the second paragraph, to see him bring in thing/object as if it needed no introduction but was being discussed all along. He brings it in again the same way, and in the context of idealism, a paragraph or two later.

Check Reflexions and Formal Logic for more statements like DK's "every object is set before the mind as something capable of existing." (And note: this is a logical point because it concerns the way objects are "set before the mind" or are "presented" to the mind.)

XxxPerinoetic is more than just that which cannot be derived from the self-evident (as I imply in my article on M's philosophy of nature views). M is thinking of things having different substantial natures, i.e., natures determined by specifically distinct substantial forms. But usually our knowledge of the properties of things does not allow us to deduce the fact that the substantial forms are of distinct species, or deduce how the substantial forms must differ for the known properties to be what they are. Instead, we stop at the properties which function as natural signs (as smoke is a natural sign of fire) without being able to get to that of which the signs are signs, except as something standing behind the signs.

XxxScience and Rity 5-7-92

In the Boston Globe's 4-4-92 article on the COBE-Smoot big bang ripple discovery, it describes the inflation theory as saying the inflation went faster than the speed of light. And it says that this does not contradict relativity because the speed of light limits things in space, while the expansion affected space itself.

But doesn't speed not only limit things in space but *measure* things in space, so that it wouldn't make any sense to apply the same standard of measurement to space itself? Speed measures change within space, so how can it measure change that does not take place internally to space but affects space as a whole?

Maritain, Science and Rity, BORs in science, quantum physics, 4-20-93
M says that science can use math because quantity is the first accident of bodies, ie., that all their actions are quantitatively conditioned. But that is an ontological fact about a real accident of bodies. How can a real accident give rise to the use of beings of reason? The answer probably comes from the distinction between law and theory. Real quantity is expressed at the level of law. In Reflexions, M talks about scientific laws expressing how one quanity varies with another. In other words, scientific laws directly concern real quantity as opposed to real causal relations directly expressed (see Salmon). But BORs come in at the level of theories explaining why one quantity varies with another. They come in because (1) the real natures, ie., causal dispositions of things are unknown; and (2) we need an explanation with quantitative assumptions in order to deduce the quantitative laws from it. Hence, we invent fictitious quantitative explanations. In other words, we do it because we need an explanation that is formally mathematical, because the material fact we are explaining is a quantitative fact.

Still, does this explain why we could not guess at the true explanation? Maybe we do not have to explain that; maybe the true explanation is just too far beyond us.

Concerning the interpretation of quantum physics that says it is unthinkable that things not be this way. The person who holds that owes us an explanation of how his scientific theory would have to be different if there were real velocity and

position, only they cannot be measured at the same time because of physical causal relations.

Also explain that science can be simpler than reality, and that the lack of complete commensurability between mathematical and physical relations can explain anomalies like quantum physics.

Xxx Beings of Reason 4-23-91

For any being of reason (BOR), we must be able to state its truth conditions without using BORs, i.e., we must be able to relate the BOR to predicates that are not BORs. Examples of how to do this are "known by A" as related to "A knows" and the explanation of BORs in science in Causal Realism. Also, the explanation of evil as a privation.

Maritain and Science

Toulmin, in the NY Review of Books review of Teilhard, accuses Maritain of "Anti-scientism." Ironically, Toulmin is correct, but for a reason opposite to his. (But notice how the empiricist wraps himself in the mantle of science. "If you are against me, you are against science. Shades of Paul Erlich. And he may do this sincerely; he may honestly think that to honor science, he must make it into a metaphysics.) Maritain is not anti-science; he is only anti-scientism. In his first article, Maritain criticizes the limitations of the scientific *mode of thinking* for not being appropriate for giving us knowledge of things like God.

Maybe the scientific mode of thinking contributes to the abortion mentality. Not science itself, i.e., not that which science informs us about babies; but the scientific mode of objectifying, mode of signifying, that which science knows about the real. Maybe that mode contributes to our ability to substitute circumlocutions

like "product of conception," "genetic material," "mass of cells" for more appropriate descriptions of the baby.

These descriptions stop at the phenomena.

Xxx, self-consciousness, 3-8-91

Maritain: Be sure to point out that Maritain has implicit, concomitant self-awareness, self-awareness not requiring a distinct act. See your comments on such a text (in a footnote?) in the DK section preceding "Common Sense" section. This may appear to contradict Aquinas, who seems to require a distinct act for the soul to be aware of itself. However, there is at least one text in Aquinas which seems to affirm a concomitant self-awareness without a secondary act. That text is the one Simon quotes at the beginning of his section on truth to show that the knower always has some self-knowledge but not necessarily the kind of self knowledge involved in the grasp of truth.

But if Aquinas does affirm the need for a second act, he is wrong, as the problem raised in that appendix to DK (how do I know that the object of the second act is the same being performing the second act) shows.

Thing and object, truth, Maritain, DOK, material and formal objects, Jan 5, 1998

A comment on the logic of Maritain's introduction of the concepts of thing and object in The Degrees of Knowledge: First, he explains the definition of truth. Then, he says that truth requires that diverse objects of knowledge be identical other than as objects, or as more than being objects. So truth requires that every "object" be more than an

object; i.e., truth requires that awareness of a formal object *logically include* awareness of a material object. Truth, and so knowledge of truth, requires that awareness of an object be awareness of it as more than an object, as more than what is made an object in *this* way, where "what is made an object in this way" refers to the formal object.

So he is not begging the question by assuming the scholastic doctrine of formal and material objects. He is saying that that doctrine follows necessarily from the definition of truth, if there is to be truth and if we able to know it.

Feb 24, 1998

If we didn't get a material object along with a formal object, we couldn't even ask whether "Snow is white" is true; we couldn't even contemplate its being true; we couldn't even understand the sentence. In other words, if we were not from the beginning aware of a formal object as an aspect of a <u>possible</u> material object, then we couldn't even ask . . .

Science and Rity, Einstein, BORs, Spatial relations, Maritain, August 22, 1997 BIG

Einstein made up (deduced?) General Relativity "out of whole cloth" and only then found out that it predicted Mercury's orbit. But he started out from the insight that there could be nothing more to gravity, from the viewpoint of the methods of empirical physics, than what is expressed by the curvature of a mathematical world-line. He got that insight from the equivalence of gravity and inertia. Previously it was thought that accelerated motion was not relative, that laws of physics

could tell the difference between acceleration and inertial motion. Yes, but laws of physics cannot tell the difference between gravitational acceleration and any other kind. If not, then the world can offer no empirical evidence about gravitational behavior that could not be expressed by the curvature of a world line, and by the same kind of curvature of a world line that expresses any kind of acceleration.

In other words, if gravity and acceleration are equivalent, then a curving of Minkowski's space-time will give you gravity. And if gravity and acceleration are equivalent, then there can be nothing more to gravity, from the viewpoint of strictly empirical evidence, than what a curving of M's space-time will give you.

September 8, 1997

A change occurs when A goes from relative rest to relative motion. Now A has kinetic energy that can cause effects not possible before. But is the locomotion itself a process of change? If so, change in what? Can we say that for relativity it can only be a change in A's world line, and so is a change in relative space-time? If so, can we say that when A changes to being in motion, A changes to being in a state of causing a change in the geometry of space-time? Perhaps the relativist will say that inertia, being in a state of relative rest *or* of continuous relative motion, is the limit case where there is no change in the geometry of space-time. But then, what is there a change in? If gravity is acceleration and is universal, perhaps it is a change in the relation A to the acceleration A would otherwise be undergoing.

Mar 12, 1998

Mathematically, there is nothing more to describe, there are no more questions to ask, than what can be described as a change in the geometry of a space-time continuum. That's all there is to say.

Maybe this helps to understand what Maritain means by suggesting "If you want a certain kind of theory, a certain approach, then you will necessarily use BORs.

Maybe he's not implying by the "if" that you could have a different kind of mathematical science, or a different kind of scientific theory. He is saying, if you want to do mathematical physics, if you want to do physics quantitatively and deduce from mathematical assumptions, then if and when you think of viewing space/time data and space/time descriptions as if they were coordinates in one space/time continuum, you will know that you can't want anymore of a description than describing the "geometry" of that continuum can give you.

Someone might say, "What do you mean 'If I want to do mathematical physics,' what other kind of physics is there? Well, Maritian does not mean that there is another kind that could do the same thing for you that mathematical physics does, something that will get you the same results about predicting events by space/time coordinates but will get them by starting from a different kind of theory. He means the opposite. Only mathematical physics will give you that. But he means there are other kinds of things to learn about nature. The kind of things biology, geology, etc. learn, and the kind of things the philosophy of nature learns.

But if you set out to deduce the measurable aspects of nature, you will inevitably get many BORs.

But if the success of mathematical theories derives from the fact that quantity is both a reality and the first accident, why must any of the quantitative constructs that science uses be BORs? Because the data

science has available can be simpler than the reality, because a dianoetic knowledge of natural events would be ontological, not empirical. And for a reason I haven't thought of before: the quantitative aspects of things though perfectly real need not derive from the things' substantial forms but from accidents of the disposition of matter resulting from the history of the universe.

For example, man is a featherless biped. This is a way of knowing what man is. For "biped" and "featherless" are both ways of answering the question "What is it?" about something. We can say that "featherless biped" is a superficial understanding of what man is, but only if we are ready to define the goal or goals from the perspective of which some ways of knowing what man is are more or less superficial than others. But defining those different perspectives is precisely what Maritain is striving to do.

"Featherless biped" gives us only a perinoetic understanding of what man is because a common accident like being bipedal need not result from the interior nature of man's substantial form. It may result from an historical accident in the evolution of man's body. For example, man's substantial form may require man to be pedal, or multi-pedal, or multi-appendaged, but not to have this or than number of feet, or to have both legs and arms, etc. So a combination of common accidents may not tell us anything revelatory of the nature of a specific kind of substantial form.

And among such nonrevelatory, or nondianoetic, common accidents are quantitative features like the two-ness of our feet, hands, eyes, nostrils, etc.

Science does not determine what to believe about causality. Causality determines what to believe in science — just as nonstandard logic requires us to use standard logic. That is, to verify the nonphilosophic uses of causality in science we have to rely on our philosophic understanding of causality.

Apr 27, 1998

We discover new ways of describing the world, e.g., chaos theory, mandlebrout sets, non-euclidean geometries, statistics. Thus we discover new kinds of statements we could not have made before (and hence neither could we have contradicted them before).

Course idea, Jul. 16, 96

Have a course showing what is unique to Thomism in the solution to philosophical problems. I.e., a course showing the alternatives that Thomism offers but no one else offers. Use Adler's list (see Deal) and Maritain's Introduction to Philosophy. Also use the similarities between The Degrees of Knowledge and current philosophies of science to show the superiority of Maritain's approach, e.g., he can say with Quine that scientific truth applies to theories as a whole, because he has another absolute standard of truth. And he can distinquish the aspects of quantum mechanics that do and do not have ontological weight.

Ben Cogen questions, Rity questions, science questions, May. 14, 96

In General Rity, does the unity of space and time in one continuum depend on multiplying by an imaginary number or on some other

mathematical trick?

Does light have mass? If so, there is some mass that does not increase to infinity at the speed of light.

What does it mean to describe nonEuclidean space as the space on the outside, or on the inside, of a sphere. I.e., what does it mean to say that on the outside or inside of a sphere there can be infinite parallel lines through a point or no parallel lines, respectively.

Feb 12, 1998

What is a pseudosphere and how do you map parallel lines onto it?

Science and Rity, Jan. 1, 96

Why can't we guess at the hidden essence of physical things? Because to do so would require ontological concepts, and ontological concepts do not descend to that level of detail. The cannot get to the detail of phenomena because of the causal opacity of empirical concepts (see Causal Realism).

November 14, 2004

Mathematical theories objectify physical natures in the way that mathematical theories are supposed to objectify physical nature's. For example, consider the quantum theory cat that is nonexistent until a measurement takes place. The reason a cat is nonexistent is that the theory has no place for such an existent cat before a measurement says either where it is or how fast it is moving but not both. That is what is theory is supposed to do. Theory is supposed to have no

place for either actual position or actual velocity before the results of a measurement are entered into the calculations.

To conclude that the cat does not exist in a metaphysical sense, one must impose a metaphysical interpretation on the mathematical theory. But in saying that the mathematical theory does not support a metaphysical interpretation I am not saying that the mathematical theory is false. The mathematical theory is true. It is true in the sense in which a mathematical theory is supposed to be true. That is, the theory succeeds in objectifying natures in the way that the theory is supposed to objectify natures.

April 1st, 2003

on page 58 of David Gallagher's article on the person and ethics in Aquinas in the middle of the page. He makes the statement "appetitive activity in general is contrasted with intellectual in that it is directed to beings as they exist in nature and not as they exist in the mind;"

What does this mean? Appetition is directed to the cognition-independent existence of its object. The cognition-independent existence of its term. So its object or term is something that starts off as existing in appetition or cognition. And given that it exists in appetition or cognition, appetition is directed to making it also exist in reality.

In the case of cognition, however, things do not start off existing in cognition. Cognition deals with things that either already exist cognition-independently, or are able to exists cognition-independently.things that are merely able to exist extra mentally do not yet have an existence that is outside of cognition. But the goal of cognition is not to put them into existence extra mentally. The goal is merely to understand the conditions for a possibility of their extra mental existence. When cognition understands that, cognition has fulfilled its goal of giving intentional existence, the existence of beings in the mind, to beings that in themselves are able to exists outside the mind,

beings which in their nature are capacities for extra mental existence, not just for mental existence.

The teleological cause of all cognition is being that exists or can exists outside the mind as such, that is, as an actual or possible extra mental existent. But given that existence is what the goal of all modes of thinking have in common, and given that our vocabulary is meant to communicate that goal of cognition, the fact that different modes of cognition have diverse relationships to existence outside the mind as such means that different modes of cognition can have varying and perhaps apparently contradictory vocabularies. For it is one thing to have the goal of giving existence inside the mind to what does what or does not exist outside the mind already. I should say for it is one thing to give existence inside the mind to something that actually or possibly is able to exists outside the mind, and it is one thing to have the goal, that kind of relation to existence as one's goal, namely, the goal of giving it existence inside the mind; and it is another thing to have goal of putting into actual existence, extra mental existence, something that exists inside the mind. In both cases the goal concerns what exists outside the mind and its relation to what exists inside the mind. But in each case of the relation is the contrary opposite of the other.

We can say that speculative thinking is analytic and practical thinking is synthetic. Speculative thinking breaks things down into parts in order to understand the conditions for the possibility of their extra mental existence. Practical thinking brings parts together into a whole because the purpose of past of practical thinking is to bring something into real existence. It cannot really exist while its parts are separate. It's parts must be brought together in order for two exist. So practical thinking is synthetic and holistic where speculative thinking is analytic.

An example of this is the command "repent and believe the good news." From the point of view of speculative theology there are many more conditions for justification and these two. In addition to repentance and belief, one needs a fear of God, belief that God rewards a good and punishes evil, belief the afterlife, a etc. etc. etc.. But it would be foolish on Ash Wednesday to give a command

listing of all of the analytical contents necessary for salvation. It would be foolish instead of saying "repent and believe the good news," to say "believe in God believe that he rewards good and punishes evil, fear his punishment, etc. etc. etc.. It would be foolish because that kind of breaking into parts is inimical to achieving that the effect of making acts of the will that will dispose of person for salvation. Rather, all those other qualities are assumed and presupposed by repentance and believing the good news. Still, there's a place for listing them when we're looking at the situation speculatively.

Discussing such questions with people I have found that distinction between speculative and practical vocabulary is better understood when I describe it as the distinction between ontological and moral vocabulary. Of course the ontological vs. moral vocabulary wouldn't be perfectly true to Maritain's position's as presented in "but degrees of knowledge." their Maritain uses ontological to contrast philosophy to other modes of knowing. Even if he does not say so explicitly, then, ethics in the philosophical sense would be contrasted to ethics in say the sociological sense as ontological analysis to some other kind of analysis. So it would not be appropriate to distinguish ethics from other parts of philosophy by saying they are ontological and ethics is not. So it would not be appropriate to distinguish speculative from practical vocabulary in these ways.

But later Maritain gave us another vocabulary: "ontosophical" vs. "ideosophical:". This distinction is meant to contrast 2 kinds of philosophy, good and bad. But since ontosophical describes philosophy as a whole, that is, good philosophy as a whole, we can use ontosophical in the way that "the degrees of knowledge" used "ontological". Then, we can use ontological to refer to speculative philosophy and moral to refer to practical philosophy, when we're distinguishing ontological from moral vocabulary or speculative from practical vocabulary.

But that distinction is important to not only for the reasons that Maritain states in "The degrees of knowledge" but also because it has applications in many other ways as well.

The "correspondence" of the correspondence theory of truth is the effect of a strict identity between what is an object and what is more than an object.

The common sense notion of truth naturally gives rise to epistemological problems because, in common sense, a correct notion of truth is associated with extraneous elements that would render

Before turning to Maritain's next arguments, it will be helpful to consider two arguments closely related to his, but not explicitly made by him.

that statement is true, some "thing," something that is more than an object, is twice made an object, once by means of the noun "lion" and once by means of the adjective "carnivorous." And if

Awareness that something is a term of a relation of awareness is what occurs in reflective self-awareness. In reflection, we recognize the existence of a previous state of awareness, and since awareness is awareness of something, in reflection, we recognize that something is the term of a previous act of awareness. But what about the prior, prereflective awareness of something, the prior awareness without which there would not be a reflective awareness? What is it aware of?

In our epistemological reflection on the bipolarity of consciousness, it is proper to use the word "object" to distinguish that which is known from the knowing subject.

Maritain

In his essay, "Critical Realism," Jacques Maritain told us that "The problem of thing and object is the nub of the critical problem."[1] Since that time, the thing/object distinction has been almost totally ignored. Either Maritain was very mistaken, or we have been missing something very important. In fact, if Maritain was correct, "Critical Realism" must be the most important epistemological work of this century. For it alone can claim to have addressed "the nub of the critical problem," since it alone approaches epistemological questions from the perspective of "the problem of thing and object."

One reason we have failed to grasp the significance of the thing/object distinction may be this. Maritain tells us "We would say in Thomistic language that the thing is the 'material object' of the sense and intellect, whereas what we are calling object in this context . . . is their 'formal object'." (93) When we read that, there is a temptation to think we know what we need to know about the thing/object distinction, because we understand the scholastic distinction between formal and material objects. And if that is all there is to the thing/object distinction, we have good reason to think that Maritain exagerrated its significance for epistemological problems. In fact, it is hard to see how Maritain can use that distinction against the skeptics and idealists he addresses in "Critical Realism" without begging their questions.

For the scholastics, it is true that "material object and formal object are grasped at a single stroke and indivisibly by the very same perceptions" (93), because formal objects "are aspects (it would be better to say 'inspects') of elements of knowability in certain ontological nuclei called things." (92) But for the modern epistemologist, these claims about the relation of our objects to things are precisely what stand in need of justification.

The modern epistemologist will grant that our awareness relates us to objects, but she wonders about the relation of our objects to extramental things. If she is a skeptic, she may not doubt the possibility of

their being extramental things, but she will doubt whethe our consciousness gives us accurate information about things. If she is an idealist, she may not doubt that our consciousness gives us accurate information about things, but she will doubt whether these things have an existence that is other than being known.

Maritain, of course, did not seek a "justification" of knowledge in the sense of a direct proof that our awareness reaches things in their extramental existence. He sought no more than to be able to reduce the opposite position to absurdity. He can prove realism without making our awareness of things indirect, because it is the proof that is indirect. But he claimed that the thing/object distinction allowed him to reduce the skeptic or idealist to absurdity. And it is difficult to see how the scholastic distinction between formal and material objects can serve to do that.

But while Maritain's analysis of thing and object is consistent with the scholastic use of the material object/formal object distinction, his analysis goes further, or rather, deeper. He asks us to consider what we are doing when we call something an "object" of consciousness; what conditions are necessary for calling something an "object." The subject-object polarity is a fundamental fact of consciousness, encountered in our reflective self-awareness. We can ask epistemological questions only because we are aware of our own consciousness. And this reality we call "consciousness" is a relational reality, a way of relating to terms non-identical with itself that we call its "objects." Maritain saw that the conditions necessary for recognizing the situation we call

consciousness's relation to objects provide a reduction to absurdity of the positions of the skeptic and the idealist.

But that reduction to absurdity is only the first step. The ground-floor analysis of what it means to call something an object provides us with a tool, the thing/object distinction, applicable to the whole range of questions about human knowledge, from the distinction and nature of the sciences, as the scholasitcs had seen, to contemporary problems of the relativity of truth in hermeneutics, the history of science, and cultural and psychological linquistics. As Kant gave us a Copernican revolution, Maritain makes possible an Einsteinian revolution where, as in Einstein, we account for the relative by situating it properly with respect to something absolute. In Einstein, measurements of space and measurements of time are relativized by recognizing the absoluteness of the measurement of the spatial-temporal interval. In Maritain, relativity can characterize objects as objects without interfering with the absoluteness of our knowledge of things as things.

1.

How, then, do the conditions required for using the concept of object enable us to defend realism? An "object" is an object of knowledge. "We must distinguish," Maritain tells us, "between the thing as thing -- as existing or able to exist for itself -- and the thing as object -- when it is set before the faculty of knowing and made present to it." (91) "The object is the correlative of a knowing subject . . . which precisely takes the name 'object' from the fact that is is presented to the mind." (93) When we describe something as an object, we are describing it as the term of a knowledge relation. We are saying that it is known, conceived, seen, heard, referred to, described, mentioned, thought about,

remembered, etc. Any state of awareness has an object, since an an awareness is an awareness of something.[2] And just as we can describe awareness as a relation to something, we can describe that something as a term of a relation of awareness, as an object.

But we cannot describe that something only as a term of a relation of awareness. Whatever we are aware of, we must be aware of more than its being an object. If the only thing we were aware of were that something was an object, the only thing we would be aware of was that something was a term of a relation of awareness. In order for something to be recognized as a term of a relation of awareness, we must recognize the awareness of which it is the term. In order to describe something as what is "seen," we must be aware of what sight is; in order to describe something as what is "imagined," we must be aware of what imagination is. We know states of awareness, like seeing and imagining, through reflective self-awareness, secondary states of awareness that relate us to prior states of awareness.[3] Like any awareness, reflective self-awareness is a relation to a term which, ipso facto, is distinct from the awareness as the term of any relation is distinct from the relation. The distinct term of reflective self-awareness is a prior, primary awareness. But what is the term of that prior awareness? What is it aware of? What is the something of which it is an awareness?

If it is aware only that something is an object of awareness, it is aware of an an awareness, just as reflective self-awareness is. And there must be an additional awareness for it to be aware of. But what is that additional awareness aware of? That something is an object of awareness? An infinite regress is underway. If the only thing we know about something is that it is an object of consciousness, consciousness must

start be being consciousness of consciousness. Consciousness could never come into existence on that condition, because a requirement for its coming into existence would be a series of prior consciousnesses that, being infinite, would neverterminate at the consciousness whose existence we are considering. But that consciousness does exist; epistemological only questions arise because we recognize the existence of conscious states. Therefore objects of consciousness are always known as more than objects of consciousness. What is seen is not that something is seen but that something is red or round or moving. What is imagined, in the first instance, is not that something is imagined but that it is tall or swift or soft. Later, we can imagine(2) that something is imagined(1). But what is imagined(1) cannot be the something is imagined; otherwise, there would be nothing for imagining(2) to imagine.

This argument derives from Maritain, but he puts in an a compressed and oblique manner, which may be another reason we have failed to grasp the significance of his analysis. We can see that it derives from Maritain by looking at the paragraphs where he justifies his assertion that the problem of thing and object is the nub of the critical problem. Immediately after making that statement, he criticizes those who consider it "'naive realism' . . . to start with an act of knowledge about things rather than an act of knowledge about knowledge." (107) So those who deny that objects of knowledge are also things are starting with an act of knowledge about knowledge. The knowledge that something is an object is knowledge about knowledge, since something "precisely takes the name 'object' from the fact that it is presented to the mind" (93), that is, "is set before the faculty of knowing" (91). And to start with knowledge about knowledge is to "fain start with what comes second." (108)

To claim that we are aware of objects without being aware that they are things is to start with and what we know to come second in awareness, because we know that awareness is awareness of something other than awareness. For, as Maritain continues, "One cannot think about a 'thought thing' until after one has thought about a 'thinkable thing.'" To call something an object is to thik about a "thought thing"; for to call it an object is to describe it as term of a relation of awareness. But for awareness to have a term, that term must be other than awareness itself. The term must not be a "thought thing" but a "thinkable thing," that is, something whose nature makes it potentially the term of a knowledge relation, but whose nature is more than the term of a knowledge relation. For unless it were something more than the term of a knowledge relation, more than an object, it could not be the term of a knowledge relation even potentially, because then the first term of a knowledge relation would be knowledge.

Again, "The cogitatum (the object) of the first cogito is not cogitatum (the fact that something is an object) but ens." The cogitatum of the first cogito must be something more than cogitatum or else the first cogito could have nothing for its cogitatum. For "We do not eat what has been eaten; we eat bread." (108) Like cogitating, eating is a relation to a term; we eat something. And for the relation of cogitating to have as its first term the fact that something is cogitated would be like eating, not bread with its quality of having carbohydrates or meat with its quality of having protein, but something with one quality only, the quality of being "that which is eaten." And if that were its only quality, there would be nothing eaten, even potentially. To be "that which is eaten" the term of the relation of eating must have other characteristics. Likewise, if the cogitated were nothing more than "that which is

cogitated," there would be nothing cogitated, even potentially. To be that which is cogitated, the cogitated must be more than that which is cogitated. It must be cogitated as green or organic or at rest or oblong or possessing mass, etc. Objects of awareness must be more than "objects of awareness."

And we are capable of knowing they are more than mere objects as soon as we form the notion of object. The original data presupposed to the asking of epistemological questions is the bipolarity of consciousness, the relation of consciousness to something other than itself. Modern philosophy spontaneously calls that other the object. Many a student encountering philosophy for the first time has reached the point of describing consciousness as a subject-object polarity, only to wonder how to establish the relation of objects to what is independent of consciousness. Maritain shows that what we spontaneously call an object we must be aware of all along as something other than an object. He shows that what is known at the outset is necessarily something later recognizable as being more than the "known."

And as he notes "In current modern language, it (the word 'object') has received a very different meaning inasmuch as the opposition of objective to subjective has finally made the values proper to "thing" or the "real" pass on to the object." (91, n. 1) To express realism, we say there are "objective truths" and "objective facts"; we speak of what comes from the side of the "object" of knowledge rather than the subject; we accuse skeptics and idealists of denying the "objective" character of knowledge. In other words, we find it natural, when describing things as what I have called "more than objects," to call them "objects." Why? When we are reflecting on the subject of knowledge, which is what we are doing in epistemology, it is proper to distinguish the known from the

subject of knowledge by calling the known an "object." In Latin, "objicio" means what is "to throw in the way of, against, or before something." When we describe the known as an object, we are describing it as thrown against the knower and, therefore, as distinguished from the knower. We recognize the distinction of object from subject in the act by which we recognize, and for the same reason that we recognize, the subject as related to the object. And in reflecting on the bipolarity of consciousness, we instinctively recognize that in being aware of the object-pole, as distinct from being aware of the subject-pole, we are aware of more than the subject's relation to the object or the object's relation to it. In recognizing the distinction between the subject-pole and the object-pole, we implicitly recognize the independence from the subject of that which we have distinguished from the subject by calling it an "object." Therefore, we use "object" and "objective" to express that independence.

What Maritain does is show that the data we are aware of when we use "object" in this way, namely, necessarily justifies our calling them things as well as objects, since to be aware of them as objects we must be aware of them as more than objects. The object-pole of the bipolarity of consciousness is known from the very beginning, before reflection, as what we can later call, after reflection, more than an object. All along, the data we need to affirm realism is there, is directly there, and is demonstrably (by indirect proof) directly there. When we describe one pole of consciousness as an "object," we are already expressing secondary knowledge of it; so we must have a primary knowledge of it other than as an object. If not, there would be no secondary knowledge. That which we are aware of must be more than "that which we are aware of."

The argument as so far presented is far from being the whole of Maritain's

defense of realism, but it is the necessary presupposition of the rest of his argument. That more is needed is obvious from the fact that the thing/object analysis so far given applies as much to the objects of imagination or conception, which need not really exist outside of awareness, as to the objects of sense perception, which (presumably) do have extramental existence. And has the argument even proven that, if something really exists, as opposed to being merely imagined or conceived, that existence is something other than being an object of knowledge? Granted, what is known, at any level of consciousness, is known as more than "known." Does it follow that this something more has an existence independent of consciousness. For example, what is seen is not seen as "seen," it is seen as red or some other color. But it does not follow that color has an existence in things independent of our perception.

Maritain's answer is that existence is the primary value included in our objects as more than objects; existence is included in what is known insofar as what is known is more than "what is known." Therefore, even thought not all our objects really exist or are known to really exist, if and when they really exist, that existence is other than being known. Furthermore, sense experience lets us know that its objects really exist, even if perceived qualities like colors do not exist in things as they are perceived. We do have objects that are not capable of extramental existence. These are beings of reason. But we can have beings of reason as objects only by thinking them on the pattern of real being, and so only in dependence of our awareness of real being.

Maritain offers a variety of arguments in support of these conclusions. To appreciate the force of these arguments, we have to understand them in relation to Maritain's analysis of truth, because that analysis of truth is his reason for introducting

the thing/object distinction to begin with.

2.

If they were asked what does Maritain consider "the first problem for critique to solve," how many of his readers would answer "the elucidation of the notion of truth"? (76) He had said the same thing in his earlier work on epistemology, Reflexions sur l'intelligence.[4] There he makes clear that by the elucidation of truth he means, first, the answer to the question, "What is truth?" and, second, the solution to problems about how truth is possible that arise from the answer to that question. To understand Maritain, therefore, we have to understand why he considers that the first question critique must answer and how the answer to that question creates problems for explaining how truth so understood is possible.

For Maritain, the job of epistemology is to evaluate, to show what "value," (73, 92) what goal,[5] is achieved "on the different levels of elaborating knowledge" (73), or "in the various moments of human knowledge (74). Knowledge begins with percipere (73) and ends with judicare (74). But what is achieved in perception and in the judgments of mathematics, logic, physical science, metaphysics, natural theology? Is the same goal achieved by perception and by all the diverse kinds of judgments that derive from it? And how does the goal attained in perception enable us attain the goals attained in those other levels of human knowledge?

The ultimate state of human knowledge is judgment. In judgment we evaluate statements by deciding whether or not they achieve the goal of being true. So knowledge of the truth or falsity of statements is the fundamental and principal evaluation with which epistemology is concerned. In the case of any "level of elaborating knowledge,"

epistemology seeks first to determine that we can know the truth of statements made at that level. The answer to that question will necessarily involve some understanding of the relation of that level of knowledge to perception, from which every level of knowledge derives. After determining that the goal of truth is attained at more than one level of knowledge, epistemology seeks to know how the goals attained at those levels differ.

But if truth is the primary goal with reference to which epistemology evaluates, we first need to know what truth is. Hence the question of what is truth is epistemology's first problem. The answer to any other question that might claim to be epistemology's first question would presuppose an answer to the question, "What is truth." For example, if I set out to answer whether consciousness attains the external world, I am setting out to determine whether the statement "Consciousness attains the external world" achieves the goal of truth.

In answering the question, "What is this goal: truth?" epistemology is only making explicit something we are aware of prephilosophically. Indeed, epistemology is just an extension of the kind of evaluating we do whenever we judge some statement true or false. In any judgment, there is an initial, implicit reflection of the knower on her knowledge. For in judging truth, one is not only aware of the existence of a state of affairs, but she is also aware of the existence of a statement making a claim about the state of affairs. Every evaluation of the truth of a statement is an implicit critique asking whether thought achieves its goal; and epistemology is an explicit extension of the kind of reflection on knowledge every evaluation of the truth of statements requires.

Furthermore, the very asking of epistemological questions presupposes

knowledge, including knowledge of the nature of truth, we possess prior to our explicit epistemological reflection:

> An authentic critique of knowledge does not imply a single instant of real or universal doubt. Such an instant of doubt in effect includes in actu exercito the negation of something about which we pretend not to know anything as yet[6] (I mean the essential ordination of the intellect to being). And that is a vicious circle.
>
> And that is not the only one. The value of certitude cannot be cast into doubt in reflection without expressly referring to an absolute and incontestable ideal of certitude, to a notion of certainty that is already acquired and held to be guaranteed, to a strict principle that will command the entire discussion that follows, namely, that valid scientific certitude -- certitude that has objective truth as its correlative -- bears certain characteristics, and demands certain conditions. There is at least something for reflection which cannot be at all doubtful. That is a reflex and, indeed, philosophical certitude, one that may easily be recognized and that has to be put outside universal doubt. And it implies all the elements of critical philosophy: a notion of truth, reality, objectivity, etc. Critical philosophy has, therefore, begun even before the start assigned to it (by the opponent). (78 and 78, n. 3)
>
> The conditions for asking epistemological questions are what enable us to answer

them. But those conditions are also what give rise to epistemological questions to begin with. Maritain holds that "critical" questions arise "naturally." As the quoted passage indicates, he does not mean that lived skeptical doubt arises naturally; such a doubt would contradict the conditions necessary for its existence. But reflection on things we know prephilosophically gives rise to critical questions in "signified act." That is, issues such as the possibility of universal doubt arise naturally as hypotheses to be examined.

In RI, he had shown how critical questions had arisen naturally in Greek philosophy from reflection on the unavoidable question: what is truth. Epistemological problems did not have to wait for the howlers of modern philosophers. In DK, he argues that critical questions arise naturally, not from an analysis of the history of philosophy, but from a reflection on the common sense idea of truth that epistemology must start from.[7] In both cases, he comes to the conclusion that truth is a conformity between thought and things, in particular, between a statement to be judged and things. But he also comes to the conclusion that:

> We are compelled to effect a certain disjunction between the thing and thought, to recognize that the conditions that attach to one do not attach to the other. (84)

Otherwise:

> How could we know a thing that was one in itself, for example, what we call "man" by means of a complex thought like the idea "living being" joined to the idea "capable of sensation" and the idea "capable of understanding"? And how

> could we know by universal ideas a thing that is singular in its proper existence? (84)

> In the inner world of our understanding there is a whole multitude of distinct views or distinct concepts for things that exist undivided in the world of nature, and they lead quite a different life in the latter than they do in the former. In the world of nature the lion eats the antelope; in the world of understanding the lion receives the predicate carnivorous by means of the copula. And the possibility of error arises simply from the disparity in the way things exist in these two worlds. (86)

In the face of this diversity between thought and things, how are we to understand the conformity required for truth? As it did among the Greeks, philosophic reflection on the prephilosophic understanding of truth leads to problems for philosophy to solve. In RI, he put the problem this way:

> If, on the one hand, there is being independent of my mind and, on the other hand, there is my mind, and if an identity, in the strictest sense, between them in no way occurs, then my mind attains only a resemblance of being, not being itself. And the philosopher will always ask, "What guarantees that that this resemblance really resembles, that the conformity of my mind with being is real and not only apparent?" (RI, 16-17)

Given the diversity between the conditions of thought and the conditions of things, how can thought attain more than a resemblance of what exists, a resemblance whose value as a resemblance can always be open to doubt? To what degree does the "resemblance" resemble, and to what degree does it not resemble? We can have no answer to such a question, since the only available bases for an answer would be other imperfect resemblances.[8]

So far, Maritain's analysis of truth is not original, and his initial statement about the nature of the conformity required for truth (88) will not be remembered for its clarity. But his main contribution is yet to come. In RI, he solved the problem by saying that we can "distinguish in our thought that which is of things themselves and that which is of our manner of knowing." (RI, 17). In DK, he repeats and expands on what he had said in RI; the conformity in truth is between that which is known and what exists outside the mind, not between the manner in which it exists in the mind in order to be known and the manner in which it exists outside the mind. But then he goes beyond the analysis of RI to introduce the problem of thing and object.

Consider the statement "Some lion is carnivorous." Being aware of the truth of that statement requires being aware that something has been made an object, made the term of a knowledge relation, in two different ways, once as what is described by "some lion" and once as what is described by "carnivorous." If that statement is true, at least one of the things in the extension of "lion" must be the same as one of the things in the extension of "carnivorous." So the truth of that statement requires identity between what has been made an object in one way and what has been made an object in another. The truth of the statement requires that what are distinct from the point of view of the diverse

way they are made objects (let us say "logically" distinct[9]) are not distinct but are identical as things, that is, as more than objects. And to know the truth of the statement is to know the identity of logically distinct objects as things. If the relation identity holds between thing and object as required by the statement, then the relation of truth, conformity with things, holds between the statement and things. The truth (conformity with things) of a statement is a function of the identity of its objects with things.

So, to the relation of conformity between thought and things of the traditional correspondence theory of truth, Maritain adds the identity between object and things. What does Maritain gain by speaking about the relation between objects of thought and things and not, more simply, between thought and things. He gains many things, as we will see. But the most fundamental thing he gains, the gain from which his other gains derive, is a solution to the problem of the correspondence theory of truth. If correspondence is a relation between thought and things, we first have the problem of what this relation is, since it is not identity. Again, is it resemblance? Then resemblance in what respect and to what degree? And resemblance between what? One of the terms of the relation is an extramental thing, but what is the other term? And what are the rules for judging that this resemblance holds?

If the relation is not resemblance, perhaps our thoughts are true when they satisfy some built in rules of "projection" or "representation." For example, the meaning of the word "lion" may have nothing to do with the nature of the thing we are discussing, but that meaning happens to be what represents individual's of that kind in the human system of projection. Then to judge the truth of "This is a lion" or "Some lion is carnivorous," we would have to consult those rules, since there is no other relation between the sensory

evidence and the meanings of the words in those sentences. But if we consult those rules, we ought to know what they are, and wemanifestly do not; we do not even know that they exist. And what do the rules say about how things we know nothing about as yet are to be represented? Do they already state the right ways to project tomorrow's discoveries in science and technology? Then what those things are must somehow already be coded into the rules, even though they do not yet exist, and we do not know what they will be. For the rules relate what things are to terms otherwise unrelated to what things are.

There might be something analogous to rules of projection in the human thought process, but if so, their function, whatever that may be and at whatever stage it may take place, is not to provide an answer to what is the "correspondence" in the correspondence theory of truth. In fact, by explaining "correspondence" by rules of projection or representation, we merely push the question back to what is "projection" or "representation." In other words, we can ask "Rules of what?" What makes, A, something otherwise totally unrelated to B, a "representation" of B? We might be tempted to say the "rules" of connection make A a representation of B. But there are all sorts of rules. The mere existence of a rule establishing a connection between one thing and another does not make one of them something "represented" and the other a "representation." And by "rules" we ordinarily mean strings of marks that have an interpretation, that "signify" something; this understanding of "rules" cannot help us here. To function as rules, strings of marks have to be interpreted by relating them to something other than themselves, their signification, to which they are not related by being what they are. But what is it is for marks to "signify," and how do marks become related to that which they signify? By other "rules"?

A could be connected with B otherwise than by rules. There might be some causal connection uniquely linking A to B such that, if we discover that causal connection, we can use A as a representation of B. For that, however, we would have to know the connection between A and B; the truth that this connection holds would have to be an object of our awareness. But then we could not explain our awareness of truth by the existence of the connection. In attempting to explain "correspondence" by "representation" or "projection," we are explaining is more fundamental by the less, the cause by the effect. We have in mind the model of a rule that associates the word "lion" with with lions. But the functioning of that rule presupposes our awareness of lions, our awareness of "lion" and our awareness of the relation established between the two. What is happening is that we start with consciousness of what it is to be a lion; we start with familiarity with that kind of consciousness. And that gives us a model for our idea of "projection" or "representation." They are projection and representation <u>of</u> what it is to be a lion. They are relations tied to what it is to be a lion the way our consciousness is. But then they can neither substitute for nor explain that consciousness.

If something anaogous to rules of projection help explain that consciousness, they must do so <u>pre</u>consciously. That is, they function in a process whose result is consciousness of what it is to be a lion, not consciousness of something other than what it is to be a lion. If the process that has such a result uses something like rules of representation, the result of using those rules is not something which, under different rules, might not be <u>of</u> what it is to be a lion but <u>of</u> something else. The result is consciousness of what it is to be a lion, and that consciousness would not, under different circumnstances, remain what it is and yet be consciousness of what it is to be something

other than a lion.

Furthermore, if correspondence is a relation between thought and things, we also have the problem of how that relation could be known to hold. If to know the truth we need to know the relation of our thoughts to things beyond our thoughts yet our thoughts are the means by which we know, we would have to go beyond that which we know to know that our thoughts are true; for we would have to go beyond the means by which we know, our thoughts. Or, if the result of "projecting" B were consciousness of an object, A, other than B, we could never know that A is a representation of B. For to know that A is a representation of B, we have to know B; one of our objects must be B, not something other than B. (And if B itself is an object of our awareness, then whatever the "rules of projection" do, the result is a relation of awareness between ourselves and B, not between ourselves and some tertium quid that would be a "representation" of B.)

Maritain's position is that correspondence is a side effect of another relation, a relation not of representation or resemblance, but of strict identity. In judging "This is a rose," we do not compare the perceived individual designated by "This" to a mental entity called a "thought" or "concept" of a rose. We compare the perceived individual to that which is meant by the word "rose," namely, what it is to be a rose, what something is when it is a rose. What it is to be a rose is the object of the concept of a rose, the term of the relation "thought about" or "conceived of," a term thought about or conceived of by means of a mental entity, a thought or a concept, we postulate precisely as the vehicle for our conscious relation to what it is to be a rose (not for our concsious relation to the vehicle).

> To see in the judgment . . . a comparison between the mental word and the object thought about, and an affirmation of the mental word's conformity with the object, would be to involve oneself in the Cartesian path of thought in spite of oneself. On the contrary, the thing is declared to be what the object (the predicate) attained in the mental word is. (97, n. 2)

To say that "This is a rose" is true, that this statement "conforms to reality," is to say that the thing made object by our use of "this" and one of the things made object by our use of "rose" is identically the same thing. There is a identity between what some sensed singular -- objectified by "this" -- is and that for which we use the word "rose," namely, a certain kind of thing. We are related to that for which we use the word "rose" by means of a concept; for we introduce "concept" into the vocabulary to refer to a psychological modification enabling us to understand that for which words are used. But the knowledge telling us that "This is a rose" is true is not knowledge of a relation between a concept and a sensed thing; it is knowledge of a relation between an object of a concept and a sensed thing, that is, between what is objectified when we understand the kind of thing meant by "rose" and a sensed thing. And that knowledge is knowledge of an identity relation between these two terms, not something short of identity like mere "representation."

The "conformity" in truth is between an identification, in the the mind, and an identity, in things. A statement effects an identification between objects, not an identification of them as objects, since they are distinct as objects, but an identification of them as more than objects, as things. When the objects so identified are identical as

things, the statement so identifying them corresponds to things.

There is the correspondence between statements and reality meant by "truth" when there is nothing short of identity between what is made an object in diverse ways in the statement and what exists extraobjectively as a thing. In judgment, we do not compare a thought with a thing, we identify an object to which we are related by means of a thought and a thing. Here "thought" is taken in the sense of a psychological modification that we acquire. We speak of having the thought, say, of a lion, because we are consciously related to the object, lion, and we postulate the thought as the psychological modification that we acquire by means of which we have that conscious relation.

An object of concept can be called an "intentional object" if we do not mean by this that the nature so objectified is something "intentional" as opposed to physical. The mode of being objectified by our concept of a lion is a physical mode of being. That is its nature as a thing. And when this physical nature becomes an object, it remains a physical mode of being but acquires a new status; while remaining what it is, it acquires a mode of presence that is nonidentical with its physical nature. No contradiction occurs, since what is an object is always necessarily more than, and hence other than, just an object, always has a nature beyond the state that constitutes it "an object." In this case, what acquires an intentional status is something that, in itself, is physical.

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3986 Title: Relativity: (at) the Interface between Ontological and Empirical Analysis

10485 Title: Was Maritain an Instrumentalist?

530831 Quote Toulmin on anti-scientism (see the New York Review of Books review of the Phenomenon of Man). Then write for the Journal of the History of Philosophy or the Cahiers.

We see the power of Einstein's reasoning and say Maritain can't be right about beings of reason. If fact, he is. And where I depart from him, it is to make the case for beings of reason stronger than he did, not weaker.

4179 The attempt to defend realism, as opposed to instrumentalism, in science on a purely empirical basis leads to a denial of realism regarding knowledge in general, that is, it leads to linguistically relativistic accounts of truth. The diacritical defense of the realism of knowledge in general leads to an instrumentalistic account of scientific truth, but this account is a diacritical instrumentalism (a more 'moderate' instrumentalism.)

Kripke, C9 Kripke is right. We know that X is something with a certain internal structure. That does not by itself substantiate the fixing of reference versus connoting view, however; that internal structure is the causal structure that explains why X appears in this way in these circumstances, e.g., it is able to reflect light.

But we can discover properties that are more revealing of the internal structure than others. The ability to reflect light tells us little about the internal structures of the things we call tigers, gold, and fool's gold. The fact that they have this in common is enough to show that it tells us little about what is specific to the internal causal structure that is what each one

is. For dissimilar causes can have similar effects. What reveals the internal structure (or substitutes for it, Maritain on dianoetic knowledge) is a combination of common accidents (that is not shared with others and) that we find together frequently enough to designate the occurrence the occurrence of a natural kind, e.g., gold.

1485 Roger Bacon says experiment. That is not enough. We need to view nature quantitatively. Why? That quantity is the first accident is only part of the answer. That answer tells us only that quantities are one of the things we should study, not that they are essential things to study.

The first reason is that quantity is necessary for objectivity in sense experience. Without it, I can only say water freezes when it feels cold. (And someone else feels warm at the same time; objectifying by sensible quantities eliminates the subjectivity of the proper sensibles.) Also, natural causes act quantitatively, i.e., atmospheric pressue is a quantity of something; and changes in its quantity produce changes in other quantities.

Why do natural causes act quantitatively? Because they produce motion and are put in act by motions. And motions are continua.

Going back to experimental results: once we express them quantitatively, the explanations must also be quantitative.

Back to causes: change in temperature creates a change in the height of a liquid in a tube, a quantitative change. Natural causes act by changes in their quantity, or by changes in various quantities.

Quantity needed beyond experiment at three levels (for three reasons): (1) objectivity in sense experience; (2) natural causes act by changes in quantity; (3) quantitative theories are more powerful for explaining. Are (1)

and (2) sufficient reasons for (3)?

81824 What is the difference between the statements that laws are the same no matter what system of reference and that there is no way to determine whether it is A or B that is in motion? Maybe it is the claim that the laws, which are the same for all systems, do not give us a means of determining absolute motion in a particular case. Then the second statement is falsified by the Big Bang and the laws tell us so. Hence the two statements are not equivalent. The laws say that all systems of reference are moving away from the place of the Big Bang, i.e., no matter what system of refernce you are in, your direction is away from the Big Bang. But do you curve back?

no date A formula represents a physical quantity not known in advance, e.g., J = K - 6. J represents the result of a mathematical operation performed on a quantity, K, not known in advance. The result will be a physical quantity. But to get that quantity must go through gyrations determined, not be nature, but by matematical requirements for the algorithmn to be used in deriving the physical quantity. That is, we must rig the formula to get the <u>desired</u> results.

111279 Why cannot the quantitative characteristics postulated for the explanatory entities of a theory correspond exactly to the quantitative characteristics of the actual physical causes in question? And don't forget, the effects to be explained are themselves quantitative, described quantitatively, described by their quantitative characteristics. Why should not those characteristics of the effect be correlated with certain definite quantitative characteristics of the cause, e.g., the length of the string with the pitch of the sound.

This does not imply that quantity is all there is to either the effect or the cause. It simply impies that just as the effect is necessarily quantitatively conditioned, so the causality that brings it into existence has quantitative conditions that explain the quantitative characteristics of the effect (assuming that non-quantitative, but quantitatively conditioned, action is taking place?). The characteristics of the cause explain those of the effect only because they are the quantitative characteristics under which the cause acts and which condition its action and, therefore, its results.

81486 But somewhere in these notes I put it more strongly and correctly. Physical causes act by changes in quantity. That is, they produce changes in quantity and are therefore brought into act by changes in quantity.

11879 Arno Penzias on Dick Cavett says science does not know causes, does not explain, it only describes. But is it describing causal relations or not? Yes and no. It knows causal relations but not as such (the sense know lawyers but not as such), since it does not use the concept of cause or its cognates. And science is directed by necessary truths about causality.

This explains Maritain's statement that the scientist knows causal relations blindly. <u>That which</u> he knows are causes and their effects, and their relations to one another. But he does not know them as such. (Maritain says science knows essence blindly.

For 'essence', read: necessary causal relations or the locus of them.) The scientist uses mathematical relations which are not causal but concerning equalities of quantities. But these quantitities describe things which, as a matter of fact, are causes and effects. And the relations between quantities that science knows are determined by the causal properties of causes and

effects. And it is the fact that causal relations determine these quantities, or that causal dispositions are quantitatively describable, measurable, that is at the basis of our scientific knowledge. For it is that fact which allows us to apply the principles of empirical knowledge to our quantitative measurements (the fact that what we measure are causal dispositions).

330791 There is a reason why science must use mathematical fictions, bbut it goes beyond, while presupposing, the reasons given by Maritain. It is presupposed that science deals with the quantitative, measurable aspects of things and that science demonstrates through quantitative aspects of its explanatory elements. These are necessary conditions for using mathematical beings of reason, but not sufficient conditions.

For quantity is a real aspect of things; why must it call for fictions? And granted that the natures of things, and especially of the quantitatively measurable aspects of things, e.g., weight, heat, are not directly available to us through observation, still why can't we gues at their true natures guided by the principles of empirical knowledge?

The principles of empirical knowledge are useful only as applied to the workd as we experience it. For the only evidence we have for existence is the direct awareness of things as extra-objectively existing and what the principles of empirical knowledge allow us to conclude from this direct awareness. But certain cognition-independent facts about cognition-independent causal relations which determine the way we experience things and the limits of our ability to experience things make certain facts, which ontological analysis reveals to us, completely unavailable to our experience.

Events that are simultaneous in the ontological sense cannot be known as such by experience and cannot be part of the data on which science is built. Likewise determined causal relations make it impossible for events resulting from determined causal relations to be known as such by science. Hence they cannot enter the data on which science is and must be built. So scientific theories must be constructed as if these data were not there. Hence science is exxcluded from knowing the true nature of the causes underlying the measurable aspects of things. In some cases, we approximate these causes and differ from them only statistically, e.g., uncertainty phsyics. In other cases, we deal with outright fictions rather hant merely incomplete approximations which don't tell the whole truth.

So even if we could guess the true nature of that which we are measuring by its quantitative aspects (e.g., IQ is that which is measured by IQ tests) that knowledge could not help us predict our future experience or organize our experience by quantitative laws. Our experience would necessarily go on as if the simplest mathematically expressed fictions by which it can be predicted were true. Knowledge of the true nature, e.g., God's knowledge or angelic knowledge, would have no scientific relevance. We could not confirm or disconfirm it by experience; the knowledge would be scientifically useless. (And the explanatory entities we used would not be definable by reference to sensibly distinguishable features of experience; hence they would be meaningless to science. If they could be so defined, our explanation could be verified by science.)

Rather, the theoretical entities by which science would explain the laws it is able to establish would have quantitative characteristics necessary for deducing the quantitative laws. But the natures of the things that had those

characteristics would necessarily be other than the natures of the real causes of physical things.

32379 Science grasps necessary causal relations at the level of law but not necessarily at the level of theory (or does it graps effects of necessary causal relations, necessary effects?). Thus, Einstein's theory saves Newton's laws of gravitation, the inclination (disposition) of bodies to move toward one another varies inversely with the square of the distance. But the theory does not necessarily give us causal relations. For it is not based on what must exist, but on what knowledge of what exists can be gained experimentally.

Not only are his mathematical fictions simpler, but data must be subjected to a rule of simplicity, i.e., our theories only explain what can be learend experimentally (as in uncertainty physics). For example, there is no simultaneity experimentally considered, so theory must be constructed for a world with no absolute simultaneity. And no other scientific theory is even possible. A theory with absolute simultaneity would not be a scientific theory, for it would have no experimental meaning. A theory with determinate position and velocity has no experimental meaning either. Still, scientific theories account for all laws based on necessary causal relations, laws expressing results of necessary causal relations (but these results are themselves material causal relations).

4779 The real cause of gravitation, even if we knew it, could not enter a scientific theory in a useful way. It would be scientifically pointless. For if we knew it, we would know absolute motion: is A accelerating toward B, B toward A, or both toward each other? But if we don't know real causes, how do we successfully predict? We know laws resulting from

real causes, especially laws about the behavior of particles in space. They behave according to laws of Riemannian geometry. Why they do it is impossible to say. But we can postulate that certain geometric laws will apply in certain circumstances, e.g., near or far from masses. In our theory, we say that a certain geometry applies in certain cases, i.., particles behave as if there were somethng called space in which they moved. Matter behaves as if there were a container called space with a certain shape. That is a fiction that allows perfectly correct predictions. And no other fiction would do: our explanatory entities must be either causal or mathematical; causal are ruled out, so we are left with mathematical.

42791 When they say space is curved, they really mean that the behavior of moving objects in the space is described by the laws of 'curved' genmetry. It isn't the space that is curved but the motions of objects in space. So why say space is curved. Because in answer to the question why objects behave this way, it is said that they behave this way solely because the presence of matter in space brings it about those geometric laws and not others govern the motions of objects nearby. The presence of matter in space causes those laws to be operative.

But why does matter do this? Is it simply that physical principles tell us that those geometric laws operate in the presence of matter? That is, in the presence of matter use this geometry, and the result of using this geometry will be curved paths for motions? If so, curved paths are deduced but not explained. The effect to be explained is built into the assumptions and them deduced from them. That is, if these geometric laws apply, motions will be curved. But why do these laws apply? Be-cause motions will be curved? And

why the are curved is not explained. Geometric laws really apply as effect (not cause) of the fact that motions are as they are.

1111792 The quantitative conditions under which physical causes act and under which we make observations are such that the effects physical causes produce, motions, must be representable as, and must be observed such that, they would be the same no matter if it were different physical causes acting on bodies, which the obides really acted on and really moving were relative to.

111279 The quantitaive laws expressing the space-time relations (quantitative relations) between objects in motion relative to one another remain the same for all observes. The laws that remain the same, because of the quantitative conditions under which causes act, bodies move, and measurements are taken, express what? They express quantitative changes between bodies in motion relative to one another. That is, these quantitative conditions under which..., make it impossible to judge by observation which system of reference is in absolute motion or rest.

111279 The quantitative conditions under which physical causes act and pysical observations are made are such that the quantitative laws describing the changes caused and observed are true which ever term of the relation in-motion-with-respect-to is actually in motion and hence actually undergoing the causal influence.

1222791 Due to the quantitative nature of bodies, it is necessarily the case that when an ontological efficient cause produces motion in a body, the quantitative description of the motion could be the same as if another efficient cause had caused another body to move. The description of the effect must be the same on either causal hypothesis. For the effect amounts

to a change in spatial relations at different times. Hence ontological causality is irrelevant to scientific laws and, hence, to explanations.

Still, the spatial continuum is constant, and so we can't explain change just by geometry until time is included in the continuum. The time line of the apply extends even while spatial coordinates remain the same. Now since the effect is described quantitatively, a quantitative description of the cause such that as one quantity varies (cause) another varies (effect). So as mass varies, spatial-temporal relations of events (geometric laws) vary.

119795 Why could there not be some contrary theory that does not use beings of reason, or why can we not proliferate theories with contrary beings of reason? Relativity explains the universe exactly as it would be if there were no such thing as absolute motion, i.e., as if there were not ontological causality moving A toward B rather than B toward A, i.e., if all there is to motion is motion as we are able to observe it given the conditions of observation imposed by the underlying natures of things. So a theory without beings of reason would have no physical significance.

111679 DOK, p. 171: The 'forces' of classical physics (intertial or just gravitational?) were beings of reason less pure than the new beings of reason, because they were a compromise between ontological causes and the, needed-by-and-for-science, empirio-metric entities.

DOK, p. 166, middle paragraph: Once science attributed to non-qunatitative physical factors what could not be <u>predicted</u> by geometric properties alone. Now it abandons that division (by including the behavior of bodies in time among the geometric properties). Thus, the <u>effects</u> (e.g., an apple falling) of all <u>real</u> physical causes can be accounted for (by changes in

the time line) geometrically while leaving the real physical causes untouched; and they are accounted for as they must be, that is, they are accounted for by the right, correct, theory.

DOK, p. 167: Which space is real in the philosophical sense? Sense verification and measuring instruments can tell us nothing (and cf. n. 2). Measurements must be interpreted. The senses and scientific instruments know phenomena, not the space that binds them together.

111679 And there are, necessarily, distances that correspond to Euclidean straight lines. I mean physical, real distances, i.e., between real bodies. Why necessarily? Because if we can measure a non-Euclidean line, we can determine from it what the Euclidean distance between the points is.

111379 Reflexions, p. 186: Aguinas (In Boeth. de Trin., q. 5, a. 3, ad 5): The science of music does not consider sounds as sounds but a numerically proportionate to one another.

Ad 7: The same thing can be demonstrated physically or mathematically. For example, the curvature of the earth can be demonstrated physically ex motu gravium, astrologically from considerations of lunar eclipses. Cf. Post. Ana., lib. II, c 13; Meta, lib. XII, cc. 2 and 3.

Reflexions, p. 187: The ancients has particular examples of intermediary science, but a universal mathematical enterpretation of physical nature did not occur to them.

1011821 The motion of light is absolute. If light does not move, its source moves away from it at the speed of light and is therefore infinite in mass. And two objects moving toward the light would both move a C relative to the light but not necessarily relative to one another. And what about the

observer moving away from allegedly motionless light?

1010822 Einstein not only assumes the constancy of the speed of light but also the absolute motion of light. It cannot be that the photon is still and the observer moves toward it if the speed of light is constant. Why? Because the observer would have infinite mass and his clocks would stop. So either (a) uniform motion is <u>not</u> possible relative to light, so that the constancy of the observation is just as ideal state like an ideal gas; or (b) uniform motion relative to light is possible and the constancy of the measurement is explainable either by the physical conditions of observation (Geroch), by the mathematics of the geodesics of the world lines of light and the observer (Born and Gamow), or by both (a) and (b).

The propogation of light is the basis of all measurement. If the observed measurement changed without our knowledge that acceleration was taking place, all measurement would be invalid. So evernying must be observed <u>as if</u> the speed of light was constant to an observer in uniform motion relative to light (or to another observer?).

Rity card Funny things happen to things at the speed of light, but not to light at the speed of light. Why not?

See Calder, Einstein's Universe, p. 43.

41791 In order for there to be relative motion, there must be absolute motion and acceleration. An infinite number of motions can account for one body accelerating away from another at 1 mile per hour: the first may be at rest and the second in motion or vice versa; or the first may moving at 2 miles per hour and the second at 1; or the first at 3 and the second at 2, etc. But not all of these can be true at the same time. Nor can more than one of them be trueat the same time to get that effect. But at least one of

them must be true. Some one thing is happening.

The relativist replies that the one thing that is happening is relative change in motion. But that cannot be happening without of of these infinite possibilities happening. The relativist replies that it can. From one point of view it looks as if one of those possibilities is happening. But from another point of view, it looks as if another of those possibilities is happening. But this is an epistemological fact that does not change the ontological fact that relative change in motion is caused by some one of these things happening.

The relativist says that some one of these things happening is an effect of our point of view. But the difference of our point of view no more shows that no one of these things is happening than relative non-simultaneity shows there is no simultaneity. Either event A is happening and some other event is happening or event A is happening and the universe is at rest. Either the first body is in motion (moved from potency to act by a cause), or the second body, or both are moving but one more slowly than the other. If the universe contains only bodies A and B at rest relative to one another, change can occur if and only if either A is moved from potency to act re B, B re A, or both re one another. One or the other of these things must happen.

And sometimes there is an objective means of determining which happens. Simplicity is not just a subjective criterion. Of two theories with equally simple sets of laws, the theory with fewer events occurring must be deemed the true theory. If motion is not absolute, then it is valid to consider the object being sucked into the black hold as at rest while the black hold and the rest of the universe are in motion relative to it.

In a universe of 2 objects, A and B, God could cause a relative change in position only by reducing one or the other or both from potency to act. So there is absolute motion. If you do not believe in God, notice that your rejection is based on considerations extraneous to relativity itself. As far as relativity is concerned, there might be a God and, hence, absolute motion. And if there were no God, still there must be a reduction from potency to act performed by a cause, even if a thing is cause of its own motion.

81586 Either the ship shortens somewhat, the universe lengthens somewhat, or both. And what about mass? If I take myself to be at rest, I have one measured mass, and the moving body that was once equal to me has gained mass. But if I am the one considered in motion, my measured mass must increase. Can this be strictly relative? And mass is Lorenz's Achilles' heel. What if that heel turns out to be absolute? Can Lorezz be saved?

119791 Speed is a property of motion. Motion is an ontological determination in things, a passage from potency to act with respect to occupying, or a being at a distance from, physical places. Speed is a property of motion relating motion to real measures in nature (not to the measures of science); speed is a numerable number, although we only objectify it by relating it to our measurements of distance, measured by such and such units, and time, measured by such and such units.

(Since duration and distance in themselves, not relative to us, are absolute, the speed of light must vary absolutely. But the nature of things measured, including their real quantitative aspects, imply that measurements of time and space, measurements that are physical events governed by laws expressible quantitatively, e.g., rotating axes, will be relative. Thus, the

absolute character of nature implies that the relativity of measurements is mathematically deducible.)

Speed presupposes time and depends on it (time can't go more or less fast). So the speed of light is constant only if duration and simultaneity in thhemselves are relative so that the Lorenz transformations apply to them in themselves.

But the real relativity of time would be contradictory. (Duration is continu de l'avant et de 'apres dans le devinir, Reflexions, p. 236.) P. 237: It is absurd to impute to real times aand real simultaneity a relativity that is the property of the relations of reason which vary according to the observer (epistemological fallacy). (Quantity is that which is measured by relations of simltaneity and hence terminates relations of simultaneity; that which terminates these relations does not consist of these relations.) Cf. DOK, p. 157: our knowledge of absolute dimensions bears only on relations.

Absolute facts about phsyical quantities, space and time, make it necessary that, if viewed from the point of view of the space-time continuum, it is the space-time distance that is absolute as measured, not the measured space or the measured time. (Does the distance between points shrink for a moving observer or only the space ship observed to move from point to point?)

Reflexions, p. 238: If what we call 'speed' and 'movement' is not in things, speed and movement exist only as a number found (a relation of measure discovered), only as a measure effectuated by an observer (and that is the kind of physical event explained by Einstein). The same thing must be said for duration, time, and simultaneity. They are nothing more than measures effectuated by observers under certain conditions--then there is no

contradiction in relativity. (Space and time would then not be intrinsic to objects in the world but are relations between objects and an observer.)

Reflexions, p. 250: In the sciences, measure plays the role of nature in philosopy (and measures are extrinsic denominations and as such do not reveal the nature of what is measured.)

Reflexions, p. 258: The goal is to assimilate physics to geometry; when it is not assimilable, change the geometry. P. 256: Take all the measures produced by bodies in qualitative interaction, express them is a system of equations everified in experience. No consider those equations as algorithms of geometric properties, not of qualitative interaction, then the geometry must be non-Euclidean (and see good example at end of paragraph).

Reflexions, p. 221-2: If two thinkers at A and B along a railroad track have the same thought, they are to admit a sound of the same pitch. The stationary observe verifies the same pitch. But by the Doppler effect, the moving observer does not get the same pitch. Do we conclude that the identity of these thoughts is relative to the frame of reference from which we observe (measure) it?

111279 Einstein definse space and time by the possibility of measuring them, that is, he defines them as the possibility of physical measurements or as the results of possible measurements. But a measurement and that which is measured are not the same. So what if Euclidean laws cannot express the results of our physical measurements?

Reflexions, p. 213, n.1.: An example of light actually moving less than C but still observed as C?

Why should the observer on the train assumer the lights were not

simultaneious unless he was making the prior assumption, and why should he, that the sources of light were not in motion relative to the train?

Reflexions, 214, n. 2: "Apparent' time lengthening and spatial shortening does not mean subjective appearance. It means beings of reason constructed by science on the basis of sensible observations. Corresponds to Kant's distinction between Schein and Erscheinung.

1116791 DOK, 155: Matehmatics considers motion by taking a point as a pure term of a relation of distance. The relation changes but reciprocally, i.e., it makes no difference whether the point is moving vis-a-vis the axes or the coordinates vis-a-vis it. So the variation studied by mathematics posits no more reality in the point than in the axes, i.e., real motion is posited in neither one. What is studied is an effect of real motion. What is studied is a change in the relation of distance, not the term of the relation as more-than-the-term-of-such-a-relation, but the relation as relate to terms, as relating, as terminating in, terms considered as pure terms. Still, statements made from this point of view can be true statements, not yet involving beings of reason.

Relativity declines any absolute quantitative properties or determinations (of time or space) because it looks at dimensions, not in themselvers and independentally of any physical means of observation and measurement, but from the point of view of physical observation and measurement and the conditions for it. Thus, it is more physical than mathematical to that extent, a more genuinely physical word than the old physics (DOK, p. 156, top). But then starting with conditions of measurement, it attempts a meathematical explanation of measurements--as they actually occur, a quantitative explanation of quantities as actually measured.

11886 Does the baloon double in size or does the rest of the universe shrink a little bit? One or the other happens. But causally, my exhaling acts only on the baloon, not on distant parts of the universe. The effects of my exhaling lessen, for example, the further away from me my breath goes.

3836 What does it mean to say science does not look for essence or gives up looking for essences? Relativity provides a good example. Lorenz posited a reason why the speed of light is constant. When the source of light is moving relative to the ether (or the universe?), the light slows down proportionally. When the clock mesuring the speed of light is also in motion relative to the universe, the clock slows down. Why does it do this? What is it about the essence of ether or mortion or the universe that causes this? By hypothesis, there is no way for science to know, because it follows from Lorenz's hypothesis that motion is epistemologically relative (not quite, he didn't predict increases in mass correctly; from my point of view, the testability of his thesis with reference to mass is a defect). Therefore, the essence, the underlying cause, is meaningless for the scientist.

Given the contingent fact that motion is epistemologically relative, it follows that the more scrupulously the scientist adheres to the demands of his own method, the less he is interested in essence, the less meaningful essence is to him. Because whatever the essence is, it has no measurable, sensibly detectable, effects that would make a <u>difference</u> to scientific theory. The sensible facts the scientist adheres to are part of essence and result from essence. But the essence itself, which explains why motion is epistemologically relative, does not do so in a way that has any effect on scientific theory other than to <u>underly</u> the theory or the facts on which the theory is based.

There was (almost) no scientific way to test Lorenz's assertion that motion is absolute, and light and clocks slow down. This truth is not judgable by scientific fact (test) any more than is the principle of causality. That principle covers all possible sets of opposite scientific facts; hence it cannot be tested by the occurence of this one as opposed to that one. It is in this sense that philosophy is more general than science even if science makes universal assertions. Those assertions do not cover all possible states of affairs--at least not knowably (they are not knowably necessary truths in the way the principle of causality is). Since they are not knowably necessary, they need sensibly distinguishable facts to confirm them.

That is why Maritain can say that as science becomes more methodologically pure, it is not concerned with essence, but essence underlies the data of science. There is something about motion and about matter that makes light and clocks slow down and mass increase. Whatever that something is, it does not reveal itself in a way that allows us to know it the way intellectual acts reveal through reasoning the existence of a substantial form of a different kind from animals, and a substantial form capable of existing apart from matter, or the way that immanent action reveals a difference of substance.

What, for instance, does it mean to say the presence of ether slows down light? Pressure here is a metaphor (but see Asimov), a metaphor that cannot give pressure the same sense it has in science. We know the effect of this unknown essence (these unknown essences), but do not possess the necessary truths to work from effects back to the nature of the cause. Another example, mass changing the geometry of space-time. Why? We can't know. (Because mass is resistance to inertial changes and gravity is inertia?)

Since motion is epistemologically relative, a cause explaining absolute

motion is meaningless to scientific method and theory. Yet philosophically, we know motion is absolute and, hence, that light slows down. We know motion is absolute because either A is caused to move, or B, or both. But no scientific experience can tell which of these is true, so that fact is meaningless to scientific theory. Likewise, the relativity of length. Either one space ship shortened, or the other, or both. But which one really did is outside of the sphere of scientific fact, and hence of theory.

Again, philosophy is more general than science; philosophy covers all the possibilities--or at least a wider range of possibilities, not all possible worlds as such, but possibilities that are wider epistemologically since they are based on necessary truths known as such. There are other necessary truths unknown, e.g., the essence of ether, which are more general in the sense that they would be true no matter what specific test results occurred.

25862 Maybe an article on Maritain's philosophy of science is best done by showing how he corrects his predecessors, especially, Duhem and Meyerson.

81286 Tambasco didn't just say explanations stop somewhere; he said the constancy of the speed of light cannot be explained. And epistemologically that is true. But that just means the essence, e.g., of ether, is hidden from us.

3586 A way of showing how science uses <u>true</u> beings of reason. Assume there is something like Lorenz's ether that makes space-time coordinates come out as they are predicted to by Einstein'stheory. One prediction from the assumption of this ether, one deducible conclusion, is that the ether itself will be totally undetectable, hence non-existent as far as science is concerned. What exists for science, the totality of its reality, are

measurements of the coordinates of events, i.e., events objectified as bearing mathematical, quantitative, values. A maximally simple mathematical theory predicting those values must be true for the physicist.

The being of reason will not be internally contradictory and its existence will be contradictory only for reasons not accessible to the scientist himself. But by this theory we, in a sense, know the ether, i.e., we know how it works. And if the ether only works for special relativity, general relativity tells us how fields work without telling us the nature of the cause, i.e., how mass causes a change in the geometric relations of space-time coordinates. The scientist, however, doesn't even know the existence of the ether, know it as such, but he seems to know the existence of fields. Maritain would reply that there are all levels of beings of reason in science.

31286 The Lorenz solution is motivated by a desire to explain, a desire promted by an awareness of ontological realities, the ontological background of the sensible realities. The Einsteinian solution is motivated by a desire to explain, a desire prompted by an awareness of the epistemological nature of science's data and a deep-seated commitment to respect the epistemological nature of that data.

But why does light slow down when the source is in motion. Doesn't explanation stop there? Why is it more satisfying to stop here than to stop with Einstein? Because we at least know, by Lorenz's theory itself, that there can be no further explanation that is scientifically testable. That is worthwhile knowledge to have.

Where does explanation stop? At something, an entity, an ontologist would call a cause, i.e., something whose postulated nature would make it a cause,

e.g., an electron bearing a negative charge even if we don't know what electricity is. Stopping at such a cause is ontologically different from stopping at an epistemological fact like the measured constancy of the speed of light.

4186 I say science's explanation stops short of essence because it won't explain why light travels at the same speed for all observers, i.e., gives no ontological basis for the epistemological fact (but here epistemology refers to the results of physical experiments). But the reply is that explanation must stop somewhere. Even explanations concerning essence stop somewhere, namely, with the fact that an essence of that kind exists.

4386 Concerning the problem that explanation must stop somewhere, why not before essence? Yes, but we have ontological grounds for believing in absolute motion, simultaneity, spatial dimensions. Hence we know there are essences that science must refrain from seeking.

51486 Science forsakes looking for essences, but what are essences? I used the example of Lorenz's explanation of the absoluteness of light relative to all observers. On Einstein's theory, that absolutenss is completely unexplained. The objector replies that explanations must stop somewhere. But explanation stops not with a brute fact about an external relation between two distinct things (e.g., light and observes) but at postulations about the natures of things, postulations which explain, in terms of their inner structure and the relationships between their inner parts, their relations to external things.

Einstein deduces the constancy of light relative to observes from the postulation of the relativity of motion. But from the ontological point of

view, the (epistemological) relativity of motion is an effect of the constancy of light. So the relativity of motion is not a postulate explaining the constancy of light. The fact of the constancy of light explains the relativity of motion.

The relativity of motion is an epistemological fact. It says the laws of nature remain unchnaged. Laws govern relations between external things. The relativity of motion may be an unexplained fact, but it is not an unexplained explanatory fact (nor an ontological fact?)

8286 Explanations come to an end somewhere. Yes, but they can come to an end somewhere that is not capable of any further natural explanation, i.e., explanation other than the fact that God made things that way. Or at least they come to an end at a place which, as far as the evidence available to us shows, does not need any further natural explanation. E.g., at Dalton's time, there was no need to consider atoms divisible, i.e., no need to explain anything by going further than undivided atoms.

On the contrary, the unexplained fact of the observed constancy of light leaves us wondering how (in the make up of the natural order) God made things that way. Because the observed constancy of light = constancy in results of measurements = a contant effect, since observations are effects to be explained.

So the reasons why explanation comes to an end are causal, i.e., the explanation we arrive at describes the causes of observed events in a way that cannot have or does not causally need any further natural explanation.

31486 When Maritain talks about science using beings of reason when it tries to explain this (things?) geometrically, he is not talking about a preference for this method of explaining as if an alternative method were available in science. Within science, there is not alternative method of explanation to one that constructs hypotheses that are testable by differences in quantitative, measurable results. (Lorenz's method of explaining was - almost - not of this kind.)

The alternative method of explaining is no longer scientific but philosophical. What Maritain talks about there is the same thing he talks about when he talks about science giving up philosophical pretentions and not looking for essence. That is, he is talking about science become conscious of the necessary consequences of its epistemological nature and the epistemological facts about its data (i.e., motion is epistemologically relative). (2 sides to consider: (a) science's own nature as a mathematical discipline with quantitative data to explain; (b) the contingent fact that motion turns out to be epistemologically relative.) He is talking about scientists (science) being rigorous in conforming to the limits of its nature and its data. The use of beings of reason is just another aspect parallel to the aspect of purifying itself from philosophy in conforming to its nature and the nature of its data.

When the scientist says, 'I exclude essence, am not interested in essence', this amounts to saying, 'I am not interested in what will not be verifiable by differences in measurements'. 'So I need the matehmatically simplets explanation, one which will explain my measurements without postulating unmeasurable (indirectly measurable) entities'. Maritain says, 'You need beings of reason for that'.

If there is such a thing as essence, science is not interested in it whenever it is not testable by the sensibly distinguishable differences that constitute the data of science. Substantial essence (but what about accidental) is only knowable when distinguishable effects are not tracable to accidents recieved from an outside agent. Most sensibly distinguishable differences are not of that kind. Accidental essences are distinguishable by their necessary objects, their final causality, but what makes an essential difference in objects? E.g., between memory and imagination, hearing and sight, desire and knowledge, the common sense and the external senses, etc.?

314863 See Asimov, vol. II, pp. 60-61. As long as light is undifferentiated, light could be represented by a geometric line and geometric optics would do. Hence there would be no question of the nature of light; leave that to philosophy. But analysis of colors showed light to be differentiated; the question of the nature of light arises. Why? Because an explanation of sensibly distinguishable differences is needed. So get 'physical optics', not 'geometric optics'.

But with relativity 'physical optics' becomes geometric because geometry includes time through the use of beings of reason imposed by the underlying, hidden nature of light. The beings of reason are imposed by the fact that light appears to be of constant speed relative to all observes, the fact that the data available requires us to treat time and space as a continuum, and the fact that this requirement makes the geometric explanation (not just description) of light the simplest and even the only possible one.

The old geometric optics xplained certain behavior about light without explaining what it was that behaved in this way (e.g., waves or particles).

The new 'physical' optics is geometrical in another sense. It accounts for the nature of light in geometric terms. And it is unreasonable to believe there could be a simpler explanation than relativity, and we can know it is unreasonable to believe there could be a simpler explanation.

9885 Why aren't caloric fluid and phlogiston, etc., examples of beings of reason founded on the real? They are certainly beings of reason. Why do some beings of reason make good (i.e., true) science and others do not? Maritain's answer is that scientific theories are true as a whole; some beings of reason produce greater simplicity, more powerful predictiveness, more practical applications.

91385 One big difference between a 'caloric fluid' type of being of reason and a <u>mathematical</u> being of reason like the space-time continuum is that the mathematical being of reason can make a theory paragenerically 'true' in the sense of being more simple yet still explaining all the mathematical facts.

71821 Dormitive power objection is one that has little to respond to. It reflects the bare beginning of a long development, each step of which is causal. But at some point of development, we recognize that causality is subject to quantitative conditions. Then we describe things as events in space and time. Then we recognize we can include time in our quantitative description as a quantity along side of space. Then changes in <u>geometric</u> laws governing this continuum 'explain' causal relations. We are far from ontological causal relations here.

530831 Perhaps the relativist does not postulate the existence of the space-time continuum the way he postulates atoms or Newton postulated absolute

space. But in explaining variations in space-time measurements by changes in geometric laws governing relations between quantities, he treates space and time as if they were part of a continuum. He explains the variations as if they were variations in a continuum. To leave explanation there is to explain them as if the continuum were as real as are the measured relations themselves.

524831 In all mathematical science, not just relativity, the effects to be explained are described quantitatively, i.e., are variations in quantities that describe events. But quantitative variations are not explained quantitatively unless the variations are part of a single continuum so that the variations can be conceived as changes in the laws governing relations between measurements of different dimensions of the continuum.

57831 The being-of-reason aspect of relativity comes in as early as Minkowski's multiplying the time coordinate by the square root of negative 1 (so special relativity does not use beings of reason??). The time component is real, but making it part of a continuum with the space components is a being of reason. It is a physical fact that the time coordinates and the sapce coordinates vary proportionally. But to represent this fact by making them part of one space-time continuum requires the use of beings of reason. Once we do this, however, our explanation of physical fact is bound to consist of changes in the geometry of the space-time continuum, because physical facts are nothing but collections of space-time coodinates, i.e., nothing but events in space-time.

It is the being-of-reason trick that brings motion into mathematics. And we need mathematically expressible explanations that conform to the physical

facts of the space and time coordinates varying. Sincer there is no real space-time continuum, the physical facts cannot be explained by real quantity. Laws about real quantity cannot explain the facts. But a mathematically expressible explanation is needed since the facts to be explained are so expressed.

58831 Assume there really are two fields. That would not prevent us from finding some mathematical trick to represent them as one field. And on the basis of simplicity, we would confidently announce to the world that it had been shown that there is only one field.

What kind of trick? A trick (being of reason) like multiplying the time by an imaginery number to represent space and time coordinates as aspects of one continuum. If we can find such a trick to unify the field, then we as scientists must treat the field as one, and our explanations must treat the field as one. Similarly, before Minkowski and general relativity, it was true that if we could find a way to represent space and time in one continuum, then we must treat them that way. Why? Because events are nothing but space-time measurements for physics. There is nothing more to explain that space-time measurements.

But what about an explanation that would treat space and time as separate continua? Could they be so treated and still be explained? The physical fact is that their measurements vary in fixed ratios with one aother. Thus, any explanation that did not treat them as one continuum would be less simple than the relativity view.

The proof that one continuum is a being of reason is the fact that Einstein made them separate because time is not bi-directional as space is and the fact that, since MInkowski united them, people can talk about the possibility of

moving backward in time.

Back to fields. If we represent them as one, we represent different measurements, of gravity and electro-magnetism, as variations in one continuous quantity. And these measurements are space-time events just as are the explananda of relativity. We are explaining things mathematically expressed. And a being of reason gives us a simpler way of explaining that which is to be explained, a simpler way of viewing it. And there is nothing more to explain than the measurements that we can see as variations of one kind of quantity. An explanation that treats them differenctly would only be an unncessary complication. Nor would we have any access to the true explanation.

We can get the true explanation only by applying our necessary truths to the data. But the data are measurements, quantitative variations. These are more simply represented as one field, and in relativity the space-time measurements do vary in fixed ratios as the Minkowski mathematics represents it.

Also, necessary truths cover all possible states of affairs, not just the actual ones that must verify sciences laws. Ontological necessary truths, functions of being, cover all possible states of affairs. Necessary truths that express the causal relations entered into by a particular essence are true only in those universes where the essence exists.

81386 But what if I can unify the fields by postulating the previous existence of more dimensions. Why does simplicity at the level of fields justify multiplicity at the level of dimensions? It doesn't. The postulation of previous dimensions implies that at that time there would have been a

variety of measurements corresponding to the dimensions. It would be the existence of the multiplicity of measurable aspects that would justify the postulation of more dimensions, not the mere fact that it unifies the fields. Without a justification in terms of measurements to be included in theory, unifying the fields by multiplying dimensions would not reflect a valid use of simplicity. The validity of simplicity follows from the fact that known existence is the basis and goal of all explanation. That is something objective. Without that, unifying the fields by multiplying dimensions would reflect just a subjective, aesthetic desire for unity.

513831 If space and time form a continuum, or if the the time coordinate is included in the same continuum with the space coordinates, then a change in the 'geometry' of the continuum is all that is needed to explain events, and necessarily changes must be explained by changes in laws governing relations between abstracted quantities. Those laws govern relations among measurements of these quantities, how one measurement relates to others, and how one changes as other change.

And space-time events are nothing but complexes of space-time coordinates for bodies, i.e., space-time measurements. The apple is at these spatial coordinates at this time and at these other spatial coordinates at this other time. So space-time geometry explains gravitational events, and unified field events if the fields can be unified.

But do space and time form a continuum? If a mathematical being of reason can unite them into a continuum, they must be considered a continuum by mathematical physics. It is not a choice between that way of looking at them and some other. Why not? (Seeing them as a continuum simplifies the

matehmatical rules concerning them.) First, the physicist deals with measurements, quantities, and from the point of view of mathematics, imaginary numbers are just as legitimate as real numbers. So one way of looking at things is at least as legitimate as the other.

But seeing them as a continuum simplifies the mathematical laws, e.g., the pythagorean theorem now applies to space-time coordinates, not just to spatial relations. And the mathematical physicist has no physical reason for preferring a more complex explanation. For his data are quantities. And from the point of view of the mathematical representation of quantities, imaginary numbers are just a valid as real numbers. So simplicity must rul, must decide the issue.

Further, viewing them as a continuum simplifies physical explanation. And the physicist qua physicist (as opposed to the philosopher) has no justification for a more complex explanation. It simplifies physical explanation because with time included in the continuum change is included. And now change is explained just by change in the abstract geometric laws of the continuum, as if the continuum were an entity for the physicist since it explains. And there cannot (necessarily cannot) be any evidence for a more complex explanation since evidence consists of mathematically expressed quantities which, by hypothesis, can be united in one continuum. So if the fields can be matehmatically united, physical explanation must treat them as one.

514831 Maritain says science uses beings of reason when it tries to explain things geometrically? Why does it try to explain things geometrically? Once it makes time part of the geometric continuum, science has no choice but to

explain geometrically since that which is to be explained = variations in the four-dimensional continuum; that's all. So trying to explain geometrically = making time coordinates part of the continuum, i.e., describing the facts to be explained in a way that calls for a geometric explanation.

What other examples of beings of reason are there? The particle/wave theory described in vol. 3 of Asimov; cf. Asimov in vol. 2 on the magnetic field, also. See Maritain's discussion of different models for the atom. See Hesse in the Encyclopedia of Philosophy of Fields, i.e., discontinuous fields. Indeterminacy and probability physics may involve beings of reason.

Proof that including time in the continuum makes the continuum a being of reason: the simultaneity problem (but this occurred before Minkowski), unidirectionality of time as opposed to the physicist speculating on time travel.

411821 The author of 'General Relativity from A to B' says somewhere that he knowns no other way to look at nature other than in terms of events in space-time. There is another way, the ontological way. It is different from the space-time way. Why? How show they are really, not just apparently, different? They lead to contradictory results about simultaneity. The space-time way of looking apparently leads, inexorably, to a denial of simultaneity. The ontological way shows that necessarily there is simultaneity. So not only two ways of looking, but 2 assymetrical ways; the assymetry is necessary, irrevocable.

Get the same result starting from causality. So cannot expect to interpret the elements of one theory in terms of another. Cannot map one on to the other. Another example, science speculating about time travel = a non-

ontological viewpoint. The present is defined as that phase of time which exists. But the mathematical viewpoint is indifferent to existence.

82382 Einstein's explanation of gravity by changes in the metric of space-time leaves nothing to be desired from the point of view of the description of physical events by quantitative values, quantitative word-functions, the point of view of the mathematical description of physical events, of quantitative relations between physical events, the point of view of permitting the mathematical deduction of quantitative relations between physical events.

But understanding the curvature of the space-time continuum as the physical cause of these events makes the space-time continuum into an entity, a fictitious entity.

57831 Mathematics objectifies quantitative relations, not causal relations. So causality is at two removes in science: (1) causally opaque empirical word-functions; (2) mathematics getting at causality only indirectly. Quantity is only a condition associated with the active and passive properties of bodies. And mathematics studies quantity.

Correction, Chap 9 It is not that einsteinian space-times are beings of reason, but explaining gravity by the curved geometry of space-time uses a being of reason (a being of reason as measured by the standard of ontological analysis)--but a being of reason that is in no sense arbitrary.

122841 An example of the use of mathematical beings of reason in science: fields extending to infinity because the algorithm describing the strength of the field has a result that can never reach zero.

3828 The quantity expressed mathematically is an accident of the force; hence the fact that the quantity seems to go on forever does not mean

the force goes on forever (if the substance was finite to begin with.)

Why does mathematics use beings of reason? 2 in the abstract does not exist, only 2 X's or Y's. When talking about 2 + 2 =, mathematics does not consider two as a possible existent but merely as the term of a relation of causality, equality, or order. Two things can exist. But once we have abstracted these relations of causality, equality and order, we can construct other non-existent objects by defining them as terms of such abstract relations: negative numbers, even rational and irrational numbers. As so defined, they function just as well in mathematical formulas as do integers, because mathematics does not worry that its original objects are capable of real existence. Their capacity for real existence is important for the psychological genesis of mathematics, but not for its methods of verification. Once we have acquired the needed relations by abstraction, any object terminating the relation is as valid for math as is its original objects. 111283 Note that Minkowski's move is purely mathematical, i.e., the result of one formula subtracting the time coordinate is the same as that of a formula multiplying the time coordinate by negative 1 and then adding it. This equality of quantities has nothing to do with postulating entities, for it is not yet physics. So this is a different kind of being of reason from postulating causal entities (maybe it becomes the latter in general relativity).

And the fact that the interval is absolute through rotation of axes does not itself show that time can be represented as part of the same continuum with space, because of the uni-directionality of time. But Minkowski's move does show this. Hence change is space-time coordinates is the same as, identical with, a change in the laws of the continuum, the geometric laws of a

continuum as represented by Minkowski's formula. Maybe explaining gravity this way does not postulate an entity as much as it refrains from asserting the existence of the true causal relations. It postulates the effect, changes of laws, not the cause.

Rity What does Maritain mean by saying beings of reason are necessary. One thing that is necessary is that science cannot know causes ontologically and dianoetically. So science necessarily falls short of that. Also, science will necessarily be more simple than the true picture if science is excluded from data that is there, e.g., in indeterminacy. And where mathematics can simplify further, it must appear true to science.

101382 'What is intrinsic to space-time?' (Geroch). (1) Space-time descriptions are extrinsic denominations. (2) The interval is only epistemologically intrinsic; is is that wich all observers agree on due to the physical and quantitative conditions governing all observation. (3) The measurement of the interval, the actual numbers you get, are an effect of those physical conditions.

How do we get from knowledge of those effects to their causes? Motion must be represented as indifferent to its causes. Still, that does not contradict ontological causality. But what about indifference of whether the cause is gravity, i.e., granted inertia and gravity, whatever they are, are the same. Still a system that insists on representing matters (the cause) as if the cause could be acting on A, B, or on both indifferently, that system cannot reveal the ontological nature of the cause but only, to the extent that the system is indifferent, a being of reason substituting for the true ontological cause.

1010821 Einstein seems to be using the same kind of matehmatical abstraction Aquinas talks about in his commentary of the Physics' discussion of the continuum. (Cf. the two books by Vincent Smith; and Phillips Modern Thomistic Philosophy). Einstein sees that measurements are events subject to quantitative conditions; quantity = extension and time. The quantitative conditions, as material causes, make it necessary that measurements of the same events differ if the events of measuring take place in motion relative to one another. (But events are not in motion relative to one another; bodies are. Here something new enters, not an event but a body.)

Does the change in length, etc., relative to the entire universe follow just from material causality? No, efficient causality is implicit since motion is present. Events of measurement are subject to quantitative conditions. Those quantitative condtions must be representable by rotating the axes. Hence... = Physical epistemology = primacy of the interval in physical measurement follows from physical quantitative conditions of measurement.

72811 Relations between the quantities resulting from physical measurements do change (rotating clock example). But to go from there to the theory that the geometry of space-time changes and hence the motions of bodies change is to postulate space-time as a causal entity?

Why isn't it an entity. Not just a mathematical entity but a field. Not the 'unified field' but the gravitational field. But then what are those things that occupy the field?

730821 Gravity causes relative acceleration; relative acceleration causes the relations between physical measurements to be non-Euclidean. (Rotating clock

example). Einstein seems to have it the other way around. The change in the geometry of space-time, i.e, mathematical relations between the results of physical measurements, cause gravitational motion; that is, the world line curves. But for physics, the change in geometry is all that counts because, of necessity, its method makes motion into a world line governed by abstract mathematical laws.

Ontologically, there is an absolute time (and hence absolute dimensions in space; the size of a body increases or decreases, but it is always something). Insofar as relative spaces and times are asserted to exist, relativity uses beings of reason. But all it asserts to exist are the events of measurements which are relative (though characterized by the interval which is not). But insofar as it excludes absolute times and spaces, relativity uses beings of reason.

Why must it? Because its theory must conform to the facts as it is epistemologically capable of knowing them. And epistemologically, there are no absolute times and spaces for physics. Given the epistemological facts, it follows that science's explanation must take a certain form, the form of explaining by a change in mathematical laws governing relations between the results of measurements. And since geometry now includes time, as it must for relativity, geometry now explains motion.

Time must be included because the measurement of spatial dimensions varies with relative motion and the time parameter, unlike Newton, varies with relative motion.

The same epistemological facts that impose beings of reason on relativity also exclude the ontological cause of gravity, make the ontological cause of

gravity meaningless to physics. In a sense relativity must even deny the real cause, contradict it, if it denies absolute space and time and if it must necessarily treate events as if part of a space-time continuum.

Minkowski's imaginary number makes general relativity possible, so a being of reason makes general relativity possible.

Physics incorporates the conditions necessary to measure an event (objectify it) into the description of the event, i.e., an event is just a numbered space-time coincidence.

The space-time continuum is what is <u>real</u> for physics (even without Minkowski?) in the sense that only the space-time interval is an absolute quantity. But to go from this absolute <u>result of measurement</u> to there <u>is</u> a space-time continuum is a non-sequitur philosophically, although necessary for physical theory if that is all that is real (absolute) for science.

Einstein defines time by how it is known (objectified). He doesn't define time but defines the results of our attempts to objectify time, i.e., defines time by our <u>means</u> of objectifying time, defines by means, not end. (Likewise, Wittgentsein says a meter stick has no length. Length is what the meter stick measures. But length doesn't come into existence when we use the meter stick, only a particular way of objectifying length comes into existence. Wittgenstein confuses a method of objectifying with that which is objectified.)

Epistemologically, gravity and inertial acceleration are the same. Therefore, scientific theory must treat them as the same. There must be one explanation covering their epistemologically common aspects. And the explanation will work because, by epistemological necessity, no observation

can contradict it. Again, a necessary being of reason.

413821 In practive, we are not indifferent to what us the cause and what the effect. The heart pumps blood, not vice versa. But the mathematical concepts we bring to our scientific understanding of these causal relations are, of necessity, causally neutral. The distance between A and B decreases. Is a cause acting on A, on B, on both, or on the matter between them? The anwer to this causal question makes no difference to the mathematical relations.

So the concepts used to construct scientific theories of what are really ontological causal relations are beings of reason from the very beginning. Yes, a unified entity corresponding to the name 'atom' exists; but what it is is a being of reason. Does a univfied entity corresponding to the name 'space-time continuum' exist? No, because of the ontological dissymetry between space and time, i.e., the past and the future do not exist.

726821 Geroch (General Relativity from A to B) gives the being-of-reason aspect of relativity away when he asks what is intrinsic to space-time. This makes space-time a thing. And he especially gives it away in making that question the central question for physics to answer. Instead, ask what is intrinsic to events in space-time, to events related spatially and temporally, or what is intrinsic to the spactial and temporal relations between events. Answer: what is intrinsic to events are the <u>things</u> that enter into them, things with absolute dimensions and motions.

81821 In a gravitational field or an accelerating field, the geometric relations between the results of measurements change. Of necessity, the physicist must take this as explaining gravitational motion. Why? Because (1) all he deals with are the measurements of space-time relations between events. That's all that exists for him, not just events, but events

characterized by the four space-time coordinates. So (2) he must consider space-time to be one continuum because only the space-time interval between events is absolute, i.e., independent of coordinate systems.

(2) = we must include time in the quantity to which we apply our metric. (1) all we have are quantitative relations; (2) these change with acceleration; (3) time one of the quantitative measurements; (4) relations of time measurements change with acceleration also; (5) there are no other changes for the physicist than those described by the changes in the metric for these 4 quantities. Gravitational motion is nothing more than a change in relations between measurements.

12080 The explanation of gravity and field phenomena by change in geometric laws is imposed by the fact that science describes the effects to be explained mathematically. For special relativity shows something not hitherto seen but necessary. The results of measuring spatial dimensions is dependent on relative motion, but relative motion is measured by time coordinates. Likewise, the results of measuring time coordinates is dependent on relative motion, so time coordinates cannot be assumed as absolute and left our of further consideration.

So descriptions of events must take time as a dimension along with spatial dimensions in a four-dimensional continuum. But geometric laws can describe this continuum. And when geometric laws describe how relations between events in this continnum change, these events are explained as far as their quantitative relations are concerned; thus, the behavior of bodies is explained as far as the quantitative properties of that behavior are concerned.

4679 The events explained by sceince are the occurence of certain measurements. And physical causal laws make absolute measurements of time and distance impossible. Einstein grasped necessary causal laws making such events impossible in science. "Measurement is essentially relational."

119796 Minkowski's rotating axes show that some shortening must take place; is this change in length a change in measurement only? Asimov says so. The shortening of the space ship relative to the universe and the slowing of its clocks are not beings of reason. What is a being of reason is an explanation of the space ship's motion that makes it a matter of indifference whether the space ship or the universe is in motion.

From quantitative relations, physical facts follow: circles rotate more easily than squares; triangles offer more resistance to change of shape, ceteris paribus than do rectangles, times and lengths change for systems of reference in uniform motion. The last example brings in time as a quantity. If they appear to change, that appearance is itself a physical fact, i.e., the measurements producing different results are physical events, the kind of event physics deals with, measurements. The question of whether the thing measured really changes dimensions only comes up in general relativity, where more than a shifting frame of reference is involved.

1111791 General relativity--the ship turning around and returning. Assume the lengthening of time follows a priori in Minkowski fashion and that the general relativity theory of gravity just translates this a priori fact. Still the theory is a being of reason. For the a priori drawing of conclusions that can be verified in experience only means that genuine physical causes operate is space-time according to certain quantitative conditions such that certain

quantitative descriptions must be true of their effects.

Thus a certain force acting on a sphere or cylinder must make it roll; the same force on a cube must make it slide. A force can change the shape of a trinagle only by lengthening the sides or breaking their contact. Times over different distances, etc.

Still, by constructing a theory without absolute motion, the theory leaves out to that extent the specific causes which act according to these quantitative conditions. Hence the theory is a being of reason.

42792 If relativity isn't 'true' or uses 'fictions', why does it work? It works not only for the already-known but also predicts the unknown. It works because in a sense it is true; objects in space time do behave that way; there is nothing fictional or false about that. The fiction comes in when we built the <u>effect</u> into our theory as the cause by making geometric laws the cause (but does it really do that?).

After all, space is still Euclidean in the sense that for something that could pass through physical surfaces, did not have to obey the physical (not mathematical) law of not passing through surfaces, the shortest distance it would have to travel between two points would still be a Euclidean straight line. A Euclidean straight line is not the shortest distance on a surface. Rather, a plane surface is <u>defined</u> by the intersection of two such straight lines.

To build non-Euclidean geometry into explanatory principles is simply to arrange it so that an <u>effect</u> that could be described on the Euclidean model can be arrived at by <u>deduction</u> from geometric principles, an effect which could not be so deduced if the geometry were Euclidean.

33179 The proof of Einstein reading ontological implications into epistemological facts was his inability to accept indeterminacy just as an epistemological necessity.

31279 Does Einstein's theory result from a geometrizing of physical reality? (And does Maritain say or imply that it does? Maybe he only says geometrizing results from being more faithful to epistemological constraints.) Maybe. But Einstein had the idea of space-time before he had a metric with which to measure it. Four-dimensional geometry provided a method of measuring. But is it not an epistemological fallacy (not to mention a U-turn) to attribute to that which is measured, physical reality, properties of the method of measuring, the metric by which it is measured, whether three- or four-dimensional reality?

123079 Why must time be included as a geometric dimension? Because spatial measurements turn out not to be independent of time and because time measurements are not independent of the motions of bodies.

111679 DOK. p. 170: The geometric properties of space-time are themselves modified by the matter that occupies it. What are expressed by geometric laws? Geometric properties.

4279 The theory that is more complex than necessary will call for changes to occur that will not be observed. Since they are not observed, there is no reason to believe the more complex theory. Does relativity disprove this? Observation of change is relative; maybe it is the more complex change that is taking place so far as observation is concerned (for example the earth not turning on its axis, but the universe turning around it.) I want to say there is no reason to believe the earth does not turn on its axis, because this is

by far the simpler explanation. The other explanation calls for billions of more motions and the causal relations necessary to explain them.

Maybe simplicity only works for kinds of causal relations. If the most simple theory, in terms of kinds of causal relations, permits either interpretation of the facts (few motions, many motions), simplicity can no longer help us decide, for observation can no longer help us decide. Simplicity presupposes that observation can help determine the number of changes occurring. Can't observation, however, tell us whether there is enough energy for the unvierse to be spinning around the earth? Energy = causal relations.

41798 Simplicity could reject relativity only if there were an equally simple theory giving more simple experimental results. But Einstein shows absolute motion cannot have any experimental significance. So a theory postulating absolute motion (e.g., Lorenz) adds something to relativity that has no experimental significance. It is a uselessly more complex theory.

121797 All that science has to explain are relations of quantitative variations such that one quantity varies with another. When time is included, that amounts to explaining how one spatial-temporal quantity varies with another in a four-dimensional continuum. That is all the effects science explains are. So a theory explaining any more is superfluous. And to explain this is to explain laws relating variations in quantities, continuous quantities. Such laws are laws of physical geometry, experimental geometry, laws of how physically measurable dimensions really relate. So the reason the theory explains geometrically is that this is all the effect is for science. The change of geometric laws, changes in laws governing physically measurable

amounts, is in the effect and is to be explained there.

Effect = variation is spatial coordinates from one time coordinate to another. And since absolute motion is left out, laws are quantitative to the exclusion of ontological causality.

81886 The important point about including time is that time is now included as a variable whose variation depends on the frame of reference, i.e., the amount of time between the same two events varies with the frame of reference just as the distance between two things varies when they move relative to one another.

121794 The Euclidean or non-Euclidean character of experimental space depends on physical causal factors governing experiments. Those factors imply that the laws expressing teh spatial-temporal relations between events change in the presence of mass. So geometrization of physics, explanation by change in geometric laws. is absolutely and physically necessary. And the ontologist must recognize this as a being of reason insofar as causality is abstracted from.

show by their behaviour that they relate to sensed objects as more than objects. A sheep does not flee from a wolf simply as an unpleasant object of sight, an ugly object or one that it hurts the sheep to look at. If so, the sheep would not have to flee from the wolf. To avoid the wolf as an object of sight, the sheep would merely have to look in a different direction. It is the existence of the wolf, not distinguihsable from other characteristics by the senses but presented to the senses by means such sensory characteristics, that causes the sheep to flee.

1. Reference.

2. Maritain recognizes the existence of modes of consciousness not describable by the subject-object polarity. But these modes exist secondarily and in dependence on the prior awareness of objects on the part of the subject, especially in sensation.

3. Both Maritain and Aquinas affirm the existence of an implicit self-awareness in any direct awareness of the other. And Causal Realism shows how the thing/object distinction can be made

independent of the "act-object" analysis of consciousness.

4. Give a reference and perhaps use the footnote to make some remarks that would otherwise have to go in, and lengthen, the text.

5. Cite Introduction to Philosophy, epistemology deals with final causes. Maybe use this footnote to explain why philosophy is critical.

6. My emphasis.

7. Quote Gilson that he does not disagree with Maritain's views on common sense. But add that Maritain attributes his views to Aquinas, i.e., Maritain claims that the views he very precisely defines concerning "common sense" can be found scattered in Aquinas.

8. Notice the "resemblance" between the resemblance theory Maritain rejects and Wittgenstein's picture theory of truth. Of course, there is much more to the picture theory, but the problems the picture theory inevitably got into are basically the same as the problems that Maritain's solution to the problems of correspondence overcome.

9. Maritain defines the logical as the order of the "known as known," i.e., of what belongs to objects as objects.